27 Apr 2020 (Mon) David Liu

Synopsis of Albert Einstein (14 Mar 1879 – 18 Apr 1955, aged 76)
After reading (April 2020) of the biography 'Einstein, His Life and Universe' (Genius) by Walter Isaacson
(Simon & Schuster @2007, paper edition April 2017)

[E = mc2, bending of light beams, warping of space, fabric of (4D) spacetime (Def. of Gravity)]
[from a childhood encounter with compass to a lifelong devotion to field theories as a way to describe nature / universe] (pg 13)

DRAFT describtion of Universe (after comprehensive reading the Einstein):

> "An invarint perpetual 'cosmic dance' within (and upon) a curvature of spacetime fabric,
> in and on which gravitational fields exist, and all things (light, radiation, stars, blackholes, matters) are covariants – a system of covariance* within the invariant universe – are subjects of its graitational pull;
> and time would be dilated to zero (stand still), (where all things could/would exist 'as light' and move in speed of light even, in a state of eternity).
> A sharply curved 4D structure, a close system, finite, growing and expanding, but with no boundaries.**
> "In it, the force that move electrons in the eclipses about the nuclei of atoms, is the same force that moves our Earth in its annual course around the Sun (page 342)."
>
> "The Curve spacetime tells Matter how to move; Matter tell spacetime how to curve." (~ John Wheeler)
> "A cosmic tango of spacetime, energy and matter." (~ Brian Greence)

**[天衣无逢］ Heaven liken as VEIL as garment; 'the sky receded as a scroll' in Revelation 6:14 & 16:20 in the Bible.

* Covariant, meaning that all forms of accelerated and nonuniform motion are relative (213). Truly covariant, a theory that incorporated all forms of motion, whetehr it be inertial, accelerated, rotational, or arbitrary. (220)

Headings	Extracts	Scriptures Reference observed (David)/ Practical Relevance
Q. (his Quest, Vision, Reality -- QVR)	Unifying Theory (3)(of all field theories: electric, magnetic, electromagnectic, gravitational, light, quantum mechanics, etc) (13, 15) to be expressed in mathematical melodies and harmony… in beauty and simplicity (purity)…) "quest for invariants, certainties, and absolutes" "goal of science was to discover the laws of the universe" ',… field equations (in the hope) that they would form the basis for a theory of everything' (the great mystery)** (193) [the laws that govern the gravitational field and everthing else] (Math was nature's playbook) (148) His life was a constant quest for unifying theories. [moving coil vs moving magnet → special theory of relativity (no way to tell who was in motion and who was at rest); [def . IM and GM → equivalence principle → Gen theory of Rel. (no way to tell who was accelerating and who was in a gravitational field); (156) [combining particle theory with wave theory of light] (94) "Is the universe made up of particles, such as atoms and electrons? OR "Is it an unbroken continum (like field) as a gratitional field or electromagnectic field seems to be? AND "If both methods of describing things are valid at times, what happen when they intersect?" (101) "… What are light quanta ? " "all these fifty years of pondering have not brought me any closer to	Unifying Theology (440) "I discovered that nature was constructed in a wonderful way and our TASK is **to find out the "MATHEMATICAL STRUCTURE of the NATURE** itself." (his words to Henry Rosso, a 15-year-old student in Princeton High School who interviewed him) The Field Equation of Gravitation (mathemitical expression) was guided by his classmate and friend Marcel Grossmann (1878 – 1936)

	ansering the question… (99) [perplexing, pesky mysterious, madening quirk in the cosmos .. existed (a physical reality) even when light was moving through a vacuum. (111) [and theor speed of 186,000 miles/second was a speed relative to what?]	
	(82, 92) … to describe … to define … 'the field' * (concept of the field) ■ i.e. for a concept to make sense you need an operational definition of it, one that describes how you would observe the concept in operation	COE approach of Einstein: Concept - > Observation - > point to Experience
P. (his Perception, Belief, Conviction -- PBC)	(19) "out yonder there was this huge worls, which exists independently of us human beings and which stands before us like a great, eternal riddle." ** AE wrote as a young boy.	
	(2) Faith in "harmony of nature's handiwork"; (4) In a God who would not play dice by allowing things to happen by chance.	
	(3, 169) "an underlying (harmonious) REALITY (the laws of the universe) existed in nature that was independent of our ability to observe or measure it."	
	Music (Mozart's sonatas) "Mozart's music is so pure and beuatiful that I see it as a reflection of the inner beauty of the universe itself," "like all great beauty, his music was pure and simplicity."	

	(37) Music was a connection: to the harmony underlying the universe… and to other people who felt comfortable bonding with… he was awed in music and in physics, by the beauty of harmonies. (38) Mozart and Bach music to him seem "deterministic" (clear architectural structure, like his own favourite sicentific theories) Mozart's music is so pure it seems to have been ever-present in the universe.	
	(198) Mathematical formalism (after his triumphant formulation of the Field Equation of Gravitation in Nov 1915, onward) (352) ".. in believing that nature is the realization of the simplest conceivable mathematical ideas." (Oxford lecture, June 1933) It echoed Newton's declaration: "Nature is pleases with simplicity." (7) Math (and physics) is the language NATURE uses to describe her wonders* *(magnectic fields, gravity, inertia, acceleration, light beams) (15) "we never cease to stand like curious children before the great mystery** into which we were born." (18) "I became more and more convinced that NATURE could be understood as a relatively simple mathematical structure." (352) I am convinced that we can discover (the universe, the way God would make the universe) by means of purely mathematical cosntructions the concepts and the laws connecting them with each other. (353) the mathematical equations of field theories were the best way to grasp "reality"	

	Although this had not worked at the subatomic level, he admitted. (353) this was not the final word. I still believe in the possibility of a model of reality – a theory that represents things themselves and not merely the probability of their occurrence."	**This unifeid model of reality which eluded Einstein, is, you know the answer ?** **Jesus.** **(Col. 1:16-18)** **(Eph. 1:19-23)** **(Heb 2:10; Heb 1:2-3)** **(John 1:2)**
	Field Concept: (538) "Physics should be based on field concept, i.e. on continuous structures." "If field theory turned out to be unable to account for particles and quantum mechanics, in that case, nothing remains of my entire castle in the air, gravitation theory included." "Eisntein has the philosophical prejudice that a state, termed 'real', can be defined objectively under any circumstances, that is without specification of the experimental arrangement used to examine the system." (wrote Pauli to Max Born) "There was a reality, he insisted, that was independent of how we observed it."	

	(539) "one should not decist from pursuing to the end the path of the relativistic field theory."	
	(6) Independence of character and judgment. (423) Freedom & Solitude "If we want to resist the powers that threaten and suppress intellectual and individual freedom, we must be clear what is at stake. " "Without such freedom there would have been no Shalespeare, no Goethe, no Newton, no Faraday, no Pasteur, no Lister." Freedom was a foundation for creativity. (424) "The monotony of a quiet lofe stimulates the creative mind." ["scientists might be employed as lighthouse keeper so they could "devote themselves undisturbed" to thinking." (432) "What make the new arrical devoted to this country is the democratic trait among the people. No one humble himself before anotehr person or class. The lack of stiffling traditions encouraged more creativity of the sort. "American youth has the good fortune not to have its outlook troubled by outworn traditions."	
	(81, 82) 'Causality' (influenced by David Hume (1711 – 1776), Scottish sciencetist-phylospher) ■ skeptical about any knowledge other than what could be directly perceived by the senses. Even the apparent laws of causality were suspect to him, mere habit of the mind; … ■ Hume saw certain concepts cannot be deduced from our	This great influce on Einstein would caused him to later 'denied' (refused to accept) the phenomena observed in the "quantum mechanics' (David)

	perceptions of experience by logical methods." ■ Sometimes called 'positivism', denied the validity of any concepts that went beyond descriptions of phenomena that we directly experience. (91) 'strict causality' ■ Einstein admired 'strict causality' calling it "the profoundest character of Newton's teaching."	
	(83, 131, 252, 164)) 'skeptivism' (influenced by Ernst Mach (1838 – 1916), Austrian physicist-philosopher) ■ "Concepts have meaning only if we can point to objects to which they refer and to the rules by which they are assigned to these objects." ■ i.e. for a concept to make sense you need an operational definition of it, one that describes how you would observe the concept in operation ■ "we must discard concepts that "have no link with experience ," such as "absolute simultaneity" and "absolute speed." ■ Railed against postulating things that could not possibly be observed. ■ By 1911, at 32, Einstein began edging away from Mach's skeptism about theories of reality not built on directly observable data. After Mach's partial accpetance of his hypothesis on the reality of atoms. ■	Mach would call 'absolute time' and 'absolute space' of Newton's concepts monstrous; purely a thought-thing which cannot be pointed to in experience. It was the beginning of an important conversion. [Einstein, would eventually pursue concepts that "have no link with experience"]
	(84), 20) **'amorphous God'** ■ "he did, retain from his childhood religious phase a profound reverence for the harmony and beauty of what he called the mind of God as it was expressed in the creation of the universe and the	

	laws. (386, 387) “Do you believe in God?” “I am not an atheist. The problem involved is too vast for our limited minds. We are in the position of a little child entering a huge library filled with books in many languages. Thi child knows someone must have written those books. It does not know how. The child dimly suspects a mysterious order in the arrangement of the books but doesn't know what it is. That, it seems to me, is the attitude of even the most intelligent human being toward God. We see the universe marvously arranged and obeying certain laws but only dimly understand these laws.” He answerd. “Is this a Jewish concept of God?” “I am a determinist. I do not believe in free will. Jewish believe in free will. They believed that man shapes his own life. I reject that doctrine. In that respect, I am not a Jew. He answerd. (387) “Is this Spinoza’s God?” (20, 84) (influenced by Baruch Spinoza (1632 – 1677), Jewish philospher from Amsterdam) ■ Spinoza’s pan-theism concept of amorphous God reflected in the awe-inspiring beauty, rationality, and unity of nature’s laws. ■ Did not believe in a personal God who rewarded and punished and intervened in our daily lives; but believed soul and body as one, and not two separate things ■ “through the reading of popular scientific books, I soon reached the conviction that much in the stories of the Bible could not be true.” (sad : ..)	

	"Do you believe in immortality?" "No. And one life is enough for me." In his 1930 **"What I believe"** credo, a conclusion he wrote: "the most beautiful emotion we can experience is the mysterious. It is the fundamental emotion that stands at the cradle of all true art and science. He to whom this emotion is a stranger, who can no longer wonder and stand rapt in awe, is as good as dead. A snuffed-out candle. To sense that behind anything that can be experienced there is something that our mind cannot grasp, whose beauty and sublimity reaches us only indirectly: this is religiousness. In this sense, and in this sense alone, I am a devout religious man." (390) "The cosmic religious feeling," he said, "is the strongest and noblest motive for scientific research." (387, 388) "I cannot conceive of a personal God who would directly influence the actions of individuals or would sit in judgment on creatures of his own creation." (388) "Do you believe in God?" asked by a Orthodox Jewish leader in NY, Rabbi Herbert S. Goldstein. (Answer in 50 words) **"I believe in Spinoza's God, who reveals himself in the lawful harmony of all that exists, but not a God who concerns himself with the fate and the doings of mankind**." He answered. (243) "Dissenter" (1917-1918)	Note: The things that you are exposed to in your 'youth' season have great hold and impacts on you. Col. 1:21 "and you, who once were alienated and **enemies in your mind** by **wicked works**, yet now

	"Mosaic" (391) '**determinism**' : ■ a sense that the laws of nature, once we could fathom them, decreed immutable causes and effects, and that "God did not play dice" by allowing any events to be random or undetermined. ■ "all things are determined by the necessity of divine nature" (Spinoza) In his 1930 **"What I believe"** credo, a maxim he wrote: "I do not at all believe in free will in the philosophical sense. Everybody acts not only under external compulsion but also in accordance with inner necessity. Schopenhauer's saying, "A man can do as he wills, but not will as he wills," has been a real inspiration to me **since my youth**; it has been a continual consolation in the face of life's hardships, my own and others', and an unfailing wellspring of tolearance." (391, 392) When he was asked, that humans are free agents? "No, I am a determinist," he replied. "Everthing is determined, the beginning as well as the end, by forces over which we have no control. It is determined for insect as well as for the star. Human beings, vegetables, or cosmic dust, we all dance to a mysterious tune, intoned in the distance by an invisible player."** Einstein conceded that quantum mechanics called into question strict determinism, but he still believed in it (in determinism), both in the real of personal actions and physics.	He has reconcilded." For Max Born, quantum uncertainty provided an escape from the dilemma. He lacthed on the indeterminacy that was inherent in quantum mechanics to resolve "the discrepancy between ethical freedom and strict natural laws." Eisnstein belief in 'strict natural laws' failed him to progress in pursuing further in the science of Quantum Mecahnics, that was propounded further by Niels Bohr and his studends.

	(387) "I am a determinist. I do not believe in free will. Jewish believe in free will. They believed that man shapes his own life. I reject that doctrine. In that respect, I am not a Jew. Later in his explanation of the relationship between science and religion at a conference topic at the Union Theologycal Conference in New York: "The realm of science was to ascertain what was the case, but not evaluate human thoughts and actions about what should be the case. Religion had the reverse mandate. Sceicne can be created only by those who are thoroughly imbued with the aspiration toward truth and understanding. This source of feeling, however, springs from the sphere of religion. ** (390) "The cosmic religious feeling," he said, "is the strongest and noblest motive for scientific research." (390) The situation maybe expressed by an image: "science without religion is lame, religion wihout sceince is blind."	Science is 'amoral' - without attaching moral values to how things works. Not what is right and wrong morally speaking. "The beauty of his faith, was that it infomred and inspired, rather than conflicted with his scientific work."
	Science: (385) "the highest satisfaction of a scientific person, is to come to the realization "that God Himself could not have arranged these connections any other way than that which does exist, any more than it would have been in His power to make four a prime number." He wrote. (388) "Do scientists pray?"	Einstein seemed to suggest there is a limit to what God could/should or should not do to Nature (Creation). That led to Niels Bohr rebukeing him in one of their debate in

	"Scientific research is based on the idea that everything that takes place is determined by laws of nature (Determism!) and this holds for the actions of people." For this reason, a scientist will hardly be inclided to believe that events could be influenced by a prayer, i.e. by a wish addressed to a supernatural Being." That did not mean, however, there was no Almighty, no spirit larger than ourselves. "Everone who is seriously involved in the pursuit of science becomes convinced that "a spirit" (a SPIRIT) is manifest in the laws of the Universe --- a spirit vastly superior to that of man, and one in the face of which we with our modest powers must feel humble. In this wasy the pursuit of science leads to a religios feeling of a special sort, whci is indeed quite different from the religiosity of someone more naïve." (374) "During war, it gave people "the means to poison and mutilate one another," and in peace time "it has made our lives hurried and uncertain." Instead of being a lierating force, "it has enslaved men to machines" by making them work "longer worrisome hours mostly without joy in their labor." Concern for making life better for ordinary humans must be the chief object of science. Never forget this when you are pondering over your diagrams and equations."	Solvay Conference in 1930. "Eisntein, do not tell God what to do." (391) "the main source of the present-day conflict between the sphere of religion and of science lies in the concept of personal God." E said. Scientists aim to uncover immutable laws that govern reality, and in doing so they must reject the notion that divine will, or for that matter human will, plays a role that would violate this cosmic causality."
	Invariant: (131, 132) Theory of relativity does not mean that "everything is relative." It does not mean that everything is subjective. (278) Instead, it means the measurements of time, inclduing duration (time) and simultaneity, can be relative, depending on the motion of the observer. So can the measurements of space (distance and length).	Einstein briedfly called his Special Relativity theory as Invariance Theory. But the name did not take hold. Max Planck used the term Relativtheory in

	But there is a union of the two, which we call spacetime, and that remains INVARIANT in all inertial frames. And, the speed of light that remain INVARIANT. That, measurements of space (distance) and of time, that remains INVARIANT (d = c x t), whatever your frame of reference. Note: *(277) Isaac Newton's laws of motions and space and time was based on 'absolute certainties', absolute time, absolute space (and existence of ether). Einstein's "Relativity theory" (which he actually wanted to call "Invariant theory" was misconstrued by society, as it was built on the notion of "no abosolute space, no absolute time" but to view space and time dependent on frames of reference. This misperception (of public) as 'apparent dismissal of certainties, an abandonment of faith in the absolute," helped cut society adrft from its traditional moorings." And the horror of WWI, breakdown of social hierarchies, all seemd to combine to produce a 'great uncertainty' and 'state of unrest'.* (278) "The word relativity has been widely misinterpreted as relativism, the denial of the objectivity of truth or moral values. This was the oposite of what Einstein believed. (Isaiah Berlin, a philosopher, later lamented) (278) In both his science and moral philosophy, Einstein was driven by a quaet for certainty and deterministic laws. (323) Einstein saw relativity theory as leading to a deeper description of certaianties and absolutes – what he called **INVARIANCES** – based on the combination of space and time into one four-dimensional fabric.	1906. By 1907 Einstein, was calling it Relativitatstheorie. Driven by popular misunderstanding (not Einstien thinking nor his belief), 'relativity' became associated with a new "relativism" in morality, art, and politics. There were less faith in absolutes, not only in concepts of time and space, but also in truth and morality. In Dec 1919, NYT "Assaulting the Absolutes," fretted that "the foundations of all human thought have been undermined." This ripples that unsettled the realm of morality and culture, was not caused by what Einstein belived, but by 'how he was popularly interpreted'. SAD! Further notes see "Mysterious Alignment of Forces" causes a shift in human outlookat the end

		of synopsis.
	(240) **Democratic Socialism** (political stance) For the rest of his life after the outbreak of WWI (1915 – 1918), Einstein would expond a democratic socialism that had a leberal, anti-authoritarian underpinning. Advocating individual freedom, equality, social justice, and the taming of capitalism. (420) "I am a convinced democrat." (382) **Politic** "Because humans have within them a "lust for hatred and destruction," leaders ca manipulate it to stir up militaristic passions." "is ti possible to control man's mental evolutionso as to make him secure against the psychosis of hate and destructiveness?" He wrote and asked Sigmund Freud. (404) A remarks he made (on Mar 10, 1933) to Evelyn Seeley, a NY World Telegram: "As long as I have any choice in the matter, I shall live only in a country where civil leberty, tolerance and equality of all citizens before the law prevail; these conditions do not exist in Germany at the present time." [refer to the time Adolf Hitler took power on Jan 30, 1933] (416, 417) "to prevent the greater evil, it is necessary that the lesser evil – the nated military – be accepted for the time being." (433) "Striving for social justice is the most valuable thing to do in life."	Disdain 'Bolshevik' desire to impose central control; and all forms of tyranny. Treasure adventure of solitude and happiness of freedom.

	(483) upon his awareness that the Atomic bomb will be made successfully (the supersecret Manhattan Project) after he met with Otto Stern in end 1944, Einstein wrote: "it would take an empowered world government to prevent an arms race once the age of atomic weaponry arrived. Scientists who know how to get a hearing with political leaders, should bring pressure on the political leaders in their countries in order to bring about an internationalization of military power." (487) The bomb reinforced his longtime support for a world federalism. "The only salvation for civilisation and the human race lies in the creation of world government." "As long as sovereign states continue to have armaments and armaments secrets, new world war will be inevitable." (488) As in science, so it was in world politics for Einstein: he sought a UNIFIED set of principles that could create order out of anarchy. Einstein envisioned a world government of authority that had a monopoly on military power, he called it a "supranational entity, rather than an "international" one, because it would exist above its member nations rather than as a mediator among sovereign nations. The UN, which was founded in Oct 1945 after the WWII, did not come close to meeting Einstein's criteria. He shared his view to ABC (Raymond Gram Swing) article of Nov 1945, "Atomic War or Peace." To have US, UK, Russia to jointly establish the	

	new world government. (494) (1948, @ 69 year-old) "As long a there will be man, there will be war."** "If the idea of world government is not realistic, then there is only one realistic view of our future: wholesale destruction of man by man." "I do not know how the Third WW will be fought, but I can tell you what they will use in the Forth – rocks." (541) at the end of his life, he still held the belief in the need for the creation of a world government to preserve peace.**	** Alas, for the evil that exists in men and the devil, this would be an elusive ideal. Such an ideal of 'world government' would realise only during and under the reign of the Lord Jesus, the 1000-year reign (Rev 20:1-5).
	America Politic! (537) At 75, Einstein (felt) what was fundamental about America: "it can be swept by waves of what may seem, to outsiders, to be dangerous political passions, but are, instead, passing sentiments that are absorbed by its democracy and righted by its constitutional gyro-scope. God's own country becomes stranger and stranger. Bit, somehow, they managed to return to normality. Everything – even lunacy – is mass produced here. But everthing goes out of fashion very quickly.	
	(Q) Question: How did Einstein reconcile between his conflicting (1) belief in	(391) Jewish and Chrstians believed that people have free

	Determinism – that everything is predetermined, and (2) 'individual freedom' (although he did not belief in human having "free will", yet he lived his life as if there is 'free will' ? (391 – 393 "The belief in causal determinism, conflicted with the concept of a personal God. It is also incompatible with human free will. Einstein believed, as did Spinoza, "human beings in their thinking, feeling and acting are not free but are causally bound as the stars in their motions." (his statement to Spinoza Society in 1932). Human actions are determined, beyond their control, by both physical and psychological laws, he believed. A concept he drew from Schopenhauer (!) "a man can do as he wills, but not will as he wills" ** [Predeterminism would mean the end of all ethics, as Hedwig, Born's wife put it.] For Einstein, the way to resolve this "issue" was to look upon "free will" as something useful, indeed necessary, for a civilized society, because it caused people to take responsibility for their own actions. Acting 'as if' people were responsible for their own actions would, psychologically and practically, prompt them to act in a more responsible manner. "I am compelled to act 'as if' "free will" existed." Because I wish to live in a civilized society. (!!) So, Einstein would, while still believing intellectually that everone's actions were predetermined, but for both sensible and pragmatic reasons, to live life in a responsible manner. He was, nonetheless, aboe to develop, and to practice, a strong personal morality toward humanity. (393) "the most important human endeavour is the striving for morality in our actions. Our inner balance and even our existence depends on it. Only our morality in our actions can give beauty and dignity to life."	will and are responsible for their actions. They are free to choose to defy God's commands, despite that God is all knowing and all-powerful. ** some truth to this, as Paul wrote in Rom 7:19-20, For the good that I will to do, I do not do; but the evil I will not to do, that I practice. Now,if I do what I will not to do, it is no longer I who do it, but sin that dwells in me. Do not belief in "free will", yet, for practical reason, to live 'as if' free will existed. (?!) Mind is a little warp and twisted here. Note: Philosophers through the ages have struggled to reconcile free will with determinism and an all-knowing personal God.

	(169) Realist (scientific realist): Oct 1911, at Solvay Conference, Belgium: From then on, he increasingly sounded like a sceintific realist (like Newton infact), someone who believed that an underlying reality existed in nature, that was independent of our ability to observe or measure it. (191) "But nature did not deem it her business to make the discovery of her laws wasy for us." (449) over the years, Einstein had increasingly come to embrace the concept of realism, the belief that there is , "a real factual situation" that exists, "independent of our observation."** (461) Einstein concept of Realism: ■ A Reality exists independent of our ability to observe ■ Separability and Locality. Objects are located at certain points in spacetime. He cannot accept the notion of what exists in different parts of space has its own independent. ■ Strict causality, certainty and classical determinism. He cannot believe the view that events in nature are analogous to a game of chance**.	** this belief was one aspect of his discomfort with Heisenberg's uncertainty principle and other tenets of quantum mechanics that assetr that "observations determine realities." **Chance (zufall) Is the grace of God, which provides for "principle of uncertainties" and a way out for us from the "strict causality". Hallelujah!
Albert Einstein to America	(281) 1st, 0404 1921 (@42) (368) 2nd, 1930 dep – 3112 1930 arr (@ 51) (for 2 months lecture in CalTech) (395) 3rd, Dec 1931 (for good in Princeton University) (@52) (for 2 months lecture in CalTech)	(396) The DRAWs of America: FEE ■ Freedom ■ Excitement (Enthusiasm) ■ Entertainment

	(401, 403) 4th, Jan 1933 (@54) (30 Jan to 10 Mar 1933 @ Pasadena, California (18 Apr 1933, @ 54th BD, he reached Chicago. (405) Sailed back to Europe, arr Antwerp on Mar 28, 1933. (410, 415) (Mar to July, to Oct 1933) deposited in Belgium, Le Coq sur Mer, seaside resort near Ostend. Before his last and final vovage to America. (422, 424) 5th, 7 Oct 1933 (@54) 'Westmoreland' ocean liner (425) Arr NY 17 Oct 1933 (431) Invited by Eleanor Roosevelt, and met, dined and spent a night at the White House on Jan 24, 1934 (@ 55) (437) May 1935 (@56) sailed on Queen Mary to Bermuda for a few days to satisfy a formalities to becoming a US citizen. (437) Summer 1935, bought the house at 112 Mercer Street, in the vicinity of Princeton University. (Tel. Princeton 1606)	
A. (his Discovery)		
Light A1. (radiation & energy properties of light)	Light Quanta (Mar 1905) (140) [devised a revolutionary quantum theory of light] (321) light actually came is packets of energy. (321) these QUANTA behaved at times like particles. They were invisble units, NOT of a continum. (140) that radiation "behave thermodynamically as if it consisted of	(98) he also explore the hypothesis by determining

	mutually independent energy quanta." (97) And that radiation field was made up of quanta - pointlike particles (98) "Light is made up of discrete particles or packets of energy: … when a light ray is propagated from a point, the energy is not continuously distributed over the increasing space, but consists of a finite number of nergy quanta which are localized at points in space, and which can be produced and absorbed only as a complete unit." (97, 98, 99, 100) ■ "and that the radiation field was made up of quanta" ■ "if light came in discrete quanta, then the energy of each (quanta) one was determined simply by the frequesncy (f) of the light multiply by Plank's cosntant." ■ That "a light quantum (which can be produced and absorbed only as a complete unit) transfers it entire energy to a single electron ", then it follows that light of higher frequency (f) would cause the elctrons to emit with more energy. On the other hand, increasing the intensity (i) of the light (but not the frequency) would simply mean that nore electrons would be emitted, but the energy of each would be the same. ■ The energy of emitted electrons would depend on the frequency of the light according to a simple mathematical formula involving Plank's cosntant,	whether a volume of blackbody radiation, which he was now assuming consisted of discrete quanta, might in fact behave like a volume of gas (Blackhole!) which je knew consisted of discrete particles. First he looked at the formulas that showed how the entropy of a gas changes when its volume changes. Then he compared this to how the entropy of blackbody radiation changes as its volume changes. He found that the entropy of the radiation "varies with volume according to the same law as the entropy of an ideal gas."
	(155, 157) "Duality of Light" – both an undulating WAVE and stream of PARTICLES (pointlike) – these two (2) structural properties, a stream of particles Quanta (later dubbed "photons" in 1926, and a wave, simultaneusly displayed by "Radiation" are mutually compatible (not mutually incompatible). (94, 97) ■ [A unity and simplicty]**	'a heuristic point of view' ie a hypothesis that serve as a guide and gives direction in solving a problem (mystery) but is not considered proven (as in the case of David's Book)

	(Q) is it possible to combine energy quanta and the wave principles of radiation? (157) Appearances are against it, but the Almighty – it seems – manged the trick! (321) in his 1909 Salzburg address, he had predicted that physics would have to reconcile itself to a duality in which light could be regarded as both wave and particle. And at the first Solvay Conference in 1911, he had declared that "these doscontinuties, which we find so distasteful in Plank's theory, seem really to exist in nature." (321) A new phase of the Quantum revolution was launched in 1913, whwn Niels Bohr came up with a revised model for structure of the atom [featured a positively charged nucleus, around which tiny negatively charged electrons orbited]. (322) Bohr made a refinement to the structure of atom: on the fact that these electrons did not collapse into the nucleus and emit a continuous spectrum of radiation, as a classical physics would suggest. In Bohr's new model, which was based on studying of hydrogen atom, an electron circled a nucleus at certain **permitted orbits**, in states with discrete energies. The atom could absorb energy from radiation (such as light) only in "incremental quantum or amount" (increments) that would kick the electron up a notch to another permitted orbit. Likewise, the atom could emit radiation only in increments that would drop the electron down to another permitted orbit. When an electron moved from one orbit to the next, it was a Quantum	Electrons circle/orbit around Nucleus; Solar system Planets circle/orbit around Sun. Galaxy system Stars circle/orbit around Blackhole (within a system of Galaxy). Galaxies circle around God-the-Great I AM. Same arrangement observed. I think.

	leap. It was a disconnected and discontinuos shift, from one level to another, with no meandering in between. Bohr went on to show how this model accounted for the lines in the pectrum of light emitted by the hydrogen atom. (322) Einstein used Bohr's model as the foundation for a series of papers in 1916. "On the Quantum Theory of Radiation" was formally publised in 1917. About absorbtion and emission of radiation (of light) – a thought experiment in which a chamber is filled with a loud of atoms, and being bathed by light (or anyform of electromagnectic radiation) – each change in an electron orbit corresponded to the absorbtion or emission of one light quantum. (322, 323) Atoms emit radiation in spontaneous fashion. But Einstein theorized that this process* (or emission, or stimulation) could also be stimulated. How? Suppose that an atom is already in a high-energy state from having absorbed a photon (quanta), if another photon with a particular wavelength is then fired into it, two photons of the same wavelenght and direction can be emitted. And Suppose there is a gas of atoms with energy being pumped into it, say by pulses of lectricity or light. Many of the atoms will absorb energy and go into a higher energy state, and they will begin to emit photons. The presence of this cloud photons made it even more likely that a photon of the same wavelength and direction as the other photons in the clound would be emitted. *This process od stimulted emission would, almost 40 years later, be the basis for invention of the LASER, an acronym of "Light Amplification by	(322) "this is the higher form of musicality in the sphere of thought." Einstein declared. (323) LASER

	the Stimulated Emission of Radiation."	
	(128, 130) Constancy of speed of light (186,000 miles/hr); it is alo the speed limit of the universe. [if you travel at 'light speed', in a train, relative to observer at stationery, the light in the train would almost "stand still" – eternal.	Eternal Life and Eternity exist only in the realm where things are moving at the speed of light.
	(314) Law of the Photoelectric Effect (the mathematical description of how the photoelectric effec was explained, by assuming that light was absorbed and emitted in discrete packets or bundles of QUANTA, in fix amounts, determined by Plank's constant, and the way those related to the frequency of the light. Note: Lenard's experiments found something unexpected. "the brighter, more intense light had a lot more energy, so it (would) seemed logical that the electrons emitted would have more energy and speed away faster. BUT that DID NOT Occur. More intense light produced more electrons, but the energy of each remained the same. This was something that the wave theory of light did not explain.	This conception does not conflict with the properties of the photoelectric effect observed by Philipp Lenard (1862 – 1947) (see Note on left)
	(322, 323) Atoms' radiation (electromagnectic radiatin) absorbtion and emission process could be stimulated (this process of stimulated emission, 40 years later (1957), be the basis for the invention of the LASER (Light Amplification by the Stimulated Emission of Radiation).	LASER, Fibre Optics Photoelectric cells Semi-conductor
Atom A2. (the true sizes of atom)	(101, 103, 102, 106, 141, "A New Determination of Molecular Dimensions" (Apr 1905) [helped prove the existence of atoms and molecules as 'physical objects']	Avogadro number (of molecules) 6.02214 x 10 to power 23

Moving Bodies A3. (Motion of microscopic particles in liquid)	(103, 141) [explained Brownian motion] [due to hydrodynamic of atoms and molecules – random action of invisible particles refelcted in the visible world]	
A4. (Electrodynamics of moving bodies – a modification of the theory of space and time)	*(2, 108) Special Theory of Relativity (30 June 1905)* *(applies only to a situation in which the observers are moving at a constant velocity relative to one another – uniform in a straight line at a steady speed – referred as an "inertial referecen system' (hence the name)* "the fundamental laws of physics are the same whatever your state of motion" (example A at home; B in airplane) (124, 128) "All moving reference frames" have their own "relative time" "no such thing as "absolute simultaneity" neither "absolute rest" [Note: Mathematical expression of Special Theory of Relativity was assisted by his Zurich colleague Minkowski.] (223) "space and time did not have independent existences, but instead formed a fabric of spacetime."	Two limitations of Special Relativity: 1. it applies only to uniform cosnatnt-velocity motion (things felt and behaved diff if your speed or direction was changing); and 2. it di not incorporate Newton's theory of gravity (it aso conflicted with Newton's gravity theory which conceived of gravity as a force that acted instantly between distant objects). To resolve these, Einstein worked on a new filed theory of gravity: the "Field Equation of Gravitation" aka General Theory of Relativity, from 1907 to 1915. **
<< >> Time and Space	**Concept of time:** (123, 124, 127) An analysis of the concept of time was Einstein solution to the 'duality' properties of light – as particles (emisison theory) and also as wave (wave theory) – and the paradoxical of postulates	

	(emission theory/relativity; light speed a constant; light postulate) ■ Two events that appear to be simultaneous to one observer will not appear to be simultaneous to another observer who is moving rapidly. [source of conflict!] ■ *No way to declare that one of the observers is correct!** ■ *No way to declare that two events are truly simultaneous.* ■ *Events that are observed as simultaneous in one frame of reference, are not simultaneous in another frame of reference.* ■ *No way to say that any two events are "absolutely" or "really" simultaneous.* We can only say that they are in motion relative to each other. ■ It means that there is no "absolute time" (same belief held by Hume, 1711 - 1776) ■ Instead, all moving referecne frames have their own relative time. [eg Sun & Moon calendars are diff] ■ It also means there is no "absolute rest" "the magnet and the coil example, along with the observation made on light, suggest that phenomena of electrodynamics as well as mechanics possess no properties corresponding to the idea of absolute rest." (128) "the **principle of relativity,** which holds that the laws of mechanics and electrodynamics (magnet-coil-electric) **are the same** in all referecne systems moving at constant velocity relative to one another." "**the constancy of the speed of light** "independent of the state of motion of the emitting body (just like the magnet-coil motion emit electricity – a constant – independent of the state of the emiting body) (therefore suggest) "The introduction of a "light ether" will prove to be	*as it would depend on his/her frame of reference, or the environment that he/she was in. Eg. One in 'fast moving train (spirit), and one at station embankment (body/earth), will be diff. 2 environments: one being accelerated by universe (in light speed; as light; in eternity mode) (in the spirit) (time speed up); one 'resting' in a gravitational field (in this body) (time slow down) Thus, "1 Day" in Heaven, is like 1000 years on earth.

	superfluous, in as much as the view to be developed here **willl not require a 'space at absolute rest.'"** (128, 129, 130) ■ If time is relative, so too are space and distance. ■ "time dilation" or "twin paradox" * ■ 'time goes more slowly on train speeding past' to the observer on platform; 'light beam in diagonal (formed by length of mast plus distance) to the observer on land – time goes lowly on ship speeding past, too. ■ "when train appraoches the speed of light relative to observer on platform, it would take almost forever (eternanity) for a light beam in the train to bounce from floor to the moving ceiling and to the moving floor. Thus time on the train would almost stand still from the 'perspective' of the person on the platform. (131) As an object approaches the speed of light, its apparent mass (A) also increase. Newton's law (F = MA) still holds. But as the M increases, more and more Force will produce less and less Acceleration. There is no way to apply enough force to oush even a pebble faster than the speed of light. That is the ultimate speed limit of the universe. And no particles or piece of info can go faster than that, accd to Einstein's theory. ■ observers in diff states of motion will measure things differently ■ (148) "clock run more slowly in a more intense gravitational field" ; ■ light bend by gravity; wavelength of light increase slightly (gravitational redshift)	*That explains why resurrected saints in Christ looked younger; and how Enoch and Elijah taken up to Heaven at a "point in time" while "walking with God. 'Eternity = things exist and live in the 'speed of light' environment. C is ultimate? No. C to the power of 2 is achiveable as in the equation E = mc2

	(influence by David Hume, 1711 – 1776) ■ (82) "no such thing as absolute time" as echo on his theory of relativity ■ "it is dangerous to talk about concepts that are not definable by perceptions and observations."	
	(510, 511) Kurt Godel, a German-speaking mathematical logician from Brno and Vienna, a closer friend of Eisnstein in later year in Institute of Advanced Study, was famous for his "Incompleteness theory," a pair of logical proofs that purport to show that any useful mathematical system will have some proposition that cannot be proven true or false based on the postulates of that system. In his walks with Einstein, he came up with an analysis that called into question whether time, rather than merely being relative, could be said to exust at all (?). He figured, Einstein's equations, could describe a universe that was rotating rather than (or in addition to expanding). In such a case, the relationship between space and time could become, mathematically, mixed up. "The existence of an objective lapse of time," means that reality consists of an infinity of layers of "now" (today) which come into existence successively. But if simultaneity is something relative, each observer has his own set of 'nows', and none of these various layers can claim the perogative of represneting the objective lapse of time." As a result, Godel argeud that time travel would be possible. "… it is possible to travel into any region of the past, present and future,	Kurt Godel "incompleteness theory" Heb 3: 12-15 "Today" ! … but exhort one another daily, while it is called "today," lest any of you be hardened through the deceitfulness of sin. For we have become partakers of Christ if we hold the beginning of our confidence steadfast to the end, while it is said: "Today, if you will hear His voice, do not harden your hearts as in the rebellion." Space Time Travel ?

	and back again." He wrote. We could go back and chat with with younger version of ourselves; our older version could come back and chat with us. Palle Yourgrau, Boston U philosophy prof. in his book 'World Without Time' wrote, "Godel had achieved an amazing demostration that time travel, strictly understood, was consistent with the theory of relativity." "The primary result was a powerful argument that if time travle is possible, time itself is not (time does not exist at all)." (511) Einstein responded to Godel's essay that had been collected into a book, he seemed to be mildly impressed but also not totally engaged by the argument. He regarded it as "an important contribution" but noted that he had thought of the issue long ago, and "the problem here involved disturbed me already." He implied that time travel may be true as a mathematical conceiviability, it might not be possible in reality. He concluded, "It will be interesting to weigh whether these are not to be excluded on physical ground."	Like John the Apostle in the spirit; Moses and Elijah in the spirit on Mt of Transfiguration'
"On the influence of Gravity on the Propagation of Light" (1915)	*(3, 4) **General Theory of Relativity* *(Nov 1907, 1911 to Nov 1915)* **(211) "the greatest accomplishment of his life"** (223) "the most valuable discovery of my life"	WWI 28 Jul 1914 to 11 Nov 1918

	(145, 190) Gravity was a warping of space and time" – result from interplay between matter (m), motion (c) and energy (e) –- the **equations** that '**describe**' the dynamics of this curvature. [(left) _____] = [(right) _____] (196, 220) Left: called Einstein tensor, compresses together all of infomration about how the geometry of spacetime is warped and curved by objects. Right: describes the movement of matter in the gravitational field. The interplay between the 2 sides, show how objects curve spacetime, and how, in turn, the curveture effects the motions of objects. (196) the Curve Space tells Matter how to move; and Matter tells Spacetime how to curve, as John Wheeler put it. " A Cosmic Tango" – cosmic dance of spacetime, matter and energy (Brian Greene): ■ Spece and time become players in the evolving cosmos. They come alive. Matter here causes space to warp there, whcihc causes matter over here to move, which causes space way over there to warp even more, and so on. General relativity provides the choreography for an entwined cosmic dance of space, time, matter, and energy. (147, 193) "the mathemitical equations describing / expressing the two (2) complementary processes:	"Principle of Equivalence" (190) Every object has a "gravitational mass (GM)," i.e. its weight on the earth's surface. It also has an "inertia mass (IM)," i.e. how much force must be applied to it in order to make it accelerate. As Newton noted , IM of an object is always the same as its GM, though defined diff.. Einstein probed the equivalence of IM and GM. He called it "the equivalence principle". The 'local effects' of gravity and of acceleration are equivalent. But it is impossble to discover by experiment wjether a given system of coordinates is accelerated, or whether .. the observed effect are due to a gravitational field." This became the foundation of his General thoery of relativity. Heaven liken as VEIL or garment

	(1) How gravitational field acts on matter, telling it how to move. (2) And in turn, how matter generates gravitational fields in spcetime, telling it how to curve. (196) "**the Field Equation of Gravitation**" (general relativitslia laws of gravity) (Nov 1915) [*a unity and simplicity*] ** (148) "The central idea of general relativity is that gravity arises from the curvature spacetime,"; and "Gravity is geometry**." (James Hartle). (220) "gravity was the curving of the fabric of spacetime." [G (gee-nu-vu), Einstein tensor] (196) [Note: Mathematical expression of General Theory of Relativity was guided** by his Zurich Polytechnic classmate Marcel Grossmann.] **Gross,mann recommended non-Euclidean geometry that had been devided by Bernhard Riemann (1826 – 1866). Geometry of curved surfaces. A metric tensor. (192, 196, 197) The basic insight was that "the effects we ascribe to gravity and the effect we ascribe to acceleration are both produced by one and same structure (the complete physical equivalence; the Universe). In this one and same structure of the Universe, there are two (2) complementary processes: 1. how a **gravitational field** (gf, the curving spacetime fabric)	in Bible. Note: Rotating motion is a form of acceleration. (pg 192) Einstein came close to find the equation by end 1912, using a tensor by Riemann & later Ricci. But his eventual triumphant equations would only formulated in 26 Nov 1915. prediction of how much Gravity bends Light "… the bending of light meant that fabric of space, through which the light beam traveled, was curved by gravity. The shortest path through a region of space that is curved by gravity

	acts on matter, telling it how to move. 2. And in turn, how matter generates **gravitational fields** in spacetime, telling it how to curve. In short, "Gravity was the curving of the fabric of spacetime." (220) "The general laws of nature to be expressed by equations that hold true for all systems of coordinates, that is they are covariant with respect to any substitutions whatever." (219) Gravity could be defined as the curvature of spacetime (thus it could be represented by a metric tensor); – a four-dimensional fabric of space and time ■ "clock run more slowly in a more intense gravitational field" ; ■ light bend by gravity; wavelength of light increase slightly (gravitational redshift) ■ gravitational diff. causes the shift to the red end of the spectrum ■ thus, a bending of light ray by gravity A set of covarint equations that capped his general theory of relativity.	(non-Euclidean geomatry) might seem quite different from the straight lines of Euclidean geomatry." Space Travel "space and time did not have independent existences. But instead formed a fabric of spacetime. (see also 511, Godel's logic) The fabric (garment) became not merely a container for objects and events. Instead, it had its own dynamics that were determined by, and in turn help to determine, the motion of objects within it – just as the fabric of trampoline will curve and ripple as a bowling ball and some billiard balls roll across it, and in turn the dynamic curving and rippling of the trampolin fabric will determine the path of the rolling balls and caused the billiard balls to move toward the bowling ball.
	Note:	Einstein's reversal to his 1912

	(214) The discovery and completion of this Field Equation of Gravitation came about only after Oct 1915, when Einstein realised his Outline/Entwurf approach was untenable; and shifted focus from 'physical strategy' to 'greater reliance on 'mathematical strategy', which made use of the Riemann and Ricci tensors.	Zurich Notebook 'mathematical strategy' after 3 years, "parted the water and led him from bondage into the promised land of general relativity." (John Norton)
	Note: (215) The triumphant breakthrough took place in the 4 lectures series in Nov 1915: 1st, 4 Nov; 11 Nov, 18 Nov, 25 Nov 1915	'a throes of most intensed frenzies of scientific creativity history.'
On Cosmology and Black Holes (1917) (*Karl Schwarzschild, Schwarzschild's radius)	(249) Modern Cosmology (study of the universe) that follows after Einstein discovery of the Field Equation of Gravitation in Nov 1915 and onward: Karl Schwarzschild (1916) apply Einstein Field Equations to objects in space. His first calculaitons focused on curvature of spacetime OUTSIDE a spherical, nonspinning star. Another set of calculations on what ot would be like INSIDE such a star. In both cases, something unusual seemed inevitable: "if all the mass of a star (or any object) was compressed into tiny enough space – defined by what became known as the Schwarzschild's radius – then all of the calculaitons seemed to breakdown. **At the center, spacetime would infinitely *curved in on itself*.** For the Sun, that would happen if all its mass were compressed into a radius less than two miles. For the Earth, it would happen if all its mass were compressed into a radius of about one-third (1/3") of an inch.	Helping him in this endeavor, was a profound mathematician and distinguished astrophysicist, Karl Schwarzchild, who directed Potsdam Observatory. Einstein did not believe, then, or later, that these results actually corresponded to anything real. (due to hos 'realist' stance. In 1939, at age 60, he stated in a

	(250, 251) What would that mean ?? ■ In such a situation, nothing wihtin the Schwarzschild radius would be able to escape the gravitational pull (a line/point of breakdown – a gravitational collapse**), not even LIGHT or any other form of radiation. Time would also be part of the warpage as well, dilated to zero. ■ In other words, a traveler (any object, light or time) nearing the Schwarzschild radius would apprear, to someone on the outside, to freeze to a halt.	paper, "a clear understanding as to why these "Schwarzschild singularities" do not exist in physical reality." **A few months later, however, Robert Oppenheimer and his students Hartland Snyder argued the opposite, predicting that stars could undergo a gravitational collapse.
	Stars could collapse and create such a phenomenon, in fact they often did. John Wheeler dubbed them "Black Holes". Black holes have now been discovered all over the universe, including one at the center of pur galaxy that is a fe million tomes more massive than our sun. Black holes are the only places in the universe where Einstein's general theory of relativity (Field Equation of Gravitation) shows its full power and glory. (Freeman Dyson) Here, in the black holes, space and time lose their individuality and merge together (as Schwarzschild radius correctly described) in a sharply curved 4-D structure precisely delineated by Einstein's equations. (Freeman Dyson)	Eistein should have knew it as he did in his hypothesis of 'blackbody radiation' which behave like a volume of gas back in 1905 (pg 98) After Einstein's death in 18 Apr 1955, scientists would discover Schwarzschild theory was right. In the 1960s, physicists such as Stephen Hawking, Roger Penrose, John Wheeler, Freeman Dyson, and Kip Thorne showed that this was indeed a feature of Einstein's general relativity theory, one that was very real.

Cosmological Considerations in the General Theory of Relativity (Feb 1917)	(252) A paper he published shortly after his debate with Willem de Sitter of Leiden, on the issue of inertia, based on a craxy notion: ■ "Space has no borders because gravity bends it back itself." 1st, he noted that 'an absolute infinite' universe filled with stars and other objects was not plausible. There would be an infinite amount of gravity tugging at every point and infinite amount of light shining from every direction. 2nd, on the other hand, a finite universe floating at some random location in space was inconceivable as well. Among other things, what would keep the stars and energy from flying off, escaping, and depleting the universe? So he developed a thrid (3rd) option: A finite universe, but one without boundaries. The masses in the universe caused space to curve, and over the expanse of the universe they causes space (indeed the whole 4-D fabric of spacetime) to curve completely in on itself.** The system is closed and finite. But there is no end or edge to it." "The great charm resulting of these beings (refering to the 'imaginative flatlanders) is finite and yet has no limits." And if the flatlanders' surface was like that of an inflating baloon, their whole universe could be expanding, yet there would still be no	**This was first discovered and expressed by Schwarzschild (spg 252) "**At the center, spacetime would infinitely *curved in on itself*. "**

	boundaries to it." In such a curved univers, a beam of light starting out in any direction could travel ehat seems to be straight line and yet still curve back on itself." 'This suggestion of finite but unbounded space is one of the greatest ideas about the nature of the world which has ever been conceived." (Mac Born) This CONCEPT of the COSMOS that Einstein derived from his general relativity theory (Field Equations of Gravitation) was elegant and magical. It implies the conventional wisdom thinking about a stable universe was wrong. [as later proved, Distant galaxies all speeding away from our Milky Way]	One may ask: "What is OUTSIDE the curved universe ?" Author suggested that it is not merely an unswerable question, but also a meaningless one. Just as it would be meaningless for a flatlander to ask what's outside her surface. (!) (253, 254) Also, it is not very meaningful to ask what's in the realm that exists outside of the three spatial dimensions of our curved universe."
Energy A5. (build on A4, Relationship between energy and mass)	*(2) Out of concept of space and time, produced:* *(Quantum theory) (27 Sep 1905)* **E = mc2**	Atom Bomb Nuclear Power
	(138) "One more consequence of the electrodynamics paper, the relativity principle (light quanta – particles – emission theory) , together with Maxwell's equations (field theory), require that mass (m) be a direct measure of the energy contained in a body. Light (c) carries mass (m) with it (E). With the case of radium there should be a noticeable	

	reduction of mass." (139) "If a body (radium) emits the energy (E) in the form of radiation, its mass (m) decreases by E/c2." Or, to express the same quation in a different manner: E = mc2 (138) Energy equals mass times the square of the speed of light. (272) *As intitially first observed by a young man (in 1919, when Einstein was 40), that it would be possible to use energy contained within the atom for the production of frigntening expolosive. But Einstein brushed off the idea, calling the concept foolish. (139, 469, 485) Bodies whose *energy content is variable to a high degree*, e.g. *salts of radium*, would late used to test this theory… and led to the creation of Atom Bomb.* (138) Relationship between speed and mass. ■ The mass of a body is a measure of its energy content. ■ A fundamental interchanageability between the two. ■ Mass and Energy are different manifestation of the same thing.*	Note: Einstien used 'L' for 'E' and 'V' for 'C', and expressed it as L = mV2 until 1912 'a mustard seed faith (m) can move mountain.' [who was the young man in Prague, I wonder.] *Hence, Jesus can trtuthfully proclaim, I am the Door, I am the Light, I am the Bread of Life, I am the True Vine, I am the Good Shepherd, I am the Way, the Truth, and the Life. I am the Resurrection and the Life. Matt 25:35 "for I was hungry and you gave me food; I was thirsty and you gave me drink; I was stranger and you took me in;"
	(448 Quantum Entanglement "Spooky Action from a Distance" Einstein belived that when teo particles were far apart, all physical	

	interaction between them has ceased." He would ask. "How can the final state of the second particle be influenced by a measurement performed on the first?" Eistein did not believe that there is a "spooky action from a distance" exists in reality. Contrary to what Quantum mechanics theory suggests/implied. (449) Einstein believed: "obesreving or poking one particle, could not instantaneously jostled or jangle another one far away." The only way an action on one system can affect a distant one is IF some wave or dignal information travelled between them – a process that would have to obey the speed of light. That was even true for gravity. If the Sun suddenly disappeared, it would not affect the Earth' orbit for about **8 minutes**, the amount of time it would take the change in the gravitational field to ripple to the earth at the speed of light. (449) A 'supposition' Einstein believed that we should hold fast: "The real factual situation of the system S2, is INDEPENDENT of what is done with the system S1, which is spatially separated from the former. It was an intuition of Einstein. But it was a 'supposition'. It had never been proven. There are two related concepts that Einstein uses: **'Separability':** means that two differnet particles or systems that occupy different regions in space have an independent reality; '**Locality':** means that an action involving one of these particles or systems cannot influence a particle or system in anpother part of space,	That explains Daniel's prayer took a while for the Angels to bring about the answers to his prayers. As for Christian, we believed otherwise. We belieced the what is done with the system S1 (KOG),, is not separated from the system S2 (on Earth). The will of God in system S1 can affect the system S2 on Earth. ** that something travle between them, is the 'Quanta' – the Light –

	unless something travels the distance between them**, a process limited by the speed of light. To Einstein, realism and localism were related underoinning of physics. "Physics should represent a reality in time and space, free from "spooky action at a distance."	the Son of the Living God. This is the 'miss' that Einstein would never able to grasp and necer able to reconcile.
	(450, 451, 452) In responding to Einstein-Podolsky-Rosen (EPR) paper in May 1935, Niels Bohr using a concept of 'complementarity' added a significant caveat to explain Quantum mechanics. "Because the two particles (featured in Einstein thought experiment) were part of one whole phenomenon. Because they have "interacted", the wo particles are therefore "entangled". They are part of **one whole phenomenon or one whole system** that has one quantum function. (452)(Bohr) EPR did not truly dispel the uncertainty principle. As we cannot in fact measure BOTH these attributes (position & momentum) (of the two particles) precisely at any one time for particle A (right-moving) , and thus we cannot know them both precisely for particle B (left-moving). **	** Thus, we cannot know precisely when is the exact 2nd-coming of the Lord Jesus Christ! As we and the Lord have interacted and are now "entangled"; we are part of the one whole phenomenon, of one whole system that has one Quantum function.
	(453) **Shrodinger's Cat** Erwin Schrodinger (1887 – 1961) Giving his view on Einstein's concepts of 'separability' and 'locailty'; and the concept of 'complementarity' of Bohr, Shrodinger coined the term **"Entanglement"** to describe the corrleations that exists between two particles that have 'interacted but are now distant from each other:	"entanglement" ! similar to the "soul-tie" that exists in our lives?

	(454) "The quantum states of two particles that have interacted must subsequently be described together! With any changes to one particle instantly being reflected in the other, no matter how far apart they now are. "Entanglement of predictions arises from the fact that the two bodies at some earlier time formed in a true sense one system, that is were interacting, and have left behind "traces" on each other." "If two separated bodies enters a situation in which they influence each other, and separate again, then there occurs what I just called ENTANGLEMENT of our knowledge of the two bodies.	Hence, do not commit sin of sexual immorality! Man and woman, two bodies become one. An entanglement. The quantum states of the two bodies become one system.
(Quantum theory) *(27 Sep 1905)* **E = mc2**	(468, 469) in the spring of 1939, Einstein @ 60, Niels Bohr @ 54, 6-year junior/youger than Einstein, came to Princeton for 2-month visit. Bohr had arrived on Princetom with a piece of news that was related to Einstein's discovery of the link between energy and mass, E = mc2 In Berlin, Otto Hahn and Fritz Strassmann had gotten some interesting experimental results, by bombarding heavy uranium with neutrons. The results had been sent to their former collague, Lise Meitner, who had been forced to flee to Sweden because she was half Jewish. Lise Meitner in turn shared them with her nephew Otto Frisch. They concluded that the atome had been split, two lighter nuclei created, and a small amount pf loss mass turned into energy.	(272) *As intitially first observed by a young man (in 1919, when Einstein was 40), that it would be possible to use energy contained within the atom for the production of frigntening expolosive. But ***Einstein brushed off the idea, calling the concept foolish.*** [who was the young man in Prague, I wonder.] **"FISSION"** it is called/dubbed. Fission using uranium.

	Frisch infomred his colleague Bohr, who was about to leave for America in Jan 1939. Upon arrival in late Jan 1939, Bohr descriped the new discoveries to colleagues, and it was discussed at a weekly gathering, Monday Evening Club. Within days, the results were replicated. Bohr with a young untenured professor, John Archibald Wheeler, wrote papers on the process. Einstein faced the question again at his 60th birthday. He was asked whether mankind would find some use for the process. "our results so far concerning the spliting of atom (Fission) do not justify the assumption of a practical utilization of these energies released. (However) there is no physicist with soul so poor who would allow this to affect his interest in this highly important subject. (471) (1939 – 1945) (@ 60 to 66) The Atomic Bomb (471, 472) Leo Szilard, Hungarian physicsit, a friend of Einstein while he was in Berlin in 1920s, later came to work in Columbia University, NY. Explained to Einstein the process of how an explosive chain reaction could be produced in uranium layered with graphite by the beutros released from nuclear fission. (474, 475) Einstein's letter to President Roosevelt, written on 2 Aug 1939, urged by Szilard, finally was delivered on 11 Oct 1939, by hand of Alexander Sachs (an economist with Lehman Brothers) (Goldman Sachs?) into the Oval Office.	Einstein had long been skeptical about the possibility of harnessing atomic energy or unleashing the power implied by E = mc2, as before, back in 1919, and again in 1934 (469) From 1905, to now, 1939, 34 years after; or from 1919 to now 1939, 20 years after he was approached and asked the question by a young man in Prague, finally, Einstein, resumed his interest again! (472) Einstein never thought of harnessing the energy released from nuclear fission.

	(477) Mar 1940, Einstein @ 61, Szilard went to see Einstein again. Composed a 2nd letter meant for the President. Urged the President to econsider whetehr the American work was proceeding quickly enough. (477) That led to the "Manhattan Project" to build the atomic bombs. (480) On Dec 6, 1941, US launched the supersecret Manhattan Project of building atomic weapons. Under the supervision of the Office of Scientific Research and Development, Director Vannevar Bush. Just the day before the Japanese attacked on Pearl Harbor on 7 Dec 1941, that brought the US into the WWII. (480) Szilard, Wigner, Oppenheimer, Teller, (and Bohr, pg 482, as 'Nicholas Baker' joined the MP at Los Alamos), (and Otto Stern, pg 482, worked on MP in Chicago) all had disappeared to obscure towns. (480, 481) Eisntein was approaced to assist in providing solutions to problems encountered by scientists involving in the Manhattan Project as well as by Navy on ways to shape the placement of sea mines in Japanese Harbour! (485) Aug 6, 1945, the atom bomb was dropped on the city of Hiroshima. Theree days later, Aug 9, 1945, the bomb was used again on Nagasaki.	(481) Drawing on his old expertise in osmosis and diffusion, he worked on a process of gasses diffusion in which uranium was converted into a gas and forced through filters. (485) "Oh, my God!" is all he said, when he was told of the news by Helen Dukas, at his summer cottgae on Saranac Lake in the Adirondacks.
	The following day, Aug 10, 1945, officials in Washington released a long history, compiled by Princeton physics professor Henry DeWolf Smyth, of the secret endeavor to build the weapon. The Smyth report assigned great historic weight for the launch of the project (MP) to the Aug 2 (Oct 11) 1939 letter Einstein had written to Roosevelt.	(487) For a few weeks after the sropping of the atom bomb, Einstein was uncharacteristically reticent.

	Both the incluence imputed to that letter, and the E = mc2 underlying relationship between energy and mass that he had formulated 40 years earlier in 1905 (to now 1945), Einstein became associated in the popular imagination with the making of the atom bomb. Time wrote: "… Albert Einstein did not work directly on the atom bomb. But Einstein was the father of the bomb in two important ways: 1) it was his initative which started US bomb research; 2) it was his equation (E = mc2) which made the atomic bomb theoritically possible."	
B. (his 'Road Block') ("blockheaded")	(316, 454)) "spooky action from distance"	
	(101) "… What are light quanta ? "	
	(157) "the question is where to kook for these quanta?" (Max Plank)	
	(156) Sep 1909 at Salzburg, (157) While Einstein found and knew that light must be regarded as Wave and Particles, having two structural properties simultaneuosly displayed by radiation, he 'feared' of this 'errie dilemmas' raised by quantum theory (too mystifying) would undermine the 'certainties and determinism' inherent in classical physics. (169) Oct 1911, at Solvay Conference, Einstein, demurred from Plank's insistence, declared: "these discontinuities, which we find so distatsteful	Einstein was looking for way out of the 'eerie dilemmas' of ligh quantum theory he himself unearth. He would then spent his entire life (of 46 years) trying "to solve the 'radiation problem' without light quanta," to no avail.

	in Plank's theory, seem really to exist in nature." This phrase 'seem realy to exist' would discomfort and disturb Einstein, for him, being influced deeply by Hume (and Mach), it seemed meaningless to sat that they "really" existed in nature when they could not be observed. But from then on, he increasingly sounded like a sceintific realist (like Newton infact), someone who believed that an underlying reality existed in nature, that was independent of our ability to observe or measure it.	
	(466) by late 1930s, he was increasingly dfetached from the new experimental discoveries. Instead of the unification of gravity and electromagnetism, rgere was greater disunity as two (2) NEW FORCES, the WEAK and the STRONG neclear FORCES, were found. (466) Einstein chose to ignore those two (2) forces, althought they were not any less fundamental than the two (2) which have been known about longer." He concinued his old search for a unification of gravitation and electromagnetism. A menagerie of NEW funddamental particles were discovered beginning in the 1930s. Currently there are dozens of them: "bosons such as photons; gluons to femion such as electrons, positrons, up quarks, and downquarks. (467) Einstein, after his triump (*by relying more on the mathematical	(466) Einstein friend, Wolfgang Pauli, who joined Einstein at the Institute of Advanced Science in 1940, quipped about the futility of Einstein's quest: "What God has put assunder, let no man join togeher." (467) Einstein insisted that he

	strategy), would in his quest for a unified theory, to be a lot of mathematical, but very few fundamental physics insight guiding him. 'there were no comparable guiding principles (of physics) that could lead to the construction of a unified field theory. (467) Thus, his search, was as if "groping in the gloom of a mathmatical jungle inadequately lit by physical intuition." (Banesh Hoffmann) (511) A groping through clouds of abastract mamthematical equations with no ground lights to orient him. (467) "a random shuffling of mathematical formulars with no physics in view." (Jeremy Bernstein) (468) "Einstein Baffled by Cosmos Riddle" NYT headlined (512) Why did Einstein persist? Deep inside, such disjunctures and dualities – different field theories for gravity and electromagnetism, distinctions between particles and fields – had always discomforted him. He could not get his equations to decribe particles (Wolfgang Pauli) He wanted to build 'matter' out of nothing but convolutions of spacetime (Banesh Hoffmann) (512) He was still hoping to explain the existence of particles in terms of a field theory by finding permissible pointlike solutions to his field equations. "If one believd wholeheartedly in the basic idea of a field theory, matter should enter not as in interloper, but as an honest part of	still could not "accept the view that events in nature are analogous to a game of chance." So he pledged to continue his quest. (467, 514) Even if he failed, he felt that the effort would be meaningful. "the search for truth is more precious than its possession." (514) he felt that it was his duty to do it. (despite the E = mc2) he already discovered in 1905).

	the field itself." He argued.	
C. (his 'Miss / Struggles' Qs unresolved and without clear answers to him)	(514) In 1948, aged 69, he wrote to Maurice Solovine, his old frined from the Olympia Academy days, who by then became his publisher in Paris: "I shall never solve it." "I am uncertain as to whether I was even on the right track." His quest for a unified theory was destined to produce no tangible results that added to the framework of physics. No great insights or thoguht experiments, no intuitions about underlying principles, to help him visualise his goal. "No pictures came to our aid." "It is intensely mathematical. (Banesh Hoffmann)	Note: So important to have a "PICTURE" in view, for any new discovery or endeavour. So importnt to have "dream and vision" in seeing "PICTURES" that Holy Spirit would birthforth into our spirt and mind.
	(84) Fallacy of '**Determinism**' Even when quantum mechanics seemed to show that 'determism' was wrong, Einstein steadfastly believed it was right. [SAD] (515) "I still cannot believe that the good Lord plays dice." His responded to John Wheeler, whoc tried in 1948 (when Einstein was 69) to pursuade him at his home, 112 Mercer St. the naturalness of the quantum theory (sum-over-histories approach, a new approach by John Wheeler, Princeton renown physicst and a student of Niels Bohr)	Admittedly, he said, "I may be wrong. But perhaps I have earned the right to make my mistakes."

	(515) Einstein continued to disbelieve that "our observations can affect and (will) determine realities.	A mystery to him. "to call those things which are not as though they are (Rom 4:17) To "snap tinto reality."
	(94) 'Heuristic' "A heuristic point of view concerning the production and transformaion of light," his paper in Mar 1905, till before he died in Apr 1955 (over 50 years): He regarded the concept of the quanta (photons) and all of its unsettling implications as heuristic at best; incomplete and not fully compatible with his own intimations of underlying reality.	a hypothesis that serve as a guide and gives direction in solving a problem but is not considered proven
	(101) "… What are light quanta ? " (99) "all these fifty years of pondering have not brought me any closer to ansering the question… [perplexing, pesky mysterious, madening quirk in the cosmos .. existed (a physical reality) even when light was moving through a vacuum. (119) Conflicting Properties of Light, the two (2) Postulates: 1. By Emission theory: If it is Quanta (Photons / Particles), the observed speed of light under relativity would not be a constant, as the speed would be relative to the source. Yet, the Speed was found to be Constant! 186,000 miles/s 2. By wave theory: more consistent with wave theory, is to postulate that speed of light was a constant. And that has been proven as such. (157) (Q) is it possible to combine energy quanta and the wave principles of radiation? Appearances are against it, but the Almighty – it seems – manged the	*Doppler effect: If the source of sound is rushing towards you, the waves will not get to you any faster. However, in what is known as the Doppler effect, the waves will be compressed and the interval between them will be smaller. The decreased wavelength means a higher frquency, which results in a higher-pitched sound (or a lower one, when the siren passes by and starts moving away). A similar effect happens with light. If the source is moving toward you, the wavelength decreases (frequency increases) so it is

	trick! (120) Scientists has not been able to find any evidence that the velocity of light depended on that of its source. Ligth coming from any star seemed to arrive at the same speed. Einstein came up with the 3rd postulate, new one, he called it "the Light postulate" and defined it carefully: "Light always propagates in empty space with a definite velocity V that is independent on the state of motion of the emitting body." (121) Unfortunately, this light postulate seemed to be incompatible with the principle of relativity. (123) Then, he overcome this 'paradox' with a concept which he put into his paper no. 4, "Electrodynamics of Moving Bodies"*	shifted to the blue end of the spectrum. Light from a source moving away will be red-shifted. *[see Time and Space above]
	Quantum Mechanics (234, 238) Quantum law **(320) Niels Bohr and "Chance"** Einstein, with his (May 1920) view of the new ETHER (which he hoped to eliminate from his general relativity theory, but could not), the 'metric field' (metric of spacetime), the concept of 'absolute motion' (relative to the metric pf spacetime), would search for a unifying theory that would reconcile it all, and to restore 'certainty' to nature. His 'retreat' to a more conservative way of looking at the universe, would cause his hardening attitude toward Quantum theory, which in mid-1920s produced a radical new system of mechanics.	

	(321) A new phase of the Quantum revolution was launched in 1913, whwn Niels Bohr came up with a revised model for structure of the atom [featured a positively charged nucleus, around which tiny negatively charged electrons orbited]. (322) Bohr made a refinement to the structure of atom: on the fact that these electrons did not collapse into the nucleus and emit a continuous spectrum of radiation, as a classical physics would suggest. In Bohr's new model, which was based on studying of hydrogen atom, an electron circled a nucleus at certain **permitted orbits**, in states with discrete energies. The atom could absorb energy from radiation (such as light) only in "incremental quantum or amount" (increments) that would kick the electron up a notch to another permitted orbit. Likewise, the atom could emit radiation only in increments that would drop the electron down to another permitted orbit. When an electron moved from one orbit to the next, it was a Quantum leap. It was a disconnected and discontinuos shift, from one level to another, with no meandering in between. Bohr went on to show how this model accounted for the lines in the pectrum of light emitted by the hydrogen atom.	
	(345) at the opening of the Great Solvay Debates 1927 Niels Bohr said (of subatomic realm): "Certainty and strict causality did not exist in the subatomic realm. There were no deterministic laws, only probabilities and chance. It made no sense to speak of a "reality" that was dependent on our observations and measurements. Depending on the type of experiment	Hence, Jesus, the Light, can be the door, the living water, the Word, the Life, the Way, the Truth, the Resurrection. < --- > my dream on 19 Feb 2018:

	chosen, light could be waves or particles." (347) By 1928, a concensus had formed that quantum mechanics was correct. (349) at the Oct 1930 Solvay Debates Quantum theory proven to be a successful theory. Eisntein no longer denounced it as incorrect, only as incomplete. In 1931, he nominated Heisenberg and Shrodinger for the Nobel Prize. Heisenberg (1932) and Shrondinger (1933).	DNA of banana and egg changed and tranformed during prayer. [Jesus truend water into wine.] [Redemption, Transfiguration] The same.
	(322) Einstein used Bohr's model as the foundation for a series of papers in 1916. "**On the Quantum Theory of Radiation**" was formally publised in 1917. About absorbtion and emission of radiation (of light) – a thought experiment in which a chamber is filled with a cloud of atoms, and being bathed by light (or anyform of electromagnectic radiation) – each change in an electron orbit corresponded to the absorbtion or emission of one light quantum. (322, 323) Atoms emit radiation in spontaneous fashion. But Einstein theorized that this process* (or emission, or stimulation) could also be stimulated. How? Suppose that an atom is already in a high-energy state from having absorbed a photon (quanta), if another photon with a particular wavelength is then fired into it, two photons of the same wavelenght and direction can be emitted. And	

	Suppose there is a gas of atoms with energy being pumped into it, say by pulses of lectricity or light. Many of the atoms will absorb energy and go into a higher energy state, and they will begin to emit photons. The presence of this cloud photons made it even more likely that a photon of the same wavelength and direction as the other photons in the clound would be emitted. *This process od stimulted emission would, almost 40 years later, be the basis for invention of the LASER, an acronym of "Light Amplification by the Stimulated Emission of Radiation." (323) There was one part of E's Quantum Theory of Radiation that had strange ramification. "It can be demonstrated convincingly, that the elementary process of emission and absorption are directed process. That is, when a photon pulses out of an atom, it does not do so (as the classical wave theory would have it) in all directions at once. Instead, a photon has a momentum. In other words, the equations work only if each quantum radiation is emitted in some particular direction. ■ However, there was no way to determine which direction an emitted photon might go. ■ Also, there was no way to determine when it would happen. If an atom was in a higher state of energy, it was possible to calculate the 'probability' that it would emit a photon at any specific moment. But it was not possible to determine the moment of emission precisely. Nor was it possible to determine the direction. No matter how much	The BIGGEST PROBLEM to Einstein which he was unable to reconcile with in his entire life. (324) For E, and for most classical physicists, the idea that there could be FUNDAMENTAL RANDOMNESS -- (the WILDNESS of GOD?) -- in the universe, that

	information you had. (323) It was all a matter of **CHANCE**, like the roll of dice. (455) the reality (of the particles' position or state) consists only of 'the probabilities (reality of the quantum wave function consists only of those probabilities as expresseded in Shrondinger's wave mechanics) (323) That was a problem! It threaten the strict DETERMINISM of Eienstein's believed system, as well as the strict determinism of Newton's mechanics. It undermined the CERTAINTY of classical physics and faith that if you knew all the positions and velocities in a system, you could determine its future (like the rockets in space). Relativity may seem like a radical idea, but at least it preserved rigid cause-and-effect rules. The quirky and UNPREDICTABLE behavious of pesky QUANTA, however, was messing with this CAUSILITY. (323) Einstein would call it the 'weakness of the theory'. (324) "that it leaves the time (when) and direction (where) of the elementary process to 'chance' – "Zufall" was the word he used. (324) For the rest of his life, E would remain resistant to the notion of probabilities and uncertainties ruled nature in the realm of quantum mechanics.	events could just happen without cause --- was not only discomfort, it undermined the entire program of physics. (324) The Question he would ponder in his whole life thereafter was: "Is the quantumlike absorption and emission of light ever conceiveable in terms of complete causality?" E would never become reconciled to it, neither the answer. E despaired to Born. "In that case, I would rather be a cobbler, or even an employee of a gaming house, than a physicist." Just Elctrons are, accorded "own free will" (when & where) to jump, we, human are given "on free will", too. (390) Schopenhauer's saying, "A man can do as he wills, but not

	(324) "I find the idea quite intolerable, that **an electron exposed to radiation should choose its own free will, not only its moment (when) to jump off but also its direction (where)."**	will as he wills," has been a real inspiration to me **since my youth**; it has been a continual consolation in the face of life's hardships, my own and others', and an unfailing wellspring of tolearance." Einstein believed.
	(324) Einstein saw relativity theory as leading to a deeper description of certaianties and absolutes – what he called **INVARIANCES** – based on the combination of space and time into one four-dimensional fabric. (324) Quantum mechanics, on the other hand, would be based on true underlying uncertainties in nature, events that could be described only in terms of probabilities. (326, 335) the dialogue over the years between E & B about the meaning of Quantum went to the fundamental heart of the design of the cosmos ** On one of the many occasions when E declared that God would not play dice, Bohr countered with the famous rejoiner: **"Einstein, stop telling God what to do!"** (325) Bohr tried to convince Einstein. "Abandoning strict causility was "the only way open" given the evidence. (325) E was impressed by Bohr's breakthroughs on the structure of the atom and the **RANDOMNESS** it implied for the Quantum nature of	** "Was there an objective reality that existed whether or not we could ever observe it?" [Yes] "Were there laws that restored strict causality to phenomena that seemed inherently random? [Yes & No, depends] "Was everthing in the universe predetermined?" [Yes, for a larhe part of it; No, for other parts that were subject to "chance & probabilities" – rooms set aside

	radiation. But he was also worried. "… it all this is true, then it means the end of physics."	for human participation.] I think.
	(326) enter Louis de Broglie (326) Louis de Broglie (a descendant of deposed French royal family) His doctoral dissertation in 1924 helped transform the field (of quantum theory). "If a wave can behave like a particle, he asked, shouldn't a particle also behave like a wave? "A particle such as an electron could also be regarded as a wave." "I had a sudden inspiration," de Broglie recalled, Einstein's wave-particle dualism was an ABSOLUTEly general phenomenon extending to all physical nature." And that being the case, the motion of all particles – photons, electrons, protons, or any other --- must be associated with the propagation of a wave." (327) Bohr's atom model, electrons could change their orbits only by certain quantum leap, their stable standing wave patterns, de Brogile's thesis helped explain this (pattern) by conceiving of electrons not just as particles but also as wave. (327) Those waves are strung out over the circular path around the nucleus. De Broglie showed that the wavelength associated with an electron would be related to Plank's constant divided by the electron's momentum – to be an incredible tiny wavelength. This works only if the circle accomodates a whole number – such as 2, 3, or 4 – of the electron's wavelengths. It won't neatly fir in the prescribed	An interesting feature of of Math! and physical Nature!

	circle if there is a fraction of a wavelength left over. (327) Einstein praised de Broglie's work effusively, "it lifted a corner of the great veil," he said. (327) Enter Satyendra Nath Bose Applying a statiscal method of analyzing 'photoelectric effect' – Planck's blackbody radiation law -- by treating radiation as if it were a cloud of gas. He observed that: "any two (2) photons that had the same energy state were absolutely indistinguishable, in theory as well as fact, and shoul dnot be treated separately in the statistical calculations." (328) Einstein applied Bose's counting method, later called "Bose-Einstein statistics" to actual gas molecules, thus becoming the primary inventor of 'quantum-statistical mechanics' The key insight, has to do with how you calculate the 'probabilities' for each possible state of multiple quantum particles. This new calculating method, if applied to billions of particles, the change in probabilities becomes huge. When Einstein applied this approach to a gas of quantum particles, Einstein discovered an amazing property: In classical physics/classical particles, a gas will remain a gas unless the particles attracts one another and become liquid (condensation due to attractions). In this approach, a gas of quantum particles can condense into some kind of liquid even WITHOUT a force of attraction between them. (condensation with no attractions) This phenomenon, now called 'Bose-Einstein condensation', was a	连漪 Bose-Einstein statistics To actual gas molecules Bose-Einstein condensation

	brilliant and important discovery in quantum mechanics. Einstein's method had the effect of treating particles as if they had a wavelike traits (inspired by de Broglie). (328) Einstein admitted that he found this "mutual influence" of particles (the Bose-Einstein condensation without a force of attraction, but influence each other) to be "quite mysterious," for they seemed as if they should behave independently. [like a free will!] [By right] "the quanta or molecules are not treated as independent of one another; (but dependent on one another)." But in the case of B-E-condensation, they seemed to behave independent from one another. (329) He admitted that it all worked well mathematically*. But the physical nature remains veiled. (329, 330) *On the surface, this assumption that two (2) particles could be treated as indistinguishable (yet independent!) violated a principle that Einstein would nevertheless try to cling to in the future: the principle of separability * * , which asserts that particles with different locations in space have separate, independent realities. Note: (329) Despite his discomfort with the direction of Quantum theory was heading, he was still helping, and involved in the foundation of quantum (and wave)* mechanics; (330) at the forefront of discovering an aspect of quantum theory that would cause him discomfort in the future (and in his entire life).	In 1995, BEc was finally achieved experimentally by Eric A. Cornell, etc. who were awarded the 2001 Nobel Prize. ** Principle of Separability [Word of God can pierce even the division of soul/spirit; bone/marrow; thoughts/intents of the heart. Heb 4:12] "One aim of general theory of relativity, the Field Equation of Gravitation, had been to avoid any "spooky action at a distance." (SAAD) in which something happening to one body could instantly (*) affect another distant body. *wave mechanics (330) by Erwin Schrodinger (455)

	(330) Enter Erwin Schrodinger (1887 – 1961) (xxi) Austrian theoretical physicist who was a pioneer of quantum mechanics but joined Einstein in expressing discomfort with the uncertainties and probabilities at its core. He worked on a theory of 'wave mechanics' with a set of equations that govenred de Broglie's wavelike behaviors of electrons, giving credit to de Broglie and Einstein, "Einstein-de Broglie waves". (330) in Shrodinger's waves, the waves can spread over an enormous area. An electron could not, in reality, be waving, Einstein thought. So what, in the real world, did the wave equation really represent? Max born helped answer that question: "It did not describe the behavior of the particle. Instead, it describes the probability of its location at any moment." It was an approach that revealed quantum mechanics as being, even more than previously thought, fundamentally based on chance (Zufall, 324) rather than causal certainties.	*wave mechanics (330) by Erwin Schrodinger (455) Einstein's miss.
	(330) Enter Werner Heisenberg (1901 – 1976) (xxi) German physicist, a pioneer of quantum mechanics, a student of Niels Bohr (Copenhagen), and of Max Born (Cottingen) formulated the undertainty principle that Einstein spent his life resisting. In summer 1925, at age 23 (90 years ago), started by embracing Ernst Mach's dictum: that theories should avoid any concepts that cannot be observed, measured, or verified. That meant avoiding the concept of electron orbits, which could not be observed. He relied instead on a 'mathematical approach'. That would account for	

	something that *could* be observed: the wavelengths of the spectral lines of the radiation. The math involved what we known as matrices; which Born and his students eventually helped perfected it to a 'matrix mechanics' that was later shown to be equivalent to Shroringer's wave mechanics. (331) "The Heisenberg-Born concepts leave us breathless." "Heisenberg has laid a big quantum egg, in Cottingen they believe in it. I don't." Einstein wrote, to Born's wife, Hedwig, and to Ehrenfest in Leiden, respectively :)(: Two years later, **in 1927** at 25, Heisenberg propounded his best known and most baffling aspects of quantum physics: the **UNCERTAINTY PRINCIPLE**" (331) "It is impossible to know the precise position of a particle/electron/photon, and its precise momentum (its velocity times it mass) at the same instant." "The more precisely the position of the particle is measured, the less precisely it is possible to measure its momentum. And the formula that describes the trade-off invloves (no surpruse) Planck's constant." (6.62607 x10 to power -34)) "The very act of observing something (eg allowing photons or electrons or any particles or waves of energy to strike the object), affects the observation."	**(344, 348) Solvay Debates:** **Oct 1927** **Oct 1930** [Yes. TRUE. I believe so.] [True. A phenomenon I observed the second-Hand of watches. When my eye caught/observed it the first instance, it seemed

	(331) "An electron does not have a definite position or path, **<u>until we observe it."</u>** **This is a feature of our universe.** Not merely some defect in our observing or measuring abilities. [it asserts that there is no objective reality – not even an objective position of a particle – outside of our observations (objective reality occurred inside of our observation) (or objective reality become a reality only when we observe it)] [Quantum/Light/wave mechanics ←--→ Uncertainty Principle] (331) Heisenberg's principle, and other aspects of quantum mechanics, undermine the notion that the universe obeys strict causal laws. CHANCE, "indetermimacy" and probability took the place of certainty. Einstein wrote him a note objecting his principle. Heisenberg replied bluntly: "I believe that indeterminism, that is, the non-validity of rigorous causality, is necessary." Note: (332) "Observable magnitudes (only) must go into a physical theory." [Non-obervable magnitutudes must not go into a physical theory.] This has been the 'belief' held by Einstein (when he developed his relativity theory; and held by Heisenberg as well leading to his theory of "uncertainty prnciple" – a dictum of Ernst Mach: theories should avoid	frozed/stilled at a 'position' for a split second.] "Calling those things which are not (not yet), as though they are. (Roman 4:17) Hence, in our Prayers: "No Objective Reality (OR) until we "SPEAK IT" (SI)." Objective Reality come into being when we speak it. (455) **<u>"Snap into reality"</u>** "the reality of the particles (position & momentum) consists only in the "probabilities" (including the probabilities that are expressed in Shrodinger's wave mechanics). By measuring or observin the system, the observer causes the wave function to collapse and one distinct position or state to "snap into place". (455) "a definite box (real, the ball is or is not in it) comes about

	any concepts that cannot be observed, measured, or verified (331). (332) "A new fashion has arisen in physics, Certain things cannot be observed and therefore should not be ascribed reality." Einstein lamented. But the fashion you speak of, was invented by you in 1905!" Philip Frank replied. (332) The theoritical advances in mid 1920s were shaped by Niels Bohr and his colleagues, including Heisenberg, became known as the "Copenhagen interpretation of Quantum Mecahnics. "A property of any object can be discussed only in the context of how that property is observed or measured. And these observations are not simply aspects of a single picture, but the complementary to one another. In other word, there is no single underlying reality* that is independent of our observation. ■ "It is WRONG to think that the task of physics is to find out how nature is," Bohr decalred. ■ **Physics concern what we can say about nature**." (333) This inability to know a so called "underlying reality"* meant that there was no strict determinism in the classical sense. When one wish to calculate "the future" from "the present" one can only get statistical results," He-isenberg said, "since one can never discover	only when I lift the covers", which was the way quantum mechanics explained thing, Einstein said, failed the test of completeness. Einstein admited, "but it is nonsense all the same." He replied Heisenberg. (332) Einstein's approach had evolved (by 1927, aged 47) (333) Now, he was a defender of the established order, and or Newton. Bohr is right. (333) Nature/GOD, is beyond us to find out 'what it is'; neither can we define or describe it into 'what it is." But we are only able to 'say' about Nature' since one can necer discover every details of the present." Unlike Einstein who tried all his life to describe 'what it is' of Nature; to define 'what nature is'

	every details of the present." (349) still, Einstein would persist his denial of Bohr's declaration of "physics concerns not what nature is, but merely what we say about nature" -- in his tribute statement to James Clerk Maxwell (master of field approach to physics): "Belief in an external world independent of the perceving subject is the basis of all natural science." "(quantum mechanics) makes no claim to describe physical reality itself, but only the probabilities of the occurrence of a physical reality that we view." He wrote. (455) Quantum mechanics assert that particles do not have a definite state except when observed, and when two particles can be in an entanglement state so that the observation of one determines a property of the other onstantly. As soon as any observation is made, the system goes into a fixed state. ["**snap into place; snap into reality**"]** (456) Einstein never accepted this is a complete description of reality.	in a mathematical formula, like he tried to define Spacetime and Gravity. (333) Eisnstein never fully came around, even as experiments repeatedly showed quantum mechanics to be valid. He remained a realist, one who made his creed to believe in an objective reality, rooted in certainty, that existed whether or not we could observe it. Exactly, Bohr's belief physics concerns not to describe nor define what reality/nature is. But to **what to say about nature**.
	Back to Mach's principle: (334, 335) As a young empiricist, Einstein embraced Mach's principle and willing to reject any concepts that could not be observed, such as ETHER and absolute time and space and simultaneity. (that led to his 1905 special relativity theory). But the success of his 'general theory of relativity convinced him that	Niels Bohr, He-isenberg, were not "unbelieving" about the existence of "God" or "objective reality"; what they were refering to, in my

	Mach's skeptism (though was useful to weeding out superflous concepts) did not provide much help in constructing new theories. (334) In his maturity, Einstein more firmly believed that there was an objective "reality" that existed, whether or not we could observe it. And that (the belief in an external world independent of personal observing it) was the basis of all science. Hence, he resisted quantum mechanics (calling it incomplete). (334) He believed (a metaphysic faith? Or a habit ingrained in mind?) that: "*nature must operate with absolute certainty*." (334) (Author) Perhaps, it is just as reasonable, though less satisfying, to believe that "***some things simply happen by chance***" ("zufall"). Certainly, there was mounting evidence that it was the case on/in the subatomic level. (334, 335) But Einstein (**his biggest miss**!), unable to believe "some things could simply happen by chance ("unable to believe in a 'dice-playing' God"). His faith in determinism and causality (influeced by Hume), said, that the ultimate goal of physics was to discover the laws that strictly determine causes and effects. Subscribing to the philosophy of Baruch Spinoza (Einstein's concept of impersoanl God), believed that a divine design was reflected in the elegant laws that governed the way the universe worked.	understanding, the issue of God is outside of the pursuit of Physics. Rather, as Bohr put it, Physics concern with what we can say about nature/God. Neither deny nor dispute the existence of God/Nature/"objective reality" Yes, they believed that it is a feature of the universe, a feature of physics: "An electron, which exists, but does not have a definite position or path, until we observe it." AND "indeterminism", that is, the non-validity of rigorous causality, is necessary. AND CHANCE, "indetermimacy" and probability (are also a 'built-in features') (to allow to) take the place of certainty.

	Like Spinoza, E did not believe in a personal God. It was a principle that he elevated (as he had the relativity principle) to the level of a postulate, one that guide him in his work. (335, 326) "when I am judging a theory, I asked myself whwether, if I were God, I would have arrnaged the world in such a way." This one posibility he simply could not believe: "that the good Lord would have created beautiful and subtle rules that determined MOST of what happened in the universe, while leaving a few things completely yo chance. It felt wrong." He went further, "if the Lord had wanted to do that, he would have done it thoroughly, and not kept to a pattern . . . He would have gone the whole hog. In that case, we wouldn't have to look for laws at all." "Quantum mechanics is certainly imposing. But an inner voice tells me that it is not yet the real thing. . . . the theory says a lot, but it does not really bring us closer to the secrets of the Old One. I, at any rate, am convinced that **He does not play dice**." :)) Einstein ended up deciding that Quantum mechanics, though it may not be wrong, was at 'incomplete'. He continued to search and seek a mathematical unified theory in which the Gravitational Field and the Electromagnectic Field are interpreted only as different components or manifestations of the same unified Field.	He believed, and continued in his whole life, searching for a full/fuller explanation of how the universe operates. One that would incorporate BOTH general relativity theory and quantum mechanics. That would not leave things to chance. (342) **The spirit (life) (power) that moves inside a**

	One that would incorporate BOTH general relativity theory and quantum mechanics. That would not leave things to chance. A search that would elude him till the end of his life (18 Apr 1955). Note: (342) Now, but only now, we know that **the force** that moves electrons (quanta/wave) in their ellipses about the nuclei of atom, is the **same force** that moves our earth in its annual course around the sun." (344) with the discoveries of new particles and **forces** (1930s onward), physics was becoming less unified. (347) Einstein's own remarks, he was bothered by: 1, the uncertainty principle aspect of quantum mechanics; but more disturbing to him was: 2, the way quantum mechanics seemed to permit 'action at a distance'. According to the Copenhagen interpretation, something that happened to one object could, *instantly* determine how an object located somewhere else would be observed. [spooky action at a distance] "No **force**, including gravity, can postulate faster than the speed of light. Einstein insisted. (347) By 1928, a concensus had formed that quantum mechanics was correct.	**human, is the same spirit that moves in the Universe.** **The same power of resurrection that raised Jesus from the death, is the same power that now resides in us (believers who have asked Jesus to dwell inside of us). Romans 8:11**

	(250) Schwarzschild radius Due to his "realist" stance, Einstein did not believe, then, or later, that Schwarzschild radius and calculations & results showing: ■ In such a situation, nothing wihtin the Schwarzschild radius would be able to escape the gravitational pull (a line/point of breakdown – gravitational collapse**), not even LIGHT or any other form of radiation. Time would also be part of the warpage as well, dilated to zero. ■ In other words, a traveler (any object, light or time) nearing the Schwarzschild radius would apprear, to someone on the outside, to freeze to a halt. actually corresponded to anything real. After Einstein's death in 18 Apr 1955, scientists would discover Schwarzschild theory was right. Stars could collapse and create such a phenomenon, in fact they often did. In the 1960s, physicists such as Stephen Hawking, Roger Penrose, John Wheeler, Freeman Dyson, and Kip Thorne showed that this was indeed a feature of Einstein's general relativity theory, one that was very real. Black holes have now been discovered all over the universe, including one at the center of pur galaxy that is a fe million tomes more massive than our sun. Black holes are the only places I nthe universe where Einstein's general theory of relativity (Field Equation of Gravitation) shows its full power	** Einstein did not believe, then, or later, that these results actually corresponded to anything real. (due to hos 'realist' stance. In 1939, at age 60, he stated in a paper, "a clear understanding as to why these "Schwarzschild singularities" do not exist in physical reality." **A few months later, however, Robert Oppenheimer and his students Hartland Snyder argued the opposite, predicting that stars could undergo a gravitational collapse. John Weheeler dubbed them "black holes", and they have been a feature of cosmology as well as Star Trek episodes, ever since. (251, 319) * Einstein had asserted this claim in a letter (1917) to Schwarzschild. But Schwarzschild disagreed with his assessment (319)

	and glory. (Freeman Dyson) Here, in the black holes, space and time lose their individuality and merge together (as Schwarzschild radius correctly described) in a sharply curved 4-D structure precisely delineated by Einstein's equations. (Freeman Dyson)	In 1920 May, 4 years later, Eistein changed his mind on this assessment. Schwarzschild was right after all.
	(449) A 'supposition' Einstein believed that we should hold fast: "The real factual situation of the system S2, is INDEPENDENT of what is done with the system S1, which is spatially separated from the former. It was an intuition of Einstein. But it was a 'supposition'. It had never been proven. There are two related concepts that Einstein uses: 'Separability': means that two differnet particles or systems that occupy different regions in space have an independent reality; 'Locality': means that an action involving one of these particles or systems cannot influence a particle or system in anpother part of space, unless something travels the dustance between them**, a process limited by the speed of light. To Einstein, realism and localism were related underoinning of physics. "Physics should represent a reality in time and space, free from "spooky action at a distance."	As for Christian, we believed otherwise. We belieced the what is done with the system S1 (KOG),, is not separated from the system S2 (on Earth). The will of God in system S1 can affect the system S2 on Earth. ** that something travle between them, is the 'Quanta' – the Light – the Son of the Living God. This is the 'miss' that Einstein would never able to grasp and necer able to reconcile.
	(456) "Alreay" but "not yet" Aug 1935, a thoguht experiment, involved a situation in which quantum mechanics would assign only probabilies, even though common sense tells us that there is obviously an 'underlying reality' that exists with	**(456) "Alreay" but "not yet"** **Remember pastor Kong's teaches on the Victory of Jesus attained on the Cross, "alreay"**

	certainty. Einstein imagined a pile of gunpowder that, due to instability of some particles, will combust at some point. Einstein said, the Quantum mechanics equation for this situation "describes" a sort of blend of "not yet" and "already exploded system" But this is not the real state of affairs. For in reality there is just no intermediary betwwn exploded and not-exploded. (456-458) **Shrodinger 's Cat** (Nov 1935) Shrodinger came out with his similar thought experiment. "In the quantum world, a nucleous is in a "superposition", meaning it exists simultaneously as being dacayed and undecayed, until it is observed, at which point its wave function collapses and it becomes either one or the other." This maybe conceiveable for the microscopic quantum realm, but it is baffling when one imagines the intersection between the quantum realm and our observable everyday worls. He asked, when does the (quantum) system stop being in "superposition" incorporating both states and **"snap into reality?"** This led to his thoguth experiment of imaginery creature which was destined to become immortal whetehr it was dead or alive (dubbed Shrodinger's cat). Depending on the atoms in the steel chamber either decay or may not decay from "superposition" into a state one or the other, the imaginary cat in the steel chamber can be said to be alive or dead -- "the psi-function of the entire system would express this by having in it the living and dead cat mixed or smeared out."	**but "not yet" ?** **That is explained in Quantum mechanics equations.** **It also expressed in Shrodinger wave mechanics equations of probabilities.** **So, there exists, mathematically, inside the microscopic quantum world, the possibility of 'creature' exists as living as well as dead!** **However, we do know that quantum effects generally are not observed in our daily visible world, though. So, most would not argue if S-cat somehow being both dead and**

	"The psi-function that contains the living as well as the dead cat just cannot be taken as description of a real stateof affairs." Einstein responded with thrills.	**alive until the lid is opened.**
	(458) **"Spooky action at a distance" & "Entanglement"** In the 1980s, French physicist, Alain Aspect and others, provided eveidence that locality was not a feature of the quantum world. "Spooky action at a distance" and the potential entanglement of distant particles was. **"Quantum entanglement"** – an idea discussed by Einstein and Shrodinger as a way of umdermining the 'incomplete' of quantum mechanics – is now one of the weirder elements of physics, because it is so counterintuitive. (459) "the closest thing we have to magic" (2005, N. David Mermin) "Einstein's Spooky Action see on a chip (2006, New Scientist) "entanglement is the mysterious phenomenon of quantum particles whereby two particles such as photons behave as one regardless of how far apart they are." (towards aking of quantum computer) (459) "this spooky action at a distance does not violate the speed limit of light, although in theory, somethong happens to a particle in one place can be instantly reflected in by one that is billions of miles away.	Refer (454) "The quantum states of two particles that have interacted must subsequently be described together! With any changes to one particle instantly being reflected in the other, no matter how far apart they now are. "Entanglement of predictions arises from the fact that the two bodies at some earlier time formed in a true sense one system, that is were interacting, and have left behind "traces" on each other." "If two separated bodies enters a situation in which they influence each other, and separate again, then there occurs what I just called ENTANGLEMENT of our knowledge of the two bodies. Hence, the Revelation, by observing the Prophecies in

	The two particles, though distant, remain part of the same physical entity (in Jesus Christ!) By observing one of them, we may affect its attributes, and that is correlated to what would be observed of the second particle. But no information is transmitted, no signal sent, and tehre is no traditional cause-and-effect relationship. Quantum mentanglement cannot be used to send information instantaneously. ["special relativity survives by the skin of its teeth." Brian Greene]	Heaven, it would affect the attributes and correlated to what would be observed on Earth. As such, some of the Prophecies / Visions which was revealed to John, was not allowed him to write it down for our observation.
	INERTIA and Ether (119, 125, 318, 319) Newton's thought experiment about whether water roating in a bucket in empty space would be subjected to inertia pressure and thus press against the sides of the bucket: (199, 201) Einstein & Besso looked at whether rotation could be considered a form of relative motion. Eisntein believed that his Entwurf paper (May 1913) and general theory (Nov 1915) solved Newton's bucket issue in a way that Mach would have like: INERTIA (or centrifugal forces) would not exist for something spinning in a completely empty universe. Instead, INERTIA was caused only by rotation relative to all other objects in the universe. (251) "According to my theory, Inertia is simply an interaction between masses, not an effect in which 'space' of itself is involved, separate from the observed mass." * (252) "If I allow all things to vanish, then according to Newton the	(252) It implied that Einstein would believe that after death, nothing remains. LKY held the same belief. Sadly. * Einstein had asserted this claim in a letter (1917) to Schwarzschild. But Schwarzschild disagreed with his assessment (319)

	Galilean Inertial space remains; following my interpretation, however, nothing remains." * (302) ■ "How does a gyroscope know that it is rotating? ■ "How does it distinguish the direction in space toward which it does not want to be tiled?" ■ These were questions that were not answered directly, not yet, even after Einstein discovered the Field Equation of Gravitation. (131) "is there a "privileged physical states of movement"? Before Einstein relativity theory, physics was based on the notion of 'absolute movement'. The study of light waves had assumed that one state of movement, that of the "light-carrying ether", is distinct from others. All movement of bodies were were supposed to be relative to the light-carrying-ether, which was the incarnation of absolute rest. But after efforts to discover the "privileged state of movement of this 'hypothetical ETHER' through experiments had failed, it seemed that the problem should be restated. This, Einstein stated, is what the theory of relativity did. It assumed that there are NO "privileged physical states of movement" and asked what consequences could be drawn from this." (252) Throughout 1916, Einstein struggled to preserve the relativity of iniertia and Mach's principle, over the issue of inertia, which got him into a debate with Willem de Sitter of Leiden, a great astronomer of the time.	In 1920 May, 4 years later, Eistein changed his mind on this assessment. Schwarzschild was right after all. (302) Walther Rathenau (a foreign minister of Germany in 1922, but was murdered on 24 June 1922) (1917 Questions)

	(318) In a lecture in Leiden in May 1920, 4 years after his General Relativity was publised, Einstein publicly proposed a reincarnation (form) of the ETHER. "More careful reflection teaches us, however, that the special theory of relativity does not compel us to deny ether." "We may assume the existence of an ether, only we must give up ascribing a definite state of motion to it." (318) He made clear that hos (view of) new ETHER was different from the old one (as viewed by Newton, which had been conceived as a medium that could ripple and thus explain how light waves moved through space). Instead, he was re-introducing the idea in order to explain "rotation and INERTIA". "to deny the ETHER is ultimately to assume that empty space has no physical qualities whatever. The fundamental facts of mechanics do not harmonized with this view… Besides observable objects, another thing, which is not perceptible, must be looked upon as real (a departure from Mach's principle), to enable accelerateation or rotation to be looked upon as something real … The conception of the ETHER has again acquired an inteligent content, although this content differs widely from that of the ETHER of the mecahnics wave theory of light …. According to the general theory of relativity, **Space is endowed with physical qualities** (space is not empty); in this sense, tehre exists an ETHER. Space without ETHER is unthinkable.** For in such space, there not only would be no propogation of light, but also no possibility of existence for standards of space and time (measuring-rods and clocks), nor therefore any spacetime intervals in the physics sense.	This revised view (0f ETHER) was justified, he saud, by the results of the general theory of relativity. (319) So what was this new ETHER and what did it mean for Mac's principle (**(251) INERTIA would not exist for something spinning in a complete empty universe. Instead, INERTIA was caused only by rotation relative to all other objects in the universe. (319) In other words, if you were inside a bucket that was dangling in empty space, with no other objects in the universe, there would be no way to tell if you were spinning or not. That seems to answer to Q posed in

	But this ETHER may not be thought of as endowed with the qualities of ponderable media, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it." Einstein had changed his mind. In his Leiden speech (May 1920, 100 years ago), unlike his 1916 interpretation of general relativity, Einstein ACCEPTED that his gravitational field theory implied that 'empty space had physical qualities'. The mechanics behavior of an object hovering in empty space, like Newton's bucket, "depends not only on relative velocities, but ALSO on its state of rotation," And that meant "space is endowed with physical qualities." (319) Admittedly, Einstein was abandoning Mach's principle. Mach's idea that inertia is caused by the presence of all the distant bodies in the universe implied that these bodies could 'instantly' have an effect on an object (spooky effect from a distant**, was how Einstein later called it), even though they were far apart. Einstein's theory of relativity did not accept instant actions at a distance. Even gravity did not exert its force instantly, but only through changes in the gravitational field that obeyed the speed limit of light. (319, 320) "Inertia resistance to acceleration in relation to distant masses supposes action at a distance. Because the modern physics does not accept such things as action at a distance**, he comes back to the ETHER, which has to serve as medium for the effect of INERTIA." (320) Eistein seemed to believe, as he saw it (in 1920), the water in Newton's bucket would be pushed up the walls even if it were spinning	302 by Walther Rathenau) ? And for the question raised by Newton's bucket ?*

	in a universe devoid of any other objects. [In contradiction to what Mach would have predicted. "Even in an otherwise empty univers, you will feel pressed against the inner wall of the spinning bucket …. In general relativity, empty spacetime PROVIDES a bechmark (or frame of referecence points / metric field, of Einstein tensor, Gx gee-mu-nu**) for accelerated motion." (Brian Greence) (320) The INERTIA pushing the water up the wall was caused by its rotation with respect to the "**metric field**"** (as defined in Einstein tensor), which Einsitein now (in 1920 May) reincarnated as an ETHER. (320) As a result, he had to face the possibility that general relativity did not necessarily eliminate the concept of "**absolute motion**", at least with respect to the "**metric of spacetime**" (320) This (absolute motion thing) clearly made Einstein uncomfortable. (320) The best way to eliminate the need for an ETHER that existed separately from matter, he concluded, would be to find his **ELUSIVE** *unified field theory* (UFT). (320) "What a glory that would be! "The contrast between ETHER and matter would face away," he said, "and, through the general theory of relativity, the whole of physics would become a COMPLETE system of thought."	

	(543) To the very end, he struggled to find his ELUSIVE *unified field theory* (UFT). And the final thing he wrote, before he went to sleep for the last time, was one more tline of symbols and numbers** that he hoped might get him just a little step closer to the spirit (SPIRIT) manifest in the laws of the universe. ** [_____]	
R. (his Remarkable trait, character, and personality)		
Appearance (outward)	Electrified halo of hair, Piercing eyes, (29) Superior personality, wisecracking, sarcastic exterior shell around a softer inner soul; prickly exterior, delicate realm of intense personal life (39) Distracted demeanor, casual grooming, frayed clothing, carefree forgetfulness… iconic absentminded professor (in later years) (44) Playfulness and seriousness; insouciance and intensity; intimacy and detachment – peculiar and evident (207) 'inclination *not* to go along" (268) "There was a streak in him that enjoyed the photographers and	

	the crowds. He has an element of the exhibitionist* and the ham." (269) *he looked the part, and he could and would, play the role, as performer," peppered interviews readily with delightful aphorisms, and he knew exactly what made for a good story. (427) "a kindly and gentle professor, distracted at time, unfailingly sweet, … rarely combed his hair or wore socks. In baggy confortable cloths." A dis-heveled gray profusion. Partly an assertion of his simplicity, and partly a mild act of rebellion. (427) Kindly yet aloof. Brilliant yet baffled. (438) he loved to walk, shuffled up Mercer Street. **(428) He would fix his gaze on cosmic truths and global issues. Which allowed him to seem detached from the here and now.**	
Works (fruits)	** (428) This role he playes was not far from the truth. But he enjoyed platng it to the hilt. Knowing that it was a great role. (79) A very personal character, a stamp that made it recognizably his (the way a Picasso is recogzably a Picasso) Originality and creativity (299) "The value of a college education is not the learniing of many facts but the training of the mind to think."	

Traits & Character (inward)	Inner security, serenely self-confident Simple humanity A reverence for the harmony of nature -- Humility Childlike capacity for wonder Passionately CURIOUS (548) "I have no special talents, I am only passionately curious." (marveling at mysteries that struck others as mundane) Embrace nonconformity Contempt for authority (repulse TYRANNY) Free minds, Free spirits, Free individuals (214) Tolerence (condition for a creative society) Persistence and tenacity Intuitive feel; held true to his own instinct, despite the qualms of others (22) Powerful independence of mind (courage to challenge established scientific beliefs and thereby revolutionalize physics. Skepticism and a resistance to recived wisdom. (a hallmark of his life) (27) Great sense of humour** Language articulation (intimacy, influenced by Winteler family in Aarau) (298) "young and fresh," he called Princeton; "A pipe as yet unsmoked." (520) "I am giving more than receiving in every respect, do not take myself nor the doings of the massess seriously, am not ashamed of my weaknesses and vices, and naturally take things as they come with	Challenge to established theological beliefs and biblical explanations / interpretation, thereby revolutionalize the Genesis Creation Story (David)

	equanimity and humor." (522) like to speak his mind; no patience for the compromises necessary to manage, or even symbolically lead, complex organizations. (523) Einstein brilliance sprang from being a rebel and nonconformist who recoiled at any attempt to restrain his free expression. (533) "I have become kind of 'enfant terrible' in my new homeland due to my inability to keep silent and to swallow everything that happens. Besides, I believe that older people who have scarely anything to lose ought to be willing to speak out in behalf of those who are young and are subject to much greater restraint." (533) "if I were a young man again and had to decide how to make a living, I would not try to become a scientist or scholar or tacher. I would rather choose to be a plumber or a paddler, in the hope of finding that modest degree of independence still available." (534) Einstein's wry detachment and his sense of humour saved him from serios despair and bitterness.	(520) "I am giving more than receiving in every respect, do not take myself nor the doings of the massess seriously, am not ashamed of my weaknesses and vices, and naturally take things as they come with equanimity and humor."
Unusual ability	(93) Imaginative leaps – visual IMAGINATION Discerning of great principles (thru thought experiments) – CREATIVITY (tolerence) (160) Visualize how equations were reflected in reality & nature; to visualise the physical reality that was painted by the brush strokes of mathematics (physical contents in an abstract formula) (eg a boy riding alongside a light beam).	

	(7) WISDOM to see the (17) Math is the language nature uses to describe her wonders. "as a boy of 12, I was thrilled to see that it was possible to find out truth by reasoning alone, without th ehelp of any outside experience," (106) "his mind could juggle a variety of ideas simultaneously" (161) Ability to tune out all distractions.	
**Einstein great sense of Humour, and humility, politeness and touch of vanity (436) and his 'self-view' of himself	(196) On his head-snapping insight of "gravity was the curving of the fabric of spacetime, answered his 2nd son Eduard (Tete): "when a blind beetle crawls over the surface of a cruved branch, it doesn't notice that the track it has covered is indeed curved," "I was lucky enough to notice what the beetle didn't notice." (201) On the controversies around his Newton's Bucket paper, he wrote: "I enjoy controversies. In the manner of Figaro. Would my noble Lord venture a little dance? He would tell me! I will strike up the tune for him." (202) On the near completion (but not yet complete) 'The Field Equation of Gravitation", he wrote: "Nature shows us only the tail of the lion. But I have no doubt that the lion belongs with it even if he cannot reveal himself all at once. We see him only the way a louse that sits upon him would." (232) "I resemble a farsignted man who is charmed by the vast horizon and whom the foreground bothers only when an opaque object prevents him from taking in the long view." (243) a "dissenter" (since 1918)	

	(297) “Subtle is the Lord, but malicious he is not.” (1921) (298) “Nature hides her scecret because of her essential loftiness, but not by means of ruse.” (298) “Who knows, perhaps He is a little malicious.” (1955) Alluding to his frustration with the uncertainties of quantum mechanics. (367) “life is like riding a bicycle. To keep your balance you must keep moving.” Einstein wrote to his son Eduard who fell into a listless depression. (395) “I am learning English, but it doesn’t want to stay in my brain.” (395) “one feel the insignificanc e of individual and it makes me happy.” (after a ferocious storm in his 3rd time sailing across the Atlantic) (397) “I prefer to dress according to the season, not according to the weather.” (422) “The beauty of my bodyguards would disarm a conspirator sooner than their shotguns.” Referring to the two young females bodyguards “arrnaged” by Oliver Locker-Lampson to protect Einstein while he was in London, before his last scheduled departure for America. (423) “falling in love is not the most stupid thing that people do, but gravitation cannot be held responsible for it.” (427) “I’m a kind of ancient figure known primarily for his non-use	

	socks and wheeled out on special occasions as a curiosity." (427) " I have reached an age when, if someone tells me to wear socks, I don't have to." (428) " I am no longer slave to my pipe, but I am slave to that woman." (referrinf to Elsa, his cousin/wife). (435) "you see, my hair has withstood water many times before, but I don't know how many times my hat can." (caught in a rain during Summer 1934 on Rhode Island, near Long Island) (436) " when I retire, I sleep as nature made me." (439) "Please don't tell anybody, but I am Dr Einstein, I'm on my way home, but I've forgotten where my house is." (1935, @56) (440) " I am learning just as mich from your child asshe is learning from me." (440) " do not worry about your difficulties in mathematics; I can assure you that mine are even greater." (482) " I am in the Navy, but not required to get a Navy haircut." (494) "I do not know how the Third WW will be fought, but I can tell you what they will use in the Forth – rocks." (520) "I am giving more than receiving in every respect, do not take	

	myself nor the doings of the massess seriously, am not ashamed of my weaknesses and vices, and naturally take things as they come with equanimity and humor." (537) Einstein has a calming influence.	
	Eisntein last days (1954, 1955, aged 75, 76) His words in the final transition to death (18 Apr 1955) .. (natural & spiritual) (536) "Brief is this existence, as a fleeting visit in a strange house. The path to be pursued is poorly lit by flickering consciousness." (536) The strange thing about growing old is that the intimate identification with the here and now is slowly lost. One feels transposed into infinity, more or less alone." "the devil counts out the years conscientiously." (540) In 1955, after his 76th birthday (14 Mar 1789) A few days after he learned of the death of Michael Besso, his Zurich school mate since youth, Einstein ruminated on the nature of death and time in the condolence letter he wrote to Besso's family: "he has departed from this strange world a little ahead of me. That means nothing. For us believing physicists, the distinction between past, present and future is only a stubborn illusion." (!!) (539, 540) On 11 Apr 1954, he signed the Einstein-Russell Manifesto.	His eulogy at graceside of Rudolf Ladenberg, who had beeen his colleague in Berlin and then Princeton. "he ramained sane in a mad world." Bertrand Russell wrote.

	On aa Apr 1954, too, Abba Eban, Israelri Ambassador, arrived to discuss a radio address Einstein was scheduled to give to commemorate the 7th anniversary of the Jewish State. (541) 12 Apr 1955, Einstein still went to work … 13 Apr, he stayed at home, was unwell. 14 Apr, at home, refused the suggestion to repair his aorta. "I have done my share, it is time to go. I will do it elegantly." 15 Apr, he was in agony. Doctor ordered hom to hospital. 16 Apr, in hospital 17 Apr (Sun), woke up feeling better. "If only I had more mathematics." Half jokingly. 18 Apr, shortly after 1 a.m., he blurt out a few words in German. ** The ane-urysm had burst. He died at age 76.	** at his bedside lay 1) the draft of his undelivered speech for Israel Independence Day; 2) 12-page of tightly written equations. The final thing he wrote before he went to sleep the last time, was one more line of symbols and numbers that he hoped might get him, just a little step closer to the spirit, the spirit that manifest in the laws of the universe.
O. Other Physicists' observation, belief, discovery	(125) Isaac Newton (1642 – 1727) "The Deity endures forever and is everywhere present, and by existing always and everywhere, He constitutes duration and time." (2) Absolute space and time (90) Laws that describe a very comprehensible mechanical universe (knowing all the forces acting in nature at a goven instant, as well as momentary positions of all things in the universe.	

	(198) Newton's Bucket 1913 May, Einstein and Grossmann produced an Outline paper, that was conforming to the requirements of energy momentum conservation and being compatible with Newton's laws in a weak static field. (199) the most famous thought experiment described by Newton in the 3rd Book of Principia. Imagine a bucket that begins to rotate as it hangs from a rope. At first the water in the bucket stay rather still and flat. But soon the friction between from the bucket causes the water to spin around with it, and it assumes a concave shape. Why? Because INERTIA causes the spinning water to push outward, and therefore it pushes up the side of the bucket. When the bucket stops, the water keeps spinning inside for a while. Why? Perhaps the water is spinning relative to nearby bodies such as the earth that exert gravitational force. But imagine the bucket spinning in the deep space with no gravity and noreference points. Or imagine it spinning alone in an otherwise empty universe. Would there still be INERTIA? Einstein asked (200) Newton believed so. And said that it was because the bucket was spinning relative to "absolute space".	(200) Enst Mach debunked thos notion, and argued that the INERTIA existed because the water was spinning relative to the rest of the matter in the universe. He went further to say, "the same effets would be observed if the bucket was still and the rest of the universe was rotating around it."
	The Fabric of the Cosmos, Brian Greene	
	(322) Niels Bohr, new model of atom and Quantom Mechanics; Quantum Theory of Radiation (1916) (156) Wolfgang Pauli	

	(96, 141) Max Planck (1858 – 1947), Quanta, (322) Discovered a mysterious mathematical constant explaining blackbody radiation, a fundamental 'constant property of light' (6.62607 x 10 to power of -34 joule-second) (96) Which Einstein had transformed into a fundamental constant of nature: (140, 156) "energy (absorned or emitted or radiate) to be composed of a very definite of equal finite paskages" (169) Alas, despite his pioneering discovery of the light-constant, Plank insisted until his death, that the concept of quanta came into play ONLY when light was being emitted or absorbed. And that they were NOT a 'real-world feature of light itself. Maxwell's equations [building on observation by Michael Faraday (1791 – 1867)] James Clerk Maxwell (1831 – 1879) Electromagnectic wave equations that specified how changing electric fields create magnetic fields and vice versa. That result of this "coupling" was an electromagnetic wave. Maxwell's equations remain unchanged by both the relativity and quantum revolutions to date.	(141) 'Principle of least action' [socially refers as 'principle of convenient', which explains why people choose to flock to cities. David] a foundation of physics that holds that light or object moving between two points should folow the easiest path. [high to low; thick/concerntrate to dilute; hot to cold
	(193, 194, 195) Bernhard Riemann (1826 – 1866) German student of Carl Friedrich Gauss (pioneer of geometry of curved surfaces) at the center of Gottingen, Germany. At age 14, he invented a perpetual calendar as a gift for his parents. Building on the pioneering works of Gauss (diff types of geometry that could describe the surface of spheres), Riemann developed a way to describe a surface no matter how is geometry changed, even if it varied	Useful thing about Riemann's tensor, and other tensors Einstein adopted from other mathematicians (Gregorio Ricci-Curbastro; Tullio Levi-Civita), is that they are generally 'covarint'. Which means that the (R)

	from spherical to flat to hyperbolic from one point to the next. And he went beyond: dealing with curveture of just 2-D surfaces, explored the various ways that math could describe the curveture of 3-D and even 4-D space. Using a concept of metric (metric tensor), which specifies how to calculate the distance between 2 points in space. Riemann worked out ways (metric tensor) to determined mathematically the distance between 2 points in space no matter how arbitrarily it curved and contorted; whch could be used to define and describe a distance in curved 4-D spacetime.	relationships between their components remained the (S) same even when there were arbitrary changes or rotations in the space and time coordinate system. In other word, the info encoded in these tensors could go thru a variety of transformations based on a changing frame of reference, but the basic laws governing the (R) relationship of the components to each other remainded the (S) same.
	Ernst Mach (1838 – 1916) (200) "Mach's Principle" His argument on the "Newton's rotating bucket hangs from a rope" which observed the oriigin of "inertia" of the water spinning inside a bucket, even when the bucket stopped rotating, was that: the inertia existed because water was spinning relative to the rest of the matter in the universe. And that, indeed, the same effects would be observed if the bucket was still and the rest of the unverse was rotating around it." (201) Einstein, in his 1913 letters to Mach stated, after his publised of the paper "The Entwurf (Outline) and Newton's Bucket in May 1913: (201) "your brilliant investigations on the fundations of mechanics will have received a splendid confirmation, for its shows that inertia has its origin in some kind of interaction of the bodies, exactly in accordance with your argument about Newton's bucket (thought) experiment."	As for Newton, he believed that the 'inertia' was because the water was spinning relative to absolute space. But Macg debunked the notion of absolute space.

	(252) Throughout 1916, Einstein struggled to preserve the relativity of iniertia and Mach's principle, over the issue of inertia, which got him into a debate with Willem de Sitter of Leiden, a great astronomer of the time. (251, 252) By 1917, after his discovery of the Field Equation of (319) Gravitation, Eisntein believed that his general theory solved Newton's bucket issue in a way that Mach would have like: INERTIA (or centrifugal forces) would not exist for something spinning in a completely empty universe. Instead, INERTIA was caused only by rotation relative to all other objects in the universe. "According to my theory, Inertia is simply an interaction between masses, not an effect in which 'space' of itself is involved, separate from the observed mass." "If I allow all things to vanish, then according to Newton the Galilean Inertial space remains; following my interpretation, however, nothing remains." In May 1920 (4 years after 1916/17), Einstein had changed his (319) mind. Admittedly he was abandoning Mac's principle. Mach's idea that inertia is caused by the presence of all the distant bodies in the universe implied that these bodies could 'instantly' have an effect on an object (spooky effect from a distant, is how Einstein called it), even though they were far apart. Einstein's theory of relativity did not accept instant actions at a distance. Even gravity did not exert its force instantly, but only through changes in the gravitational field that obeyed the speed limit of light.	Einstein had asserted this claim in a letter (1917) to Schwarzschild. But Schwarzschild disagreed with Einstein assessment. Now, in 1920, Einstein changed his mind. Schwarzschild was right afterall.

	(212) David Hilbert (1862 – 1943) (June 1919, mathmatician at Gottingen, Germany) Raced Einstein to discover the mathematical equations for general relativity; the Field Equations of Gravitation. (216) Hibert was a better pure mathematician than Einstein.	
	(251) Karl Schwarzschild (1875 – 1917, 42 years) (249, 250, 319) (German mathematician astrophysicist) Director, Potsdam Observatory (1916 -) 'Schwarzschild radius' Karl Schwarzschild (1916) apply Einstein Field Equations to objects in space. His first calculaitons focused on curvature of spacetime OUTSIDE a spherical, nonspinning star. Another set of calculations on what ot would be like INSIDE such a star. In both cases, something unusual seemed inevitable: "if all the mass of a star (or any object) was compressed into tiny enough space – defined by what became known as the Schwarzschild's radius – then all of the calculaitons seemed to breakdown. **At the center, spacetime would infinitely *curved in on itself*.** For the Sun, that would happen if all its mass were compressed into a radius less than two miles. For the Earth, it would happen if all its mass were compressed into a radius of about one-third (1/3") of an inch. What would that mean ?? ■ In such a situation, nothing wihtin the Schwarzschild radius would be able to escape the gravitational pull (a line/point of breakdown – a gravitational collapse**), not even LIGHT or any other form of radiation. Time would also be part of the warpage	Einstein did not believe, then, or later, that these results actually corresponded to anything real. (due to hos 'realist' stance. In 1939, at age 60, he stated in a paper, "a clear understanding as to why these "Schwarzschild singularities" do not exist in physical reality." **A few months later, however, Robert Oppenheimer and his students Hartland Snyder argued the opposite, predicting that stars could undergo a gravitational collapse.

	as well, dilated to zero. ■ (319) In other words, a traveler (any object, light or time) nearing the Schwarzschild radius would apprear, to someone on the outside, to freeze to a halt. Schwarzschild, contracted 'autoimmune disease' while in Russia. He died that May 1917, just weeks after he wrote his paper/calculations to Einstein.	After Einstein's death in 18 Apr 1955, scientists would discover Schwarzschild theory was right. Stars could collapse and create such a phenomenon, in fact they often did.
	(132, 133) Hermann Minkowski Einstein former math teacher at the Zurich Polytechnic He gave a formal mathematical structure to the Special Relaativity Theory (1905) by Einstein. His approach was the same one suggested by the time traveler on the first page of H.G. Well's great novel 'The Time Machine', publisehd in 1895: "there are really four dimensions, three which we call the three planes of Space, and a forth, Time." Minkowski turned all events into mathematical coordinates in four dimensions, with time as the 4^{th} dimension. This permitted transfom=rmations to occur, but the mathematical relationships between the events remain invariant. Minkowski srmatically annouced his new mathematical approach in a lecture in 1908. "The views of space and time which I wish to lay before you have sprung from the soil of experimental physics, and therein lies theor strength. Henceforth, space by itself, and time by itself, are doomed to fade away into mere shadows, and only a kind of union of the two (spacetime) will preserve an independence reality." He said.	(133) but at the end of 1908, Minkowski was fatally stricken with perinitis.

	(125) Newton's concept of absolute time – meaning a time that exists in "reality" and tick-tocks along INDEPENDENT of any observations of it – had been a mainstay of physics ever since Newton had made it a premise of his Principia (21y years earlier). The same was true for absolute space and distance. "Absolute space, in its own nature, without relation to anything external, remain always similar and immovable." Newton wrote in Book 1 of the Principia. But Newton seemed discomforted by the fact that these concpets could not be durectly observed. "Absolute time is not an object of perception," he admitted. Newton resorted to relying on the presence of God to get him out of the dilemma. "The Deity endures forever and is everwhere present, and by existing always and everwhere, He constitutes duration and space." Newton wrote.	
	(326) Louis de Broglie (a descendant of deposed French royal family) His doctoral dissertation in 1924 helped transform the field (of quantum theory). "If a wave can behave like a particle, he asked, shouldn't a particle also behave like a wave? "A particle such as an electron could also be regarded as a wave." "I had a sudden inspiration," de Broglie recalled, Einstein's wave-particle dualism was an ABSOLUTEly general phenomenon extending to all physical nature." And that being the case, the motion of all particles – photons, electrons, protons, or any other --- must be associated with the propagation of a	Wow! YES !

	wave."	
	(353) Edwin Hubble A colourful astronomer at Mt Wilson Observatory, in the mountains above Pasadena, California, made A series of discoveries beginning in 1924, including Andromeda nebula, another galaxy; and at least 24 more other distant galaxies (more than 100 billion of galaxies, he believed). And that galaxies were moving away from us. (354) that the entire Metric of Space (spacetime fabric) is expanding in all direction.* (354) Einstein visited Edwin and Mt Wilson Observatory in Jan 1931, during his second trip to the US. (355) Einstein original general relativity theory actually predicted that the universe is expanding; he could have trusted his theory more to make that prediction in 1915/1916 (but he did not. Instead he introuduced a 'lamda' in responding to astronomers who had observed and thought then that the universe is 'static'. (356) Einstein's constant (lamda) however, si still needed by cosmologists today, to explain the accelerating expansion of the universe: ■ 1st, anything that contributes to the "energy density" of the vacuum, acts just like the the E-constant (lamda); ■ 2nd, the mysterious "dark energy" that seems to cause this expansion behaves as it were a manifestation of E-constant.	* (355) "Great dtella systems rushing away from the earth at 7,300 miles/s, offer a problem to Dr. Albert Einstein." It was reported in a Associated Press. (356) The cosmological constant (lamda) he had introduced to account for a static universe was apparently not necessary. He called it his greatest blunder. Hubber's confirmation in 1931 could have the same or more ompact as Eddington's confirmation of Einstein prediction of the sun's gravity would bend rays. The Big Bang might have been named the Einstein's Bang! 'Cosmological constant' (lamda), the repulsive force, to hold the universe, if there is, shall be the same force that contribute to the 'energy density' of vacuum, and

	(356) "the genious of Einstein, who added a 'cosmological constant' to his equation for the expansion of the universe (1915/16) but then retracted it (1931), may be vindicated by new research."	the 'dark force' that seems to cause expansion of the universe. Just as the force that moves the elctrons is the same force that moves the earth; the repulsive force is also that same force. A varying manifestation of the same force. God himself.
Historical moments where and when "Mysterious Alignment of Forces" causes a shift in human outlook	(279) 1st, it happened to art, and philosophy, and science at the beginning of the **Renaissance** (1300 – 1600) (14th to 16th Century) ■ transition from the Middle Ages to Modernity (Humanism), that associated with great social change. ■ Began in Florence, Italy. Artists: Leonardo da Vinci, Michelangelo, Raphel, Donatello, Sandro Botticelli, Filippo Brunelleschi, Titian, Giorgio Vasari etc. ■ Black Death (1347 to 1351), the Pestilence and the Plague. 75 to 200 mil deaths. The disease caused by Yersinia pestis bacterium, originated in Central Asia or East Asia. In large part spread by human fleas – which cause pneumonic plaque. 2nd, Again at the beginning of the **Enlightenment** (1715 – 1789) (17th to 19th Century) (from the death of Louis XIV to the outbreak of French Revolution) ■ intellectual and philosophical movement (Renaisance Humanism;	

	Age of Reason) ■ some consider the publication of Isaac Newton's Principia Mathematica in 1687 as the first major enlightenment work. Newton completed his paper while escaping the Great Plaque (in 1666). ■ Great Plague of London (1665 to 1666) (bubonic plaque). Originated from Central Asia in 1331, that led to the Black Death (1347 to 1351), and Great Plaque in Loondon, and lasted until 1750. It killed estimated 100,000 – ¼ of London's population – in 18 months. The pague was caused by Yersinia pestis bacterium, usually transmitted through the bite of an infected rat flea. 3rd, Now in the early 20th century, **Modernism** was born (1900s to 1940s) by breaking of the old strictures and verities. A spontaneous combustion occurred that included the works of Einstein (1905), Picasso (1907), Matisse, Stravinsky (Renard, May 1922), Diaghilev (Ballets Russes, May 1922), T.S. Eliot (The waste Land, 1922), James Joyce (Ulysses, 1922), Proust, Schoenberg, Freud, Wittgenstein and many other path-breakers. "The Relativity proposition was directly responsible for abstract painting, atonal music, and formless leterature." (Lawrence Durrell, Bathazar) (280) The mechanical orderand Newtonian laws that had defined classical physics, music, and art no longer ruled.	

	■ WWI (28 July 1914 to 11 Nov 1918) (mobilise more than 70 mil military personnel; 60 mil Europeans) (Est 9 mil combatant deaths; 7 mil civilian deaths; 16 mil deaths as a direct result of the war) (while genocides and 1918 influenza pademic caused another 17 – 50 mil deaths worldwide) ■ WWII (1 Sep 1939 to 2 Sep 1945) (Presidents: Franklin D. Roosevelt, Winston Churchhill, Jospeh Stalin, Harry S. Truman, Benito Mussolini, Adolf Hitler) ■ Between the Allies and the Axis. Involving more than 100 mil people in more than 30 countries. 70 to 85 mil deaths (massacres, genocides, and the Holocaust). Deaths in Societ Union and China were mostly civilians (premediated death, starvation and disease). 4th, Postmodernism (PM), mid to late 20th Century A broad movement across philosophy, the arts, architecture, and citicism, marking a departure from modernism. Generally defined by an attitude of skeptism, irony, rejection of the grand naratives and ideologies of modernism, often calling into question various assumptions of Enlightenment rationality. Common targets of PM critique include universalist notions of objective reality, morality, truth, human nature, reason, science, language, and social progress. Is broadly characterized by tendencies to 'self-referentiality', epistemological and moral relativism, plurarism, and irreverence; promoting obscurantism. (Which adds nothing to analytical or empirical knowledge).	

	5th, Today, 21st Century (2000s to 2020s, if the time is cut short; if grace period is extended further, to 2040s) Globalism(?) Emerging technology: AI, 5G, Drones' Cyber warfare; Space force Emerging Globalists: Bill Gates, Henry Kissinger, Elon Musk, Masayoshi Son, Jack Ma, Mark Zuckerberg, Larry Page, Sergey Brin, George Soros, Jeff Bezos, Ban Ki Moon, Obama, Dr Fauci, Rothschild, Rockellfeller etc Leaders: Pope Francis, Bishop Sanchez Sorindo (Vatican), J Sachs (UN), Vladimir Putin, XJP, E. Macron, B. Obama and others. Pandemic: ■ Covid-19 pandemic (Dec 2019 to June 2021 ??) ■ Pestilences and Plagues II, III, IV etc ■ Global Vaccination (ID2020 initiative) Deaths due to Covid-19: 258,963 worldwide (as of 6 May 2020) WW III (2026 ??) Deaths: (one-third of world population, ot 1/3 of 7.6 billion, that is 2.5 billion deaths ?)	