Scholars are now using scientific instruments to help broaden our understanding of the world and how the universe operates since the fifth century BCE. Few evolutions happened before the twentieth century, however, a lot of developments started in the world around 1900 till date.

These developments and technological developments happened because of Albert Einstein's theory of general relativity and quantum mechanics. Discovery has been made, from one discovery to another since the past one hundred years. This book summary has provided an important record on various revelations and the problems that the physicists are yet to solve.

Scholars of ancient Greece began the present-day science as well as the experiments of the late Middle Ages

After the first human civilization which took place thousands of years, day to day natural incident caused by appealing supernatural spirits and celestial beings were explained by our forefathers. However, this started changing around the year 500 BCE, thanks to the scholars of ancient Greece. These scholars understood that reason, observation as well as mathematics can be used as instruments to describe the world we live in.

One of the ancient Greece scholars was Anaximander a philosopher who described how rain falls from the sky using rational methods. He further clarified that rainfall was not the result of a benevolent god. He explained that accumulated water in the sky as a result of evaporation is what falls back on earth as rainfall.

After, Democritus another scholar came up with a theory that all the things in the universe were from tiny building blocks called atoms. Additionally, Democritus also contemplated that there will a point in which atoms of matter can never be divided. This was explained in the spatial extension theory which states that anything that has weight and can occupy space is called matter. This means that atoms definitely have indivisible size.

In the third century BCE, philosophers like Plato and Aristotle produced greater advancement. Both Plato and Aristotle helped us understand how mathematics can be used as an instrument

of understanding for our universe. In 100 CE Ptolemy was born and he designed formulas used to calculate how the planets move which has helped us predict the future spots of planets.

Thousands of years after in the Middle ages, Copernicus and Galileo the Renaissance scholars went back to ancients instruments of mathematics and reason. Due to this, Copernicus was able to transform astronomy by showing that once the Sun and not the Earth is seen as the center of the solar system, the orbits of the celestial bodies can be calculated.

Due to the newly invented telescope during the sixteenth century, Galileo was the first man to see the Earth’s moon, Saturn's rings and the moons of Jupiter. Also, Galileo repeated various experiments just to test his hypotheses, which created the scientific method that is known now. One of the hypotheses Galileo tested was that all objects fall at a uniform speed.

Although it was revealed by Galileo's experiments that it was acceleration and not speed, that was uniform among objects falling. This led to the first mathematical law discovery for earthly bodies, that speed of any object falling on Earth will increase by 9.8 meters per second.

The theory of universal gravitation by Newton was unfinished by Albert Einstein during the twentieth century

In the seventeenth century, a scientist named Isaac Newton saw Galileo’s calculations after a hundred years in a new direction. Newton came to the realization during his experiment on the little moon orbiting over the Earth’s surface, that force affecting Galileo’s falling objects is the same as the force affecting the speed of the orbiting objects.

Newton was aware that a force must have caused objects to fall to the floor and the moon to orbit around the Earth. Therefore, this led to the development of the theory of universal gravitation.

A new picture of the universe was created by Newton’s theory in which the great sizes of space and bodies are drawn to each other through the constant force of gravity. This theory led to a great discovery of scientific understanding as that was the first time that a force was known to be connected to the laws of the Earth and celestial bodies in the heavens.

Even though Newton was a genius, he realized there was a missing picture. There were unknown forces at work that still needs to be discovered.

One of those unknown forces was disclosed by Michael Faraday and Clerk Maxwell both British scientists in the nineteenth century. Both scientists also discovered electromagnetism which is the force that joins both atoms that build molecules and electrons that are found within atoms. However, the most important was the field concept. Both Faraday and Maxwell proposed that there was an unnoticeable web also known as field all through space that allows electromagnetic forces to act.

Due to the theory of special relativity by Albert Einstein, the field concept happened in 1905. This theory was expected to unite Newtonian physics together with the most recent theories. With Einstein’s new theory, he was able to show observers how they could witness the laws of time and space differently based on their unique state.

Instantly, time became a non-universal absolute. Einstein just began with his theories after this huge revealment.

The theory of general relativity by Einstein bonded matter and space as well as proposed an expanding universe.

The theory of special relativity by Einstein raised a lot of concerns in 1905 which made him a famous young man in the community of scientists. After 10 years, Einsteins' theory of general relativity was commended by a lot of people and scientists.

The theory of general relativity was an intelligent theory that bonded all matter and space as being liable to the same laws of the gravitational field. This is similar to earlier years where the electromagnetic field bonded both electric and magnetic forces.

Einstein redefined the concept of space and what space is all about by launching a gravitational field. For a long time, space has been known to be empty. However, Einstein suggested that space is not empty. Space is known as the gravitational field that constantly affects all matter as claimed by the theory of general relativity.

In the word of the Newtonians, inquiries about matter or space were asked separately. However, Einstein illustrated how mass can affect the space around it, hence, generating a loop in space. Which led bodies to be drawn towards one another, for instance, like two marbles in a funnel. Hence, the concept of gravity in the seventeenth-century was successfully taken and used in the twentieth century.

The theories of Einstein has been applied to the beginning of the universe, which led to the concept of how it all began from a “big bang”.

Scientists have been wondering for a long time whether or not the universe is finite or infinite. However, Einstein asserted that the universe can both be finite or infinite. Einstein used the Earth as an example. For instance, if you travel around the world forever in just one direction, you would never get to a point where the road ends. Therefore, this means the earth has no limit but it is finite, accompanied by a specific amount of surface to the planet.

This made Einstein postulate whether or not the geometry of space isn't the same. Maybe if you travel in one direction, you might actually find yourself at the point where you started the journey from. A universe that is finite is one that all bodies would be pulled to the center due to gravity which will lead to inward fall of all the matter. Although this hasn't happened yet, this made Einstein realize that the universe must be expanding outward due to the event that set all things in place.

That was how Einstein got the concept of the big bang theory which is the actual event that generated sufficient force to overcome the pull of gravitation.

The quantum mechanics theory has revealed three important features of the world.

In the twentieth century, the theory of general relativity by Einstein was not the only turning point that happened in Physics and science. Quantum theory or quantum mechanics also transformed Physics.

The theory of general relativity attempts to describe the universe law of matter and space while the theory of quantum mechanics tries to unfold what is happening at the microcosmic position of atoms and particles.

Although physics has recorded various exceptional number of experimental success, there are still a lot of mysteries physicists have not been able to solve.

Quantum mechanics has revealed three important features of our world which are granularity, relationality, and indeterminacy.

This started in 1900 with Max Planck a German physicist while he was calculating energy found in electrical fields. In order for Planck to make things easy, he took a shortcut in mathematics by assuming that all the energy found in the field was spread out in small packets called quanta instead of a continuous rate. Surprising, Planck's calculations and assumption were right.

According to Einstein in 1905, he concluded that light consisted of similar small packets. Therefore, it was realized that quanta were more than mathematical tricks. Years after, Neils Bohr, a Danish physicist revealed that atom's electrons can only contain a specific quantity of energy in opposition to the continuous spectrum of energy that had been previously assumed.

Therefore, what Planck, Einstein, and Bohr had previously detected were the basics behind the theory of quantum mechanics which was the universe is granular because energy and light both consist of tiny finite packets.

The other important feature of quantum mechanics is that the universe is relational which was discovered by Werner Heisenberg a German physicist.

In the 1920s, Heisenberg discovered that electrons do not usually have a specific position in space which put an end to some of the popular belief among physicists. What Heisenberg found was that the position of electrons can only be decided if the electron is acting with something else. Therefore, this could also mean that the existence of an electron is based on its association with other objects.

This takes us to the last feature of quantum mechanics which is indeterminacy. As the name implies, indeterminacy means that physical events such as the position an electron is uncertain and can only be predicted. An example is the uncommon world of the subatomic environment.

The quantum gravity theory raises uncertainty about the usual beliefs of space and time.

There are contradictions facing modern physics today. The theory of general relativity and quantum mechanics which are the backbone of the twentieth-century physics are inconsistent with each other.

The theory of general relativity states that space is bent and everything in it is continuous. While the theory of quantum mechanics states that space is flat and everything is granular which comes in tiny packets.

Physicists are finding a way to bring another theory that can combine and balance these two theories together. This is exactly what quantum gravity is trying to achieve. Quantum gravity has two basic claims which are space is not continuous but it is also granular.
This takes us back to Democritus question on what can or cannot be infinitely divisible at an atomic level. According to the theory of quantum gravity and Matvei Bronštein the Soviet physicist, it was said that space is not infinitely divisible which was what Democritus had speculated concerning matter and atoms.

Although Bronštein theory was formulated around the 1930s, various research has supported his theory that the smallest size of space can be broken down between 10-33 centimeters. This measurement was given a name, known as the Planck length which is a billion times smaller than an atom nucleus.

Since space and matter are ending up to being similar to one another as recently suspected, different names such as atoms of space and quanta of space have been used to describe the space granular nature.

Another basic concern of quantum gravity is the popular belief of the time

Einstein's theory of special relativity that was formulated over a century ago enlightened us on the popular belief that we are all subjection to the cosmic clock. As a matter of fact, the time differs in some places as time might be slower in a place and fast in some places.

For instance, a place where the gravity is higher the time will be slower. Also, if you put a clock on top of a table and place another clock on the floor, the one far away from the earth will be slightly slower than the one close to the earth.

Time is no longer used as a universal and valid scientific measurement. Also, time is no longer used in basic equations among current physicists and those in the field of quantum gravity. Therefore, one could say time is not in existence in present physics and events does not happen in time anymore.

Reality is Not What it Seems: The Journey to Quantum Gravity by Carlo Rovelli Book Review

Physics has been around for a long time. The scholars of Greece were the first people to utilize reason. Scientific methods using accurate and repeatable experimentation were formulated during the Middle Ages. This made Newton develop a theory about the world in which both time and space were absolute.

In the twentieth century, Newton's law was completely turned around due to the theory of general relativity and quantum mechanics by Einstein. Physicists of today try their best to settle the differences that general relativity and quantum mechanics may have. Due to this, a new world has been created in which time can be relative, space is granular and electrons can be in existence and not exist at the same time.

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