

REPORT ON STAR GROUP MEETING OCTOBER 2021

On Monday 4th October, Andrew Morrison (of Soar-Valley U3A) gave STAR Group a very interesting talk entitled, "**Gravity: From Aristotle to Einstein by way of Newton.**"

This talk addressed the accumulated understanding of Gravity throughout the ages.

As the Abstract for this talk outlined:

Since the ancient world began to speculate about the nature of the Universe, it has taken more than 2000 years to gain our present - and almost certainly incomplete - understanding of Gravity.

This talk will trace the way our concept of Gravity has developed from then to now.

The Aristotelian explanation of gravity is **that all bodies move toward their natural place**. For the elements earth and water, that place is the centre of the (geocentric) universe; the natural place of water is a concentric shell around the earth because earth is heavier; it sinks in water.

Aristotle's theory covered both aspects with a description of how bodies reacted under gravity and also a reason for the effects, namely the "natural tendency" of a stone to produce motion to bring it to its natural place on the Earth. Both aspects are, of course, **quite incorrect**.

The Italian scientist **Galileo, (then professor of mathematics at the University of Pisa) is said to have dropped two spheres of different masses from the Leaning Tower of Pisa to demonstrate that their time of descent was independent of their mass.**

Newton understood gravity as **a universal property of all bodies**, its force dependent only on the amount of matter contained in each body. Everything, from apples to planets, obey the same unchanging laws. The apple falling on Newton's head which gave us the famous gravitational law has recently been disproved by scientists researching black holes.

Newton's view of gravity didn't work for some things, like Mercury's peculiar orbit around **the** sun. The orbits of planets shift over time, and Mercury's orbit shifted faster than Newton predicted.

Einstein's general theory of relativity explains **gravity as a distortion of space** (or more precisely, spacetime) caused by the presence of matter or energy. A massive object generates a gravitational field by warping the geometry of the surrounding spacetime.

Andrew demonstrated his keen knowledge of this subject and traced our understanding (or our lack of understanding) of gravity from the earliest ideas to current day level of knowledge..

He took some very interesting questions relating to how gravity works and the limits to our knowledge. The questions covered such issues as Gravity Waves and how we can detect the

presence of gravitational waves using instruments like the LIGO Observatory comprising two enormous laser interferometers located 3000 kilometres apart.

Note: Gravitational waves are 'ripples' in space-time caused by some of the most violent and energetic processes in the Universe.

Even though science has come a long way from our earliest theories of what Gravity is, this talk emphasised how many more important questions remain unanswered.

For example: If we regard the immense amount of mass that there is in the known universe why is it that the gravitational force is still insufficient to stop or even slow down the rate at which galaxies are moving away from each other?

The members of STAR Group are truly grateful to Andrew Morrison for giving such an interesting and thought provoking talk and showed their appreciation in time honoured way.