TASC Clarion article

A New Cosmology – a talk given by Professor Andrew Norton – 20th November 2016.

You know how it is, everything seems to be going along smoothly, you've no cares in the world then completely out of the blue someone throws a spanner in the works, the lights go out and everything goes Dark. Well, this is how it must have felt for many cosmologists back in the late 60's and early 70's. Up till then we thought we knew just about everything that there was to know about Life the Universe and everything. Then along came Vera Rubin and a new cosmology.

Just to set the scene, before I tell you about Vera, I should mention that the world of cosmology in the early 20th century was going through some revolutionary times. Back in 1920's an astronomer, Edwin Hubble, discovered what looked like small diffuse clusters of stars, called nebula, which were in fact completely separate galaxies many light years from our own. He also discovered that these galaxies, apart from a handful of nearby ones, were speeding away from us in all directions.

In the late 70's Vera Rubin, who was an astronomer at the Cambridge Institute of Washington, made some crucial discoveries about the way the outer most stars in spiral galaxies, similar to our own, which seemed to be moving too fast and as a result should have been flung out into intergalactic space. But for some reason they weren't. There had to be something holding them back and this is where things got Dark.

It was proposed that what was keeping these stars in place was a new form of matter, something that had mass and exerted an additional gravitational force which kept these stars in check. The only thing was you couldn't see it, and because it was invisible it was called Dark Matter. So far this idea has stood up to many challenges but is still being disputed every so often by newer theories.

Ever since Hubble's discovery of an expanding Universe, further investigations have found that galaxies are moving away from each other faster and faster, what was the reason for this? Well in 1998 experiments were carried out which seemed to show that Space itself was expanding, causing galaxies to accelerate away from each another and this effect was being driven by a new force, Dark Energy. In fact it seems that about 75% of our Universe is composed of Dark Energy, 20% is Dark Matter and the remaining 5% is what you, me and everything else is made of, normal visible matter. It certainly seems that we have come a long way from the times of Aristotle where the Earth was considered the centre of the whole Universe, to today where the Earth, us and in fact our whole visible universe is just an insignificant little side show to what's actually going on out there.