"An Unknown Force of the Universe is Acting on Dark Matter"

- *dailygalaxy.com*
- Dark Matter
- July 4th, 2013
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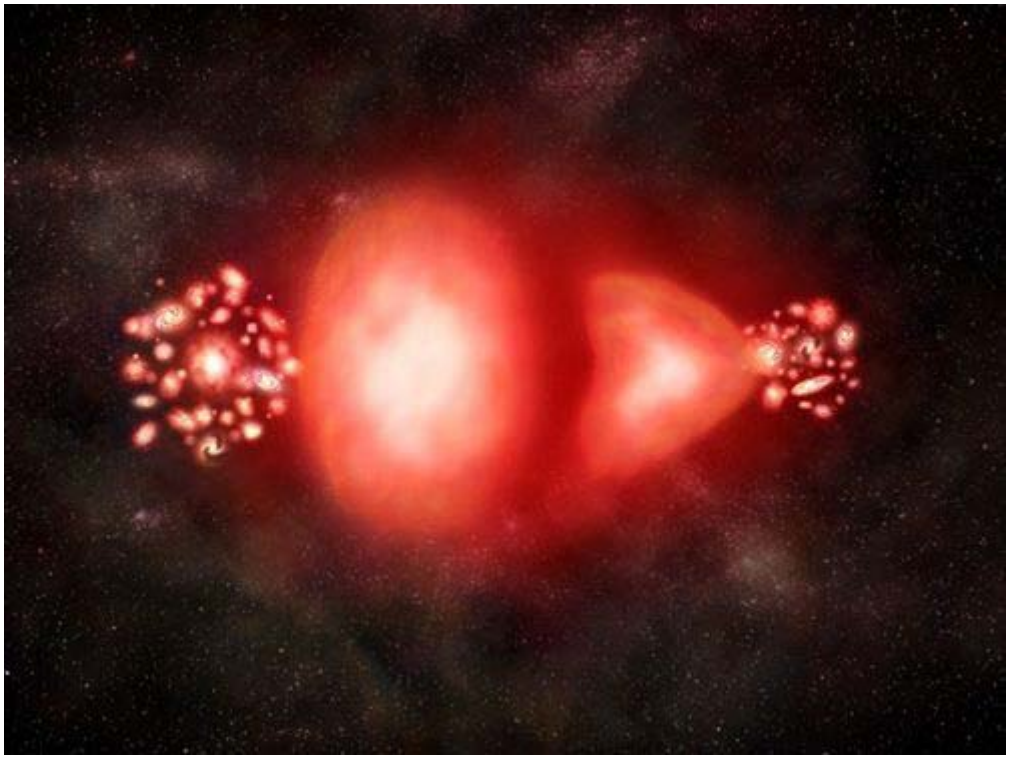

Today, on the 4th of July, a European team of astronomers led by Hongsheng Zhao of the SUPA Centre of Gravity at the University of St Andrews are prsenting a radical new theory at the RAS National Astronomy Meeting in St Andrews. Their theory suggests that the Milky Way and Anromeda galaxies collided some 10 billion years ago and that our understanding of gravity is fundamentally wrong. Remarkably, this would neatly explain the observed structure of the two galaxies and their satellites.

Dr. Zhao is not unused to controversial theories. In 2009, he led An international team of astronomers that found an unexpected link between

mysterious 'dark matter' and the visible stars and gas in galaxies that could revolutionise our current understanding of gravity. Zhao suggested that an unknown force is acting on dark matter.
Only 4% of the universe is made of known material. Stars and gas in galaxies move so fast that astronomers have speculated that the gravity from a hypothetical invisible halo of dark matter is needed to keep galaxies together. However, a solid understanding of dark matter as well as direct evidence of its existence has remained elusive.

The team believes that the interactions between dark and ordinary matter could be more important and more complex than previously thought, and even speculate that dark matter might not exist and that the anomalous motions of stars in galaxies are due to a modification of gravity on extragalactic scales.

"The dark matter seems to 'know' how the visible matter is distributed. They seem to conspire with each other such that the gravity of the visible matter at the characteristic radius of the dark halo is always the same," said Dr. Benoit Famaey (Universities of Bonn and Strasbourg). "This is extremely surprising since one would rather expect the balance between visible and dark matter to strongly depend on the individual history of each galaxy.
"The pattern that the data reveal is extremely odd. It's like finding a zoo of animals of all ages and sizes miraculously having identical, say, weight in their backbones or something. It is possible that a non-gravitational fifth force is ruling the dark matter with an invisible hand, leaving the same fingerprints on all galaxies, irrespective of their ages, shapes and sizes."

Such a force might solve an even bigger mystery, known as 'dark energy', which is ruling the accelerated expansion of the Universe. A more radical solution is a revision of the laws of gravityfirst developed by Isaac Newton in 1687 and refined by Albert Einstein's theory of General Relativity in 1916. Einstein never fully decided whether his equation should add an omnipresent constant source, now called dark energy.

Dr Famaey added, "If we account for our observations with a modified law of gravity, it makes perfect sense to replace the effective action of hypothetical dark matter with a force closely related to the distribution of visible matter."

The implications of the new research could change some of the most widely held scientific theories about the history and expansion of the universe.

Lead researcher Dr. Gianfranco Gentile at the University of Ghent concluded, "Understanding this puzzling conspiracy is probably the key to unlock the formation of galaxies and their structures."