Down to earth

Unraveling The Formidable Force Of Gravity

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SCIENCE BEDTIME STORIES

The relatively calm sphere, namely Earth, we occupy today has an unruly and fierce past. For some billion years ago, it was just a hot ball of gases requiring a whole lot of work to make it habitable. And so, when the Almighty ventured out to accomplish this mission, he faced several challenges. He did prepare all the water bodies, the hills, and other animate beings - everything a decent habitable place demands with precision, oddly enough, there was still something that went off course. For everything he stationed on the Earth's surface would just float away in the cosmos to be never found. "Why can't I place my creations on it," the Almighty thought out loud. A clueless Earth stood there wondering what went wrong.

As a few months passed in like manner with no progress whatsoever, the Almighty decided to meet his other celestial creations in hopes of finding a plausible solution. A meeting was organised in the Solar sphere with Sun, Moon, the planets, etc., all in attendance. As everyone settled, the Almighty divulged his Gordian knot for all to ponder over and unravel. What followed next was an array of bizarre opinions -

"Perhaps, you can just give up on your endeavours and invest your precious time somewhere else," suggested Mercury, the hot-cold planet.

"Or you can plan in order to make me hospitable instead?" tacked on the red planet Mars.

"How about giving me a surface first?" exclaimed Sun, while all the others burst out laughing.

By now, the Almighty knew that nothing great would come out of this discussion. So, he decided to leave. But, as he was about to do so, Jupiter, the eldest, sneaked up on him, attempting to talk to him in private. "Earth has no interest in taking up the responsibility you wish to entrust him with. Give him a reason at least," he let out at once. His words acted like magic for the Almighty, lifting up his mood and liberating him of his 'earthly' woes. He knew the magical force he sought was buried deep inside Earth, waiting to be kindled someday. "The time is now!" he mumbled to himself.

The next day, without losing any time, he took Earth to his laboratory in heaven. There he made him witness all his glorious creations – the mountains, the beaches, the animals and the shores. Instantly enchanted by the sheer beauty and purity of it all, Earth felt something in his soul stir for good. The more he looked, the more he burnt with a desire to make them his own. Sensing it from the newfound radiance in his eyes, the Almighty offered him all of it and more. "Really? I can have it all?" reconfirmed Earth. "It was made solely for you in the first place," came the response. In a trice, a magnetic force inside Earth, dormant until now, exerted a strong pull on everything in his vicinity, making it all fall towards its center and on the ground. They termed it 'gravity', a formidable force of attraction that has the power to pull the whole shebang down to Earth!

The science of it

Gravity or gravitational pull is the force with which a planet or other body draws objects towards its center.

A cosmic discovery

All About Astrophysicist Katherine Freese And Her Expertise In Dealing With Dark Matter

Women in STEM PART XIV

Ruchita Nair, AIS MV, XI I

Katherine Freese is known for her work in theoretical cosmology at the interface of particle physics and astrophysics. One of the first to propose ways to discover dark matter, Freese was born on February 8, 1957. Currently serving as a professor of physics at the University of Texas, Austin, she began her illustrious educational journey at Princeton University and was one of the first women to major in physics from this prestigious institution. She then obtained her MA from Columbia University, a PhD from the University of Chicago, and a postdoctoral fellowship from Harvard University.

She has been constantly working to identify dark matter and dark energy that permeates the universe as well as to build a successful model for the early universe immediately after the Big Bang. Freese is also known as the founder in the field of calculations for SUSY (Supersymmetric) particles and WIMP (Weakly Interacting Massive Particles). In fact, one of her experiments between MACHO (massive astrophysical compact halo object) and WIMPs ruled out MACHO dark matter in favour of WIMPs. She also proposed a model known as the 'Cardassian Expansion', in which dark energy is replaced with a modification of Einstein's equations. Besides, Katherine proposed a new theoretical type of star, commonly referred to as a dark star, powered by dark matter annihilation rather than fusion. And, at present, is working on the evolution of these dark stars and their role in the cosmic space. Moving a step further, Freese is investigating the future of universe and at the same time, working on a new approach to study inflationary cosmology - 'Chain Inflation'.

For her revolutionising work, Freese has received multiple honours over the years, including an Honorary Doctorate (Honoris Causa) from the University of Stockholm in the year 2012, and Julius Edgar Lilienfeld Prize from the American Physical Society (APS) in 2019. GT