

BSA Distinguished Lecture: The Mystery of Dark Matter in the Universe

Wednesday, 20 November 2024 16:00 (1 hour)

The ordinary atoms that make up the known universe, from our bodies and the air we breathe to the planets and stars, constitute only 5% of all matter and energy in the cosmos. The remaining 95% is made up of a recipe of 25% dark matter and 70% dark energy, both nonluminous components whose nature remains a mystery. Freese will recount the stories of the dark matter puzzle, starting with the discoveries of visionary scientists from the 1930s who first proposed its existence, to Vera Rubin in the 1970s whose observations conclusively showed its dominance in galaxies, to the deluge of data today from underground laboratories, satellites in space, and the Large Hadron Collider. Theorists contend that dark matter most likely consists of new fundamental particles; the best candidates include WIMPs (weakly interacting massive particles), axions, light or fuzzy dark matter, or even primordial black holes. Billions of the particles would pass through our bodies every second without us even realizing it, yet their gravitational pull is capable of whirling stars and gas at breakneck speeds around the centers of galaxies, and bending light from distant bright objects. In this talk Freese will provide an overview of this cosmic cocktail, including the evidence for the existence of dark matter in galaxies. She will also talk about Dark Stars, early stars powered by dark matter, that may have already been discovered by the James Webb Space Telescope. Solving the dark matter mystery will be an epochal moment in humankind's quest to understand the universe.

Presenter: Prof. FREESE, Katherine (University of Texas)