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Gravitational and Dark-Matter Concepts that Can Help Explain Cosmic Data

Thomas J Buckholtz

Researcher in Cosmology, Portola Valley, California, USA

Abstract

We discuss gravitational concepts and candidate specifications for dark matter that, together, can help explain known ratios of dark-matter effects to ordinary-matter effects and can help explain eras in the rate of expansion of the universe. The ratios pertain to galaxies and galaxy evolution, galaxy clusters, and densities of the universe. The candidate specifications for dark matter reuse, with variations, a set of known elementary particles. Regarding galaxy evolution and the rate of expansion of the universe, we deploy multipole-expansion methods that combine Newtonian gravity, aspects of motions of sub-objects of gravitationally interacting objects, and Lorentz invariance. One outgrowth from our work suggests relationships among some physics constants. Another outgrowth from our work suggests a basis for a candidate specification for quantum gravity