

PHYSICS COLLOQUIUM

Pushing Einstein's Boundaries: Gravitational Approaches to the Challenges of Modern Cosmology

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Einstein's general theory of relativity (GR) is one of the most successful and well-tested physical theories ever developed. Nevertheless, modern cosmology poses a range of questions, from the smallest scales to the largest, that remain currently unresolved by GR coupled to the known energy and matter contents of the universe. This raises the logical possibility that GR may require modification on the relevant scales.

I will discuss the status of some modern approaches to alter GR to address cosmological problems. We shall see that these efforts are extremely theoretically constrained, leaving very few currently viable approaches. Meanwhile, observationally, upcoming missions promise to constrain allowed departures from GR in exciting new ways, complementary to traditional tests within the solar system. I will finish by describing some promising very recent ideas.

Mark Trodden is the Fay R. and Eugene L. Langberg Professor of Physics at the University of Pennsylvania. He is co-Director of the Center for Particle Cosmology, and currently serves as the Chair of the Department of Physics and Astronomy. Trodden is a theoretical physicist, who has worked broadly in both cosmology and particle physics. The majority of his work is firmly on the particle physics-cosmology border, and includes the development of the modified gravity approach to cosmic acceleration, approaches to dark energy and dark matter; extra dimensional models of particle physics and cosmology; and the matter-antimatter asymmetry of the universe.

Trodden holds an MA and a Certificate of Advanced Study in Mathematics from Cambridge University, and an M.Sc. and a Ph.D. in Physics from Brown University. He previously held the Alumni Professorship at Syracuse University, and has had visiting positions at Cornell University, the Kavli Institute for Theoretical Physics in Santa Barbara, and as a Sir Thomas Lyle Fellow at the University of Melbourne.

Trodden is an elected Fellow of the American Physical Society, the American Association for the Advancement of Science, and the Institute of Physics, and sits on the editorial boards of Physics Letters B, the Journal of Cosmology and Astroparticle Physics, Physical Review D, and the Springer Multiversal Journeys Series. He is the co-author of over 130 papers, and lectures widely on his work, both in the US and internationally, including a number of prestigious public lectures and panel discussions.

Thursday, April 13, 2017 at 4:10PM in LL. 316

Refreshments at 3:45PM

