ASU Department of Physics
Arizona State University

COLLOQUIUM

Thursday, February 22, 2024

Refreshments at 3:15pm in PSF 101
Colloquium from 3:30pm - 4:30pm outside PSF 101

Capture of Primordial Black Holes by Neutron Stars

Professor Thomas Baumgarte

Bowdoin College

Abstract:

Primordial black holes (PBHs) - if they exist - interact with stars. Sufficiently compact stars, in particular neutron stars, are able to capture PBHs gravitationally, which results in the PBH being swallowed by the star. Once inside the star, the “endoparasitic" PBH accretes stellar material, ultimately inducing a dynamical collapse of the entire host star. In this talk I will invoke simple estimates, point-mass approximations, and numerical relativity simulations in order to explore different aspects of this scenario. Specifically, I will discuss the capture process, will highlight the peculiar properties of accretion of matter obeying stiff equations of state, will examine the stability of stars hosting a black hole in the interior, and will present simulations of the final dynamical collapse.

Biography:

Thomas Baumgarte is the William R. Kenan Jr. Professor of Physics at Bowdoin College in Brunswick, Maine. He received his Diploma (1993) and Doctorate (1995) degrees from the Ludwig-Maximilians-Universitaet in Munich, Germany, but carried out most of his dissertation research at Cornell University. He held a post-doctoral position at the University of Illinois before joining the faculty at Bowdoin College in 2001. His work in numerical relativity and relativistic astrophysics has been recognized with Fellowships from the Guggenheim Foundation, the American Physical Society (APS), and the Simons Foundation, as well as with the Bessel Research Prize of the Humboldt Foundation. He co-authored, together with Stuart Shapiro, the textbook Numerical Relativity: Solving Einstein’s Equations on the Computer, and the more introductory book Numerical Relativity: Starting from Scratch.

Host: Prof. Cindy Keeler
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