Search

CENTER FOR COMPUTATION & TECHNOLOGY
Interdisciplinary | Innovative | Inventive

LOUISIANA STATE UNIVERSITY

| Home | About ▼ | Focus Areas ▼ | Research ▼ | Divisions ▼ | Programs ▼ | News ▼ | Events ▼ | Computing Resources ▼ | Jobs | Contact Us | Log In | LSU ▼ |

Events

Current Events
Lectures ▼
Events Archive ▼

Special Guest Lectures

Particles moving around black holes: Opportunities in self-force problems

Ian Vega, University of Florida

Graduate Student, Institute for Fundamental Theory

Johnston Hall 338
May 02, 2008 - 10:00 am

Abstract:
Motivated by the need for accurate waveform templates to be used by LISA, steps are being taken towards developing improved models for point particle motion around a black hole. The inspiral of a stellar mass compact object onto a supermassive black hole (or extreme-mass-ratio inspiral, EMRI) is one the main sources expected to be seen by the LISA satellite. However, the disparity of length and time scales present in this system currently prevent full-fledged numerical relativity from being able to handle it adequately. The more natural strategy is to exploit the small mass ratio of the system and the tools of black hole perturbation theory. Through this approach, one considers the EMRI as a point mass moving in a black hole spacetime. At the test mass approximation, a point particle moves along a geodesic of the black hole spacetime. But going beyond this approximation entails properly taking into account the interaction between the emitted radiation and the emitting point source. The resulting corrections to the geodesic approximation (in both the motion of the particle and the resulting waveform) are now commonly referred to as self-force effects. Getting a grip on these self-force effects has been the pursuit of more than a decade long effort, however the main goal of achieving waveforms remains unmet. In this talk, after giving a brief overview of some of the progress achieved so far, I shall outline a general method we have developed for generating self-consistent models of particle motion in black hole spacetimes. This is illustrated in detail using the analogous, but simpler, case of a scalar charge moving in a Schwarzschild black hole. I shall also discuss the problems that remain in the field, particularly emphasizing the role numerical relativists can play in the work that lies ahead.

Speaker's Bio:
Mr. Ian Vega is in his final year as a graduate student of the Institute for Fundamental Theory at the University of Florida. Ian received his Bachelor's in Physics (Honorable Mention) from the Ateneo de Manila University, Philippines. He has various interests in general relativity and relativistic astrophysics, but his current work is focused mainly on self-force problems in black hole spacetimes.