Abstract Submitted
for the 4CF10 Meeting of
The American Physical Society

Busting Up Binaries: Stellar Interactions With Galactic Supermassive Black Holes ERIC ADDISON, SHANE LARSON, Department of Physics, Utah State University — Gravitational wave astronomy is a new observational tool that will further our understanding of the Cosmos. Virtually everything we know about the Cosmos has been learned through observations of light; gravitational waves are a fundamentally different spectrum that can be used to learn about distant astrophysical systems. Einstein's theory of General Relativity predicts the existence of gravitational waves, and it is well known that stellar-mass compact object binaries will be among the most abundant and easily detectable sources. Gravitational waves from binary systems have not yet been directly detected, however the Laser Interferometer Space Antenna (LISA) mission is expected to detect such systems with ease. Previous analytic studies of stellar mass binaries interacting with a supermassive black hole have predicted a population of stars that spiral into the black hole along nearly circular orbits by the time they enter the LISA detection band. This research explores the three body interaction of a supermassive black hole with a stellar mass binary though numerical simulations. Using direct integration of the gravitational interactions, we are Monte Carlo simulating the black hole - binary interaction to statistically characterize the end state given arbitrary initial conditions.

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Date submitted: 08 Sep 2010 Electronic form version 1.4