

Abstract Submitted  
for the APR10 Meeting of  
The American Physical Society

**A Practical Foundation for Mapping Black Hole Spacetimes**

SARAH VIGELAND, SCOTT HUGHES, MIT — Observations have shown that the universe contains many compact and massive objects that are believed to be black holes. Precise observations of orbital motion near candidate black holes have the potential to determine if they have the spacetime structure predicted by general relativity. We propose to compare strong-field observations of compact objects with the spacetime of bumpy black holes: objects whose multipolar structure is almost, but not quite, equal to that of the Kerr spacetime. We build bumpy black hole spacetimes by adding a perturbation onto a Kerr black hole, and we show how to map the perturbation onto changes in the multipole moments. The perturbation results in changes to the orbital frequencies which we calculate using Hamilton-Jacobi techniques.

Sarah Vigeland  
MIT

Date submitted: 22 Oct 2009

Electronic form version 1.4