Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Spontaneous Scalarization: Dead or Alive?[1] EMANUELE BERTI, LUIS CRISPINO, DAVIDE GEROSA, LEONARDO GUALTIERI, MICHAEL HORBATSCH, CAIO MACEDO, University of Mississippi, HECTOR OKADA DA SILVA, PAOLO PANI, HAJIME SOTANI, ULRICH SPERHAKE, University of Mississippi — In 1993, Damour and Esposito-Farese showed that a wide class of scalar-tensor theories can pass weak-field gravitational tests and exhibit nonperturbative strong-field deviations away from General Relativity in systems involving neutron stars. These deviations are possible in the presence of "spontaneous scalarization," a phase transition similar in nature to spontaneous magnetization in ferromagnets. More than twenty years after the original proposal, binary pulsar experiments have severely constrained the possibility of spontaneous scalarization occurring in nature. I will show that these experimental constraints have important implications for the torsional oscillation frequencies of neutron stars and for the so-called "I-Love-Q" relations in scalar-tensor theories. I will also argue that there is still hope to observe strong scalarization effects, despite the strong experimental bounds on the original mechanism. In particular, I will discuss two mechanisms that could produce strong scalarization in neutron stars: anisotropy and multiscalarization.

[1]This work was supported by NSF CAREER Award PHY-1055103.

Emanuele Berti
University of Mississippi

Date submitted: 01 Jan 2015 Electronic form version 1.4