Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Improved Modeling of EMRI Signal Confusion Noise for LISA DANIEL OLIVER, University of Arkansas, AARON JOHNSON, University of Wisconsin-Milwaukee, BEN RUSSELL, University of Arkansas, LENA JANSSEN, JOEL BERRIER, University of Nebraska-Kearney, DANIEL KENNEFICK, University of Arkansas — Scattering events around a supermassive black hole (SMBH) will occasionally toss a stellar-mass compact object (CO) into an orbit around the SMBH, beginning what is known as an extreme mass ratio inspiral (EMRI). The early stages of such a highly eccentric EMRI will not produce detectable gravitational waves because the source will only be in a suitable frequency band briefly (close to peribothron) during each long-period orbit. However, if we consider an ensemble of such subthreshold sources, spread across the Universe, together they produce an unresolvable background noise that may obscure sources otherwise detectable by LISA, the proposed space-based gravitational wave detector. Previous studies of this EMRI signal confusion background used a Newtonian order approximation. We seek to improve this characterization by implementing kludge waveforms from relativistic population models developed by a semi-relativistic code that can calculate highly eccentric orbits. Further, our group has used the Illustris cosmological simulation to improve on previous black hole mass functions. Here we present some of the preliminary results of this study.

Daniel Oliver
University of Arkansas

Date submitted: 07 Jan 2021 Electronic form version 1.4