Abstract Submitted
for the APR17 Meeting of
The American Physical Society

Efficiently Simulating the Evolution of Massive Black Holes, and Implications for NANOGrav and LISA SEAN MCWILLIAMS, West Virginia Univ — The coalescence of massive black-hole binaries is the principle target source for existing pulsar timing arrays (PTAs) like NANOGrav, and future spaced-based observatories like LISA. For the very massive sources that occur in the PTA band, the massive elliptical host galaxies are thought to evolve primarily through mergers, whereas at the lower masses that will be observed by LISA, other factors such as star formation and accretion must be accounted for. We discuss a novel approach to simulate this evolution that avoids expensive numerical simulations by calibrating to galaxy observations, but which ensures a self-consistent merger model by requiring that the sum of all effects on galaxy and black hole growth actually yield the galaxy evolution that we observe. By optimizing this new approach, we are able to simulate many realizations of the Universe, including a variety of evolutionary scenarios, and what impact they have on the signal observable by PTAs. We will also discuss the extension of this approach to predicting LISA event rates, and the challenges that must be overcome if we are to reliably simulate this lower mass population.

Sean McWilliams
West Virginia Univ

Date submitted: 30 Sep 2016 Electronic form version 1.4