Abstract Submitted
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Constraining stellar binary black hole formation scenarios with LISA eccentricity measurements[1] EMANUELE BERTI, ATSUSHI NISHIZAWA, Univ of Mississippi, ALBERTO SESANA, Birmingham University, ANTOINE KLEIN, Institut d'Astrophysique de Paris — A space-based interferometer such as LISA could observe few to few thousands progenitors of black hole binaries (BHBs) similar to those recently detected by Advanced LIGO. Gravitational radiation circularizes the orbit during inspiral, but some BHBs retain a measurable eccentricity at the low frequencies where LISA is most sensitive. The eccentricity of a BHB carries precious information about its formation channel: BHBs formed in the field, in globular clusters, or close to a massive black hole (MBH) have distinct eccentricity distributions in the LISA band. We generate mock LISA observations, folding in measurement errors, and using Bayesian model selection we study whether LISA measurements can identify the BHB formation channel. We find that a handful of observations would suffice to tell whether BHBs were formed in the gravitational field of a MBH. Conversely, several tens of observations are needed to tell apart field formation from globular cluster formation. A five-year LISA mission with the longest possible armlength is desirable to shed light on BHB formation scenarios.

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Emanuele Berti
Univ of Mississippi

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