Can we distinguish formation models of a super-massive black-hole?

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Outline & Summary

The second generation of detectors, such as KAGRA, advanced LIGO, advanced VIRGO, and future planned Einstein Telescope have enough sensitivity over 10 Hz, which enable us to detect the ringdown gravitational wave from a BH of the mass less than 2000 M\(_{\odot}\). We discuss how can we distinguish models for forming a super-massive black-hole (SMBH) via mergers of intermediate-mass black-holes (IMBHs) by accumulating event data. We assume two different merging histories; hierarchical growth and monopolistic growth, and compare their event rates.

The former model assumes accumulations of coalesces of equal-mass binaries, while the latter assumes only one BH grows by sweeping others. The observable distances highly depend on the unknown BH spin parameter, but we show event rates will differ by models as a function of frequency, corresponding to mass distribution function of each model.

IMBH-IMBH inspiral at Space Interferometers

IMBH ringdown at Ground Interferometers

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