Contribution ID: **16** Type: **Talk**

# Deeper, wide, sharper: binary black holes in the next generation of ground based detectors

*Thursday, 11 April 2019 11:40 (20 minutes)*

Next-generation GW observations will uncover binary black holes throughout the entire Universe back to the beginning of star formation, and will detect new source types (if they exist) beyond stellar-mass binaries, such as intermediate-mass black holes. A number of key questions can be posed that will find an answer:
1) What is the merger rate as a function of redshift to the beginning of the reionization era, and how does it correlate with massive star formation, metallicity, and galaxy evolution?
2) What are the mass and spin demographics of black holes throughout the Universe, are they correlated, and do they evolve with redshift? What do they reveal about the formation and evolutionary origin of BBHs?
3) Do seeds of supermassive black holes exist in Nature? Do intermediate-mass black hole mergers occur in nature, and can such black holes serve as the long sought seeds of supermassive black holes? Is there a single thread which connects the formation of stellar-mass and supermassive black holes?

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**Session Classification:** ET Science

**Track Classification:** 3G science