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Cosmology with Dark GW Sirens and the importance of population assumptions

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Gravitational waves (GWs) from compact binary coalesces are cosmological standard sirens and provided with an electromagnetic (EM) counterpart can be used to probe cosmology. With the rapid increase of GW detector sensitivity, it will be less and less likely that GW sources are accompanied by an EM counterpart. Furthermore, the completeness of galaxy catalogs rapidly decreases and the statistical association of GW and EM data is less and less effective. We show how assumptions on the binary black hole formation channels that lead to features in the component mass distribution can be used to study GW-based cosmology. We discuss how those population assumptions can impact, and possibly lead to systematics on the inferred cosmology. This suggests to jointly infer population properties and cosmology. We show how this can be performed and what order of magnitude of the accuracy to expect for the up-coming science runs.

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