

Measuring the value of H_0 using dark sirens and Sunyaev–Zeldovich galaxy cluster catalogues

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The determination of the Hubble constant (H_0) plays a crucial role in cosmology. Recent work has demonstrated the feasibility of constraining H_0 through analysis of gravitational wave (GW) events without an electromagnetic (EM) counterparts and galaxy catalogues. This can be achieved using the publicly available gwcosmo package, with GW events from the GWTC3 catalogue and the GLADE+ galaxy catalogue. Despite the success in aligning with current state-of-the-art H_0 measurements, the precision is severely limited by the incompleteness of galaxy catalogues. As a consequence, a significant fraction of the GW events that are situated at high redshifts become less informative due to their deficient redshift support.

In this presentation, I propose a novel approach which incorporates information from Sunyaev–Zeldovich (SZ) galaxy cluster catalogues. These catalogues are created using the SZ effect to detect large cluster gas masses and associating them with known clusters identified in EM surveys. The usage of SZ catalogues offers distinct advantages, including the provision of support up to higher redshifts and a more straightforward derivation of host probabilities via cluster masses. Initial findings suggest that integrating SZ catalogues into the existing methodology presents a promising avenue for refining H_0 estimates derived from GW events, thereby enhancing our comprehension of cosmological parameters.

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