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Multi-probe Cosmology with Standard Sirens: a GWxHI Cross-correlation Approach

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Multi-probe techniques have proven to be powerful tools in modern cosmology.
By breaking degeneracies, they provide new ways to gain insights into the large-scale structure (LSS) of the Universe and its evolution.

In this talk, we explore the potential of cross-correlation between gravitational waves (GWs) and 21 cm intensity mapping from neutral hydrogen emission (HI), focusing on its role in view of future high-precision observatories, specifically Einstein Telescope (ET) and the Square Kilometer Array Observatory (SKAO).

Assuming that GW and HI are different tracers of the same underlying dark matter density field, we infer cosmological parameters from both the angular power spectrum (auto-correlation) and the angular cross-power spectrum (cross-correlation) of these probes.
We show that synergies between future GW and HI experiments will significantly improve standard-sirens measurements, thanks to increased sensitivity and high-redshift coverage, allowing us to constrain cosmological parameters to a level comparable to that of well-established alternative probes.

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