Contribution ID: **97** Type: **Oral presentation**

Hunting for the gravitational-wave background: implications for astrophysics, high energy physics, and theories of gravity

I will first define the gravitational-wave background (GWB) and highlight the method we are using to detect it in the presence of correlated magnetic noise. I will then discuss astrophysical (compact binary coalescences) and cosmological (cosmic strings, first-order phase transitions) sources and report on the current constraints imposed from a non-detection during the last observing run of the LIGO/Virgo/KAGRA collaboration. I will also address the question of a simultaneous estimation of astrophysical and cosmological stochastic GWB. Then I will present a search for circularly polarised stochastic GWB and its relation to early universe cosmology. Finally, I will discuss how the GWB can provide tests for gravity theories, including quantum gravity proposals.

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