

# Astrophysics with BH mergers: making sense of a jumble of everything

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The rate of GW detections will soar from hundreds to millions per year as detectors improve, revealing the population properties of BH mergers in great detail. Such properties encode valuable information about how stars form and evolve in galaxies very different from our own. They can provide complementary constraints on the cosmic chemical history and on star formation in environments that evade electromagnetic observations. However, the use of GWs in astrophysics presents challenges that must be overcome to realise their full potential.

In particular, the astrophysical “interpretation challenge” that I will discuss in my talk. The observable BH merger population contains a mixture of systems formed throughout the Universe, with different chemical compositions and in very different environments (allowing for unique formation channels). Both strongly influence the formation of BH mergers and can degenerate into their population properties. One aspect that is key to breaking such degeneracies, and which I will focus on, is constraining the iron-dependent cosmic star formation history.

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