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First observational constraints on the GW-AGN connection through spatial correlation analysis.

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Despite the increasing number of GW detections, the astrophysical origin of the Binary Black Hole (BBH) mergers detected by the LIGO and Virgo interferometers remains elusive. A promising formation channel for these BBHs is inside accretion discs around supermassive black holes, that power AGN. Investigating the spatial correlation between the positions of these potential host environments and the localisation volumes of detected BBHs allows to put constraints on the GW-AGN connection. In this talk I will present how we used this approach to obtain the first observational constraints of the fractional contribution of the so-called AGN channel to the total stellar-mass BBH merger rate. We have found that the fraction of the detected mergers originated in AGN brighter than $10^{45.5}\,\mathrm{erg\,s^{-1}}$ ($10^{46}\,\mathrm{erg\,s^{-1}}$) cannot be higher than 0.49 (0.17) at a 95 per cent credibility level.
Our upper limits imply a limited BBH merger production efficiency of
the brightest AGN, while most or all GW events may still come from lower
luminosity ones. Alternatively, the AGN formation path for merging stellar-mass BBHs may be actually overall subdominant in the local Universe.

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