

GRAVITATIONAL WAVES

Side view of a spectacle

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For those who have not followed the aftermath of the binary neutron-star merger GW170817 reported widely last October, it may come as a surprise that the afterglow emission from the merger continued to brighten for five months afterwards. Telescopes sensitive to radio through X-ray wavelengths have been tracking the evolution of the afterglow but it remains unclear whether we are seeing an off-axis structured jet or a more spherical cocoon of relativistic ejecta or something else. To help narrow the options for the source that is powering the evolving ejecta, Daniel Finstad and co-workers set out to determine the viewing angle between our line of sight and the angular momentum of the binary system.

Finstad et al. use Bayesian inference to estimate the parameters of GW170817. They combine the most precise measurement of the distance for NGC 4993, the host galaxy, with the strain data from the two advanced LIGO and Virgo detectors. When they add the electromagnetic information into the mix, they establish an upper bound of the viewing angle as $32_{-13}^{+10} \pm 1.7^\circ$ and a lower bound of 13° , both at 90% confidence. These improved constraints are more consistent with the structured jet model.

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