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Counting on Short Gamma-Ray Bursts: Gravitational-Wave Constraints of Jet Geometry AMANDA FARAH, REED ESSICK, University of Chicago, ZOHEYR DOCTOR, University of Oregon, MAYA FISHBACH, DANIEL HOLZ, University of Chicago — The detection of GW170817 in gravitational waves and gamma rays revealed that short gamma-ray bursts are associated with neutron-star mergers. Gamma rays are thought to result from the formation of collimated jets, but the details of this process continue to elude us. One fundamental observable is the emission profile of the jet as a function of viewing angle. We present two methods to measure the effective angular width of short gamma-ray burst jets using gravitational wave and gamma-ray data. The first is a counting experiment, where we combine the known detection thresholds of the LIGO/Virgo and Fermi Gamma Ray Burst Monitor detectors to infer parameters of systems that are detected in gravitational waves. This method requires minimal knowledge about each event, beyond whether or not they were detected in gamma-rays. The second method uses additional information from the gravitational-wave and electromagnetic data to estimate parameters of the source, and thereby improve constraints on jet properties. In the limit of many detections, the second method achieves marginal improvements; we conclude that the majority of the information about jet structure comes from the relative sensitivities of gravitational-wave and gamma-ray detectors as encoded in simple counting experiments.

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