Abstract Submitted
for the APR13 Meeting of
The American Physical Society

GRB beaming and gravitational-wave observations HSIN-YU CHEN, Department of Astronomy and Astrophysics, University of Chicago, DANIEL HOLZ, Enrico Fermi Institute, Department of Physics, and Kavli Institute for Cosmological Physics, University of Chicago — Using the observed rate of short-duration gamma-ray bursts (GRBs), it is possible to make predictions for the detectable rate of compact binary coalescences in gravitational-wave detectors. We show that the non-detection of mergers in the existing LIGO/Virgo data constrains the beaming angles and progenitor masses of GRBs. Furthermore, We predict the rate of events in future networks of gravitational-wave observatories, finding that the first detection of a NS–NS binary coalescence associated with the progenitors of short GRBs is likely to happen within the first 16 months of observation, even in the case of a modest network of observatories (e.g., only LIGO-Hanford and LIGO-Livingston) operating at modest sensitivities, and assuming a conservative distribution of beaming angles (e.g. all GRBs beamed with $\theta_j = 30^\circ$). We also demonstrate that the detection rate of GRB triggered sources is lower than the rate of untriggered events if $\theta_j \lesssim 30^\circ$, independent of the noise curve, network configuration, and observed GRB rate. Therefore, the first detection in GWs of a binary GRB progenitor is unlikely to be associated with the observation of a GRB.

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Date submitted: 24 Jan 2013 Electronic form version 1.4