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GW170817, General Relativistic Magnetohydrodynamic Simulations, and the Neutron Star Maximum Mass MILTON RUIZ, STUART SHAPIRO, ANTONIOS TSOKAROS, Univ of Illinois - Urbana — Coincident detections of gravitational waves with electromagnetic signals can be used to constrain the nature of the progenitor of GW170817/GRB170817A. Combining the observational data with our recent fully general relativistic magnetohydrodynamic numerical simulations we conclude that the progenitor represents the merger of a magnetized binary neutron star that undergoes delayed collapse to a black hole immersed in a magnetized disk of tidal debris. This conclusion leads to a bound on the maximum mass of a cold, spherical neutron star (the TOV limit): $M_{\rm max}^{\rm sph} \leq 2.74/\beta$, where β is the ratio of the maximum mass of a uniformly rotating neutron star (the supramassive limit) over the maximum mass of a nonrotating star. Causality arguments allow β to be as high as 1.27, while most realistic candidate equations of state predict β to be closer to 1.2, yielding $M_{\rm max}^{\rm sph}$ in the range $2.16 - 2.28 M_\odot$. Assumptions and caveats, which can be removed by further numerical simulations and analysis, are also discussed.

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