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Newborn Neutron Star Activities in Gamma-ray Burst

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The collapse of the CO star forms a newborn neutron star (νNS) and triggers a supernova (SN) explosion. Mass and angular momentum are transferred to the νNS through fallback accretion. The energy from this accretion powers the gamma-ray burst prompt emission, while the synchrotron radiation fueled by the spinning νNS, explains the afterglow. Taking GRB 171205A as an example, we calculate the νNS's mass, angular momentum, and rotational evolution, fit the afterglow lightcurve, and determine that the SN explosion occurred within at most 7.36 hours before the GRB trigger.

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