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Discovery and confirmation of the shortest gamma ray burst from a collapsar

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Gamma-ray bursts (GRBs) are among the brightest and most energetic events in the universe. The duration and hardness distribution of GRBs has two clusters, now understood to reflect (at least) two different progenitors. Short-hard GRBs (SGRBs; $T_{90} < 2$ s) arise from compact binary mergers, while long-soft GRBs (LGRBs; $T_{90} > 2$ s) have been attributed to the collapse of peculiar massive stars (collapsars). The discovery of SN 1998bw/GRB 980425 marked the first association of a LGRB with a collapsar and AT 2017gfo/GRB 170817A/GW170817 marked the first association of a SGRB with a binary neutron star merger, producing also gravitational wave (GW). Here, we present the discovery of ZTF20abwysq (AT2020scz), a fast-fading optical transient in the Fermi Satellite and the InterPlanetary Network (IPN) localization regions of GRB 200826A; X-ray and radio emission further confirm that this is the afterglow. Follow-up imaging (at rest-frame 16.5 days) reveals excess emission above the afterglow that cannot be explained as an underlying kilonova (KN), but is consistent with being the supernova (SN). Despite the GRB duration being short (rest-frame T_{90} of 0.65 s), our panchromatic follow-up data confirms a collapsar origin. GRB 200826A is the shortest LGRB found with an associated collapsar; it appears to sit on the brink between a successful and a failed collapsar. Our discovery is consistent with the hypothesis that most collapsars fail to produce ultra-relativistic jets.

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