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Fermi-GBM GRBs with characteristics similar to GRB 170817A

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We present a search for gamma-ray bursts in the Fermi-GBM 10 yr catalog that show similar characteristics to GRB 170817A, the first electromagnetic counterpart to a GRB identified as a binary neutron star (BNS) merger via gravitational wave observations. Our search is focused on a nonthermal pulse, followed by a thermal component, as observed for GRB 170817A. We employ search methods based on the measured catalog parameters and Bayesian Block analysis. Our multipronged approach, which includes examination of the localization and spectral properties of the thermal component, yields a total of 13 candidates, including GRB 170817A and the previously reported similar burst, GRB 150101B. The similarity of the candidates is likely caused by the same processes that shaped the gamma-ray signal of GRB 170817A thus providing evidence of a nearby sample of short GRBs resulting from BNS merger events. Some of the newly identified counterparts were observed by other space telescopes and ground observatories, but none of them have a measured redshift. We present an analysis of this subsample, and we discuss two models. From uncovering 13 candidates during a time period of ten years we predict that Fermi-GBM will trigger on-board on about one burst similar to GRB 170817A per year.

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Classifica Sessioni: Multi-messenger science potential with current detectors