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Using GBM As Alert For A Galactic Type Ia Supernova

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A Galactic type Ia supernova(SN Ia) event would go entirely unnoticed to us due to the large optical extinction in the Milky Way plane, the weak neutrinos signal from a SN Ia, as well as the dim soft X-rays signal. But the recent SN2014J confirms that SN Ia emit gamma-ray lines, which lasts for weeks, from the $^{56}\text{Ni} \rightarrow ^{56}\text{Co} \rightarrow ^{56}\text{Fe}$ decay. The lines span from 158 keV to 2.6 MeV, which occur just within the Fermi GBM energy range. The Milky Way is optically thin to gamma-rays and GBM has continuous and nearly all-sky coverage, therefore GBM can act as an ideal Galactic SN Ia monitor and alarm. We will build analytical models of SNIa gamma line emission to yield the supernova gamma-ray light curves and spectra and use SN2014J data to constrain and calibrate, predicting the timescale when the supernova signal emerges as distinct from the GBM background within the first days after the explosion. Thus finding how soon we are able to confirm a Galactic SN Ia signal from GBM data after explosion and get alarmed, and use GBM to get localization (Earth occultation technique) meanwhile.

Collaboration

– not specified –

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