# How Not to Miss a Galactic Type Ia Supernova: gamma rays sound the alarm and probe nucleosynthesis

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A Milky-Way Type Ia Supernova could go entirely unnoticed, being dim in radio, X-rays, and neutrinos, and suffering large optical/IR extinction in the Galactic plane. But SNIa emit nuclear gamma-ray lines from 56Ni →56 Co →56 Fe radioactive decays. These lines fall within the Fermi/GBM energy range, and the 56Ni 158 keV line is detectable by Swift/BAT. Both instruments frequently monitor the Galactic plane, which is transparent to gamma rays. Thus GBM and BAT are ideal Galactic SNIa early warning systems.

We simulate SNIa MeV light curves and spectra to show that GBM and BAT could confirm a Galactic SNIa explosion, followed by Swift localization and observation in X-rays and UVOIR band. The time needed to sound the alarm depends on the 56Ni distribution, and can be as early as a few days if ~> 10% of the 56Ni is in an exterior shell as suggested by SN2014J gamma data.

We also find that the early-time SNIa light curve strongly depends on–and probes–the 56Ni density profile, while the late-time flux is independent of the ejecta distribution, and measures the ejected M_56Ni. These effects are complementary in pinning down the supernova structure and nucleosynthesis.

PHYSICS