

CATCHING A SUPERNOVA IN THE ACT

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The progenitors of type-Ia supernovae remain a mystery despite their importance as fundamental distance indicators. We still do not know if type-Ia explosions come from single degenerate binary stars or binaries made of two white dwarfs. Recent models show that the secondary star in a single degenerate binary will cause bright shock emission in the first hours or days after the explosion while double degenerate explosions are expected to brighten monotonically. We propose to monitor about 100 bright galaxies at $z < 0.05$ in the Kepler field to obtain the early light curve of a couple of supernovae. Kepler offers a unique opportunity to observe the early light curves of supernovae in unprecedented detail. No other experiment—past, present, or presently planned—can match the time resolution and continuous monitoring of the Kepler mission. This program is also sensitive to shock breakouts in core collapse supernovae which constrain the physics of the early explosion. We are using the KAIT Supernova Search to monitor these same galaxies on a weekly cadence to quickly alert us of a transient. We have also successfully proposed for spectroscopic follow-up with the Gemini-North 8-m telescope when a supernova is detected. No supernova was seen in Q10 of Cycle-3.