

# Terrestrial Signals from Axion Star Explosions

*Thursday, October 28, 2021 4:00 PM (1 hour)*

Axions form gravitationally-bound structures called axion stars, which are astrophysical objects with unique observational signatures. When an axion star grows enough in mass, it collapses gravitationally, and in its final moments it emits a large fraction of its mass in relativistic axions; we show that these axions are detectable in current and near-future axion DM experiments. Unlike the cold DM signal, the signal from axion star explosions is not suppressed by the axion decay constant  $\propto 1/f$ , due to a cancellation with the energy emission  $\propto f$ , making this a promising avenue to detect even (nearly) Planck-scale axions. Our calculation is easily extendable to other sources of relativistic bursts of axions, including superradiant cloud collapse or collision / merger processes.

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