

## Is there a supernovae bound on axions?

*Tuesday, March 24, 2020 10:00 AM (40 minutes)*

We consider the SN1987A supernova cooling bound on axions and other light particles. Core collapse simulations used in the literature to substantiate the bound omitted from the calculation the envelope exterior to the proto-neutron star (PNS). As a result, the only source of neutrinos in these simulations was, by construction, a cooling PNS. We show that if the delayed neutrino mechanism failed to explode SN1987A, and if the pre-collapse star was rotating, then an accretion disk would form that could explain the late-time ( $t > 5$  sec) neutrino events. Such accretion disk would be a natural feature if SN1987A was a collapse-induced thermonuclear explosion. Axions do not cool the disk and do not affect its neutrino output, provided the disk is optically-thin to neutrinos, as it naturally is. These considerations cast doubt on the supernova cooling bound.

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