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Finding Exotic Particles with Fireballs

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Compact transients such as supernovae and binary neutron star mergers can produce enormous fluxes of exotic particles. One way to look for them is through fireballs, a dense expanding photon electron plasma formed when exotic particles escaping a compact source quickly decay to Standard Model particles. Fireballs produce a unique signal, allowing us to observe new parts of dark photon and axion parameter space. Fireballs formation changes the previously predicted axion signal from SN 1987a and may produce new constraints on axions with masses between 1 MeV and 1 GeV emitted in the binary neutron star merger GW 170817.

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