

The axion-photon interaction and gamma ray signals of dark matter

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Abstract content

We explore two scenarios where the axion-photon interaction could produce observable signals of the dark matter. In the first scenario, dark compact objects made of axions, named axion stars, could collide with neutron stars. The whole energy of the axion star can be dissipated in the magnetized conducting medium of the neutron star generating gamma rays. If such gamma rays are observed, this could be considered as evidence that dark matter is made of axions. The second scenario is an indirect method for observing self-annihilating dark matter trapped in stars. Gamma rays produced by the self-annihilation of neutralinos in the interior of the Sun can be transformed into axions due to photon-axion conversion. Then, the axion will travel freely in the Sun and be converted into photons again. This process is often referred to as 'shine light through walls', in this case, the wall will be the solar interior. Hence, GeV gamma rays might pass through the Sun. We may conclude that observation of GeV gamma rays from the Sun may be a signal of annihilation of neutralinos in the interior of the Sun.

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