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Recent constraints on axion-photon and axion-electron couplings with the CAST experiment

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"Axions are DM candidates that can be produced in the solar core. The CERN Axion Solar Telescope (CAST) is a helioscope looking for axions coming from the solar core to Earth. The experiment, located at Geneva (Switzerland) is able to follow the Sun during sunrise and sunset. Four x-ray detectors are mounted on both ends of the magnet waiting for a photon from axion-to-photon conversion due to the Primakoff effect. With the completion of Phases I and II, CAST has been able to scan for axions with masses up to 1.16eV. We will present recent constraints on the axion-photon coupling.

Recently, non-minimal axion models are also receiving increasing attention. For instance, WD cooling hypothesis relies solely on the axion-electron coupling. Non-hadronic axion models, have a tree-level axion-electron interaction: the Sun produces a strong axion flux by bremsstrahlung, Compton scattering, and axio-recombination, the "BCA processes."Based on a new calculation of this flux, including for the first time axio-recombination, we will also present limits on the axion-electron Yukawa coupling gae and axion-photon interaction strength gaγ using the CAST phase-I data (vacuum phase)."

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