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Axion Detection: Techniques, Experiments and Instrumentation

Wednesday, 6 September 2023 16:00 (20 minutes)

Axions are a hypothetical elementary particle originally proposed as a result of the Peccei-Quinn solution to the Strong CP problem. With the right masses, axions are a compelling dark matter candidate and have been the subject of growing interest in recent years among the international dark matter detection community.

Generally, axion dark matter is very light – on the order of micro-eV in mass (give or take a few orders of magnitude) meaning that detection techniques look radically different from common WIMP detectors. Axions are theorized to have several couplings to the standard model, the most probed of which is the axion-photon coupling. There are various axion dark matter detection experiments around the world which seek to exploit this coupling, by converting axions into photons and vice-versa.

We will discuss some of the common axion detection techniques, with a focus on axion haloscopes, and give an overview of some of specific experiments in the field such as ADMX and ORGAN. We will look at the current state of the art in axion detection and discuss the future of the field with a focus on instrumentation and detector technology.

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