

Searching for sub- μeV axions with DMRadio: Overview and Status

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The QCD axion is a promising dark matter candidate whose discovery would also solve the Strong CP problem of particle physics. The DMRadio suite of experiments, which consists of DMRadio-50L, DMRadio- m^3 , and DMRadio-GUT, are designed to be sensitive to QCD axions in the peV to μeV mass range. Axions in this mass range may be produced in the measured dark matter abundance in the early universe if Peccei-Quinn symmetry breaking occurred prior to inflation. However, state-of-the-art searches for axions using resonant cavities cannot probe axions in this mass range because the axion's Compton wavelength is very large compared to the size of the detector. Therefore, the DMRadio suite of experiments uses lumped-element LC resonators to decouple the resonance frequency from the physical size of the detector. DMRadio-50L probes axions in the 100 kHz to 5 MHz range and is nearing construction completion. DMRadio- m^3 is sensitive to the DFSZ axion model within 30 MHz-200 MHz, is sensitive to the KSVZ axion model within 10 MHz-30 MHz, and its design is nearing completion. Here we present an overview of the design and status updates of DMRadio-50L and DMRadio- m^3 .

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