

Searching for GUT-scale axions with DMRadio-GUT

DMRadio-GUT (grand unified theory) is a planned experiment that will search for GUT-scale axion dark matter in the 0.4-120 neV mass range (0.1-30 MHz). This region of axion parameter space is particularly compelling because it probes the pre-inflationary axion, thereby offering a unique view into the early universe prior to the moments of inflation. Axions at these masses also emerge naturally out of string theories. However, because axion coupling to the Standard Model scales linearly with axion mass, these well-motivated axion masses are difficult to probe experimentally. To achieve three orders of magnitude in QCD axion sensitivity at these frequencies, DMRadio-GUT will build on experience learned from previous DMRadio experiments and will require advancements in resonator design, cryogenics, applied magnetic field, and quantum sensors. Here we present an overview of the DMRadio-GUT experiment and the ongoing work to achieve this ambitious goal.

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