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Update on the ARIADNE axion experiment

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The Axion Resonant InterAction Detection Experiment (ARIADNE) will search for the QCD axion using a technique based on nuclear magnetic resonance. The aim is to detect an axion-mediated short-range “fifth-force” between laser-polarized ^3He nuclei and an unpolarized tungsten source mass. While thus sourcing the axion locally and therefore being independent of cosmological assumptions, the experiment has the potential to probe deep into the theoretically interesting regime for the QCD axion in the mass range of 0.01-10 meV. The experiment requires a low-vibration non-magnetic liquid helium cryostat, superconducting shielding to limit ordinary magnetic noise, and a stable rotary system to modulate the axion-signal from the source mass. In this talk I will discuss the results of tests of several components of the experimental apparatus and describe the next steps for bringing the experiment into its data-taking phase. When taken together with other existing and planned axion efforts, ARIADNE and other searches have the potential to discover the QCD axion over its entire allowed mass range.

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