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## The Dark Matter Radio Suite of Experiments

*Thursday, July 6, 2023 10:15 AM (20 minutes)*

DMRadio searches for QCD axions over a broad mass (frequency) range:  $0.4\text{neV}$  to  $0.8\text{ueV}$  ( $0.1\text{MHz}$  to  $200\text{MHz}$ ), with sensitivity down to the DFSZ model. To achieve this ambitious goal, DMRadio includes three axion detection experiments: DMRadio-50L is under construction and will begin operation in early 2024. It consists of a toroidal magnet with a superconducting sheath and solenoidal resonator pickup operating from  $5\text{kHz}$  to  $5\text{MHz}$ . The design of DMRadio-m3 is nearing completion. It consists of a solenoidal magnet with a copper coaxial resonant pickup, and will reach DFSZ from  $30\text{ MHz}$  to  $200\text{ MHz}$ . DMRadio-GUT is a future experiment to build on experience from both DMRadio-50L and DMRadio-m3. It uses a large detector volume with quantum enhancement to reach DFSZ from  $0.1\text{ MHz}$  to  $30\text{ MHz}$ . While readout with dc SQUIDS is sufficient for DMRadio-m3, quantum enhanced measurement through radio frequency quantum upconverters will be needed for DMRadio-GUT. To this end, quantum upconverters will be deployed on DMRadio-50L as a testbed for quantum enhancement. Experimental design and projected sensitivities for the DMRadio suite will be presented.

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