

THz Photon Source Testing for the BREAD Experiment

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Detection and understanding of dark matter is one of the major unsolved problems of modern particle physics and cosmology. Several theories of fundamental physics predict bosonic dark matter candidates that can modify Maxwell's equations resulting in additional photon emission from conducting surfaces. One of these promising dark matter candidates is known as the axion, which could be detected by observing the emitted electromagnetic radiation resulting from axion-photon coupling.

The Broadband Reflector Experiment for Axion Detection (BREAD) haloscope experiment will investigate a currently underprobed dark matter parameter space using novel reflector technology. This new experiment will develop technology for a new type of wideband axion dark matter search experiment capable of detecting axions in the mass range of approximately 10 meV – 30 eV, a range not currently accessible by other techniques. This target mass range corresponds to an observable dark matter signal in the under-probed terahertz regime.

This presentation will cover the commissioning and building of a preliminary, room-temperature, terahertz photon source testing and calibration system that is intended to be used for a prototype BREAD detector.

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