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Nota di contenuto	Introduction to RF-Structures and Their Design -- Symmetry Breaking in Haloscope Microwave Cavities -- Pound – Drever – Hall frequency locking method -- Evaluation of Commercial Phase Shifters for Cryogenic Applications -- Application of the Bead-Perturbation Technique to a Study of a Tunable 5 GHz Annular Cavity -- Novel Resonant Cavity Designs and Applications to Axion Haloscopes -- PBG cavities for future ADMX -- First test of a photonic band gap structure for ADMX-HF -- Hybrid cavities for axion detectors -- Simulation of Superconducting QUBIT devices -- Detecting Axion Dark Matter with Superconducting Qubits -- First results from a microwave cavity axion search at 24 eV -- Multiple-cavity detector for axion search -- The ORGAN Experiment -- Searching for Low Mass Axions with an LC

Circuit -- ABRACADABRA: A broadband/resonant search for axions -- The QUAX experiment -- Progress on the ARIADNE axion experiment.

Sommario/riassunto

The nature of dark matter remains one of the preeminent mysteries in physics and cosmology. It appears to require the existence of new particles whose interactions to ordinary matter are extraordinarily feeble. One well-motivated candidate is the axion, an extraordinarily light neutral particle that may possibly be detected by looking for their conversion to detectable microwaves in the presence of a strong magnetic field. This has led to a number of experimental searches that are beginning to probe plausible axion model space and may discover the axion in the near future. These proceedings discuss the challenges of designing and operating tunable resonant cavities and detectors at ultralow temperatures. The topics discussed here have potential application far beyond the field of dark matter detection and may be applied to resonant cavities for accelerators as well as designing superconducting detectors for quantum information and computing applications. This work is intended for graduate students and researchers interested in learning the unique requirements for designing and operating microwave cavities and detectors for direct axion searches and to introduce several proposed experimental concepts that are still in the prototype stage. Describes unique designs for microwave cavity axion searches Includes detectors for ultra-low noise microwave applications Presents new methods of axion dark matter detection.