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Nota di contenuto	Chapter1. Microwave Cavity Simulation Using Ansys HFSS -- Chapter2. Ultra High Field Solenoids and Axion Detection -- Chapter3. Recent Results with the ADMX Experiment -- Chapter4. The Microstrip SQUID Amplifier in ADMX -- Chapter5. The ORGAN Experiment - Ben McAllister -- Chapter6. The 3 cavity prototypes of RADES, an axion detector experiment using microwave filters -- Chapter7. Reaching the 5--9 eV Range with ADMX: Multi-Cavity Array -- Chapter8. High-Q 3D Photonic Bandgap Cavities for Axion Detection -- Chapter9. Magnetic shielding and source-mass characterization in the ARIADNE axion experiment -- Chapter10. CAPP-PACE experiment with a target mass range around 10 μeV -- Chapter11. ADMX HiRes Analysis -- Chapter12. Operation of a ferrimagnetic Axion haloscope at ma = 58

microeV -- Chapter13. Overview of the Cosmic Axion Spin Precession Experiment (CASPEr) -- Chapter14. Axion dark matter search at CAPP -- Chapter15. Multiple-cell cavity for high mass axion dark matter search -- Chapter16. Dark Matter Radio -- Chapter17. Axion Detection with Precision Frequency Metrology -- Chapter18. Quantum Oscillators and Bayesian Searches -- Chapter19. MADMAX: Introduction and status -- Chapter20. Orpheus: Extending the ADMX QCD Dark-Matter Axion Search to Higher Masses.

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 with 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 reveal 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.