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Introduction to the RADES project at CAST, an axion detector using microwave filters

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The Relic Axion Detector Experimental Setup (RADES) is an axion search project that uses a microwave filter as a detector. This type of filters allow the search for dark matter axions of masses in the decade 10-100 μeV. This presentation will focus on the proposal, design, construction and first tests of the RADES microwave filter. The filter consists of 5 stainless steel sub-cavities joined by rectangular irises. The size of the sub-cavities determines the working frequency, the amount of sub-cavities determine the working volume. A theoretical model was built in order to describe the detection properties of the cavity. Simulations were done to establish the optimal design of the microwave filter. The first cavity prototype was built to work at a frequency of $\sim$ 8.4 GHz and it was placed at the 9 T CAST dipole magnet at CERN. A description of the theoretical framework, the simulations, the construction, the data acquisition system and some preliminary results of the electromagnetic properties of the cavity are going to be presented. The results show the potential of this type of filter to reach QCD axion sensitivity at X-Band frequencies.

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