Searching for Axion Dark Matter Below 1 micro-eV: the Dark Matter Radio

KENT IRWIN, Stanford Univ, DARK MATTER RADIO COLLABORATION — The Dark Matter Radio Cubic Meter (DMRadio-m$^3$) is an experiment to search for QCD axion dark matter over more than 1.5 orders of magnitude in mass, from 20 neV to 0.8 eV, including substantial coverage of the two benchmark QCD axion models (referred to as KSVZ and DFSZ). The QCD axion, originally proposed as a solution to the strong CP problem in QCD, is one of the most strongly motivated candidates for dark matter. The design for DMRadio-m$^3$ is being developed under the DOE Dark Matter New Initiatives program. The DM Radio Collaboration brings together the teams that developed both the ABRACADABRA-10cm experiment and the DM Radio Pathfinder experiment. In this mass range, dark-matter is probed by the signals induced in lumped-element electromagnetic resonators. I will describe the design of DMRadio-m$^3$, as well as a related experiment, DMRadio-50L, which will probe axion-like particles and hidden photons at masses below 10 neV. These experiments both utilize lumped-element resonators to couple to dark-matter-induced signals.