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Introducing the Plasma Haloscope¹ MATTHEW LAWSON, ALEXANDER MILLAR, MATTEO PANCALDI, Stockholm University, EDOARDO VITAGLIANO, University of California Los Angeles, FRANK WILCZEK, Stockholm University, Massachusetts Institute of Technology, Wilczek Quantum Center, Arizona State University, — We introduce a new strategy to search for dark matter axions using tunable cryogenic plasmas. Unlike current experiments, which repair the mismatch between axion and photon masses by breaking translational invariance (cavity and dielectric haloscopes), a plasma haloscope enables resonant conversion by matching the axion mass to a plasma frequency. A key advantage is that the plasma frequency is unrelated to the physical size of the device, allowing large conversion volumes.

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