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From SuperMAG to SNIPE Hunt: Using the Earth to search for ultralight dark matter

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Ultralight bosonic particles, including axionlike particles and kinetically mixed dark photons, can be promising dark matter candidates. It was recently shown that the Earth can act as a transducer for ultralight dark matter detection, by converting the dark matter into an oscillating monochromatic magnetic field signal across the Earth's surface. This occurs because the ground and ionosphere both act as good conductors, forming a (non-resonant) cavity similar to those in shielded laboratory experiments, like DM Radio. In this talk, I review the Earth transducer effect and recent searches for the effect at low frequencies using geomagnetic field data from the SuperMAG collaboration. I also discuss recent and ongoing efforts by the SNIPE Hunt collaboration to search for this effect at higher frequencies, by measuring the magnetic field in radio-quiet locations. In particular, I focus on how environmental effects lead to large uncertainties in the signal, and how these can be avoided by measuring the local curl of the magnetic field.

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