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Results from the ALPS II first science campaign

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The Any Light Particle Search II (ALPS II) is a light-shining-through-a-wall (LSW) style experiment currently running at DESY in Hamburg, Germany, that is probing the universe for axions and axion-like particles at masses below 0.1 meV. LSW experiments use an entirely laboratory based approach, in which a beam of axions is generated, via the Sikivie effect, as a high power laser traverses a strong magnetic field. The axion beam then passes through a wall which blocks the laser light. On the other side of the wall another region of strong magnetic field converts a small fraction of the energy in the axion beam back into an electromagnetic field. In addition to magnet strings each providing 106 m of 5.3 T fields, ALPS II will also use high-finesse optical cavities both before and after the wall to amplify the power of the regenerated field by up to 9 orders of magnitude. Along with a heterodyne system whose intrinsic background is equivalent to only a few photons over the entire integration time of the data run, this design makes ALPS II the most ambitious LSW experiment ever built. From January to May of this year ALPS II completed its first science campaign utilizing a ~120 m optical cavity, with a finesse of ~26,000, after the wall. This campaign consisted of a scalar axion search in which 700,000 seconds of data were acquired, as well as a pseudo scalar search which resulted in 1.2 million seconds of data. This talk will give an overview of LSW experiments and the ALPS II optical system, along with a discussion of the results from the first science campaign and plans for the future including the implementation of a ~120 m cavity before the wall.

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