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Approaching a first science run with ALPS II

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The Any Light Particle Search II (ALPS II) is a light-shining-through-a-wall (LSW) style experiment currently under construction at DESY in Hamburg, Germany. ALPS II will probe for axions and axion-like particles in the mass range below 0.1 meV. LSW experiments create an axion field by shining a laser through a dipolar magnetic field. The axion field then passes through a wall that blocks the laser light, and into a second region of magnetic field where a small amount of its energy is converted back into an electromagnetic field that can then be measured. ALPS II will be the first LSW experiment to employ optical cavities both before and after the wall to amplify the measured signal, requiring a sophisticated optical system to do so. With a magnet string capable of producing two 106 m long regions of 5.3 T magnetic fields, optical cavities each over 120 m in length, and an input laser capable of providing 50 W, ALPS II seeks to achieve a final sensitivity in the axion-electromagnetic coupling constant of $g_{a\gamma\gamma} = 2 \times 10^{-11}\text{GeV}^{-1}$. This will allow the experiment to investigate a region of the parameter space where anomalies in stellar cooling rates and observations of high energy photons hint at the existence of axions or axion-like particles. Operation of both the magnet string at full current and the laser system at full power was demonstrated earlier this year. A 246 m test cavity, whose fields traverse the magnet string, has been built and is being used to commission the optical system. In addition to this, a heterodyne detection system is currently being implemented for an axion-search scheduled for later in the year, while a second independent detection system, using a transition edge sensor, is under development. This talk will provide a summary of the experiment, along with a report on the current status.

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