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Axion and ALP search with the Any Light Particle Search II experiment at DESY

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The Any Light Particle Search II (ALPS II) is a Light Shining through a Wall experiment at DESY in Hamburg, which will hunt for axions and axion-like particles in the sub-meV mass range with an axion-photon-photon coupling $g_{\alpha\gamma\gamma} > 2 \times 10^{-11} \text{ GeV}^{-1}$, improving the sensitivity by a factor of 10^3 compared to its predecessors. For this purpose, a high-power laser will be directed through a long string of superconducting dipole magnets and a mode-matched optical cavity where some photons can convert into a beam of axion-like particles. Next, the axion beam will pass through a light-tight barrier and another strong magnetic field and mode-matched optical cavity, where some of the axion-like particles can convert back into photons and be detected.

The ALPS II experiment is starting the initial phase of data taking, in which it will employ a heterodyne detection method (HET). Design sensitivity is expected to be reached in the second quarter of 2023 when about 2 photons/day are expected behind the wall.

To confirm the results obtained with the HET, independent measurements using superconducting Transition Edge Sensors (TES) will be conducted subsequently.

In this work, we will describe the ALPS II experiment and the first results of the collaboration.

Collaboration / Activity

ALPS II

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