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Any Light Particle Search II (ALPS II)

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The Any Light Particle Search II (ALPSII) is a Light Shining through a Wall (LSW) style experiment that will look for axion like particles with masses in the sub meV range. LSW experiments take advantage of the fact that in the presence of strong magnetic fields photons could theoretically couple to axion like fields. A constant flux of these fields can thus be generated by directing high power laser beams through a region of a strong magnetic field. The axion like field can then be isolated with a wall that allows it to pass, but blocks the laser. After the wall another strong magnetic field will cause the axion like field to convert back to a photon which can be observed by a photodetector. The interaction time between the laser and the magnetic field can be increased with an optical cavity before the wall which also increases the flux of the axion field through the wall. ALPSI used this technique to perform the most sensitive search up to that time for axion like particles.

A second optical cavity behind the wall resonant with light from the first cavity and sharing the same spatial Eigenmode will increase the probability that the axion like field will reconvert to a photon. ALPSII will use this technique with ~100m high finesse optical cavities in 5T magnetic fields to measure the coupling constant between photons and the axion like particles with a sensitivity down to 10^-11/GeV. A smaller scale proof of concept experiment named ALPSIIa is currently being constructed with 10m cavities and no magnets. All of the optical systems related to ALPSIIa should be operational by the end of the year with data runs taking place at the beginning of 2017. Construction of the clean rooms for ALPSIIc will begin next year with the commissioning of the optics starting in 2018 and data runs in 2019. We will report on progress related to the experiment.

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