Contribution ID: **687** Type: **Poster**

A Cryogenic Single-Photon Detector for ALPS II

The Any Light Particle Search II (ALPS II) experiment searches for axions and axion-like particles (ALPs) in an important parameter space that is relevant in understanding anomalous astrophysical phenomena, including stellar evolution. ALPS II takes advantage of the axion coupling to photons using a resonantly enhanced Light-Shining-through-a-Wall (LSW) technique. Photons created using a strong laser may convert into axions or ALPs in the presence of a strong magnetic field, traverse a light-tight barrier, reconvert into photons in another strong magnetic field, and be subsequently detected. Fabry-Perot resonators before and after the light-tight barrier lead to an enhancement of the electromagnetic fields, providing an extra boost in the conversion probability as compared to traditional LSW experiments. At the sensitivity goal for ALPS II we expect only 1 reconverted photon per day, which necessitates sensitive photon detectors with high efficiency and low backgrounds. The first stage of ALPS II, currently running at DESY, Hamburg, will use a heterodyne (HET) detection method. Because there are no other LSW experiments operating at the ALPS II sensitivity, an independent detector technology would be needed to confirm the results from the HET run, especially in the case of a discovery. For this purpose, ALPS II can utilize advances in cryogenic single-photon detection by employing superconducting Transition Edge Sensors (TESs). We are currently developing a TES-based detector system that can meet the requirements for ALPS II, offering single-photon detection with high efficiency and low-backgrounds at the 1064 nm (1.165 eV) energy of interest. In this poster, we present the current status of the ALPS II TES detector characterization efforts.

Collaboration / Activity

ALPS II

Primary author: Dr OTHMAN, Gulden (UNI/EXP (Uni Hamburg, Institut fur Experimentalphysik))

Co-authors: Dr LINDNER, Axel (Deutsches Elektronen-Synchrotron (DESY)); SCHWEMMBAUER, Christina (Deutsches Elektronen-Synchrotron (DESY)); Dr JANUSCHEK, Friederike (Deutsches Elektronen-Synchrotron (DESY)); RUBIERA GIMENO, Jose Alejandro (Deutsches Elektronen-Synchrotron (DESY)); Prof. ISLEIF, Katharina-Sophie (DESY, now at HSU (Helmut-Schmidt-Universität)); Prof. MEYER, Manuel (University of South Denmark); Dr SHAH, Rikhav (Johannes-Gutenberg-Universität Mainz, now University of Hamburg Institute for Laser Physics)

Presenter: Dr OTHMAN, Gulden (UNI/EXP (Uni Hamburg, Institut fur Experimentalphysik))

Session Classification: Poster session

Track Classification: Detector R&D and Data Handling