Contribution ID: **126** Type: **Poster**

PTOLEMY Project: A Quest for Relic Neutrinos from Big Bang

Since the discovery of Cosmic Microwave Background(CMB), measurements on CMB have shaped our modern understanding of the Universe. CMB dates back to the surface of last scattering approximately 300,000 years after matter-radiation equality in the Universe according to Big Band cosmology. However, the time-scale of the decoupling for neutrinos is predicted to predate the onset of nucleosynthesis. Located at Princeton Plasma Physics Lab(PPPL), the Princeton Tritium Observatory for Light, Early-Universe, Massive-neutrino Yield(PTOLEMY) aims to detect these relic neutrinos via tritium capture and measurement of the resultant electrons. To achieve the required sensitivity, PTOLEMY project is developing new experimental technologies including large-scale nano-fabrication of graphene tritium cells and massively multiplexed SQUID readout of ultra-high precision micro-calorimetry. Adsorption of tritium to graphene surface by weak bonding is expected to reduce the binding energy to sub-eV range compared to tritium-tritium bonding at eV range, reducing the uncertainties in the energy of electrons from neutrino capture(currently under experimental measurement). To cope with beta-decay endpoint electrons, a MAC-E filter-based time-of-flight spectroscopy is under design. At this stage, a prototype with a partially completed MAC-E filter is in operation at PPPL. In the future, the full-scale PTOLEMY will provide a roadmap to challenge one of the most fundamental predictions of the Big Bang, potentially revealing new interactions and properties of the neutrinos and searching for the existence of a species of light dark matter known as relic sterile neutrinos.

Primary author: SUERFU, Junast (Princeton University)

Presenter: SUERFU, Junast (Princeton University)

Track Classification: Cosmic Neutrinos