Contribution ID: **420**   Type: **Poster**

Sterile Neutrino Oscillation Searches using the PRISM Technique within VALOR at SBND

Tuesday, 18 June 2024 17:30 (2 hours)

The Short Baseline Neutrino (SBN) programme has an extensive physics program where one of the key aims is to investigate the existence of light sterile neutrinos. It comprises three LArTPC detectors along the Booster Neutrino Beam (BNB); a primarily-muon-neutrino beam. The near detector of the programme (SBND) will carry the main burden of reducing systematic error for the programme due to its proximity to the target. With unprecedentedly high statistics and excellent imaging capabilities, the detector will fully characterise the neutrino flux and neutrino-Argon cross-section and enable sensitive light sterile neutrino oscillation searches. Critically, due to its short baseline, SBND is sensitive to very fast oscillations, indicated by large squared mass splittings and hinted to by previous experiments as the region of phase space relevant for light sterile neutrino searches.

The PRISM concept exploits the relation between the off-axis angle of the beam and the flux energy spectrum; moving off-axis from the beam centre results in the spectrum of neutrino energies peaking at lower values. Therefore, by combining measurements at different beam off-axis angles it is possible to reduce the corresponding systematic uncertainties. Due to its proximity to the beam and slightly asymmetrical placement with respect to the beamline, SBND sees up to 1.6 degrees off-axis, making it ideal to exploit this technique. The work presented here will cover preliminary SBND sensitivity results and discuss the effects of using PRISM. This work used the VALOR Neutrino Fitting Framework. It will support a standalone analysis of each oscillation channel and joint multi-channel analyses to provide robust systematic constraints and definitive tests of the light sterile neutrino hypothesis.

Poster prize

Yes

Given name

Beth

Surname

Slater

First affiliation

University of Liverpool

Second affiliation

Institutional email

B.Slater2@liverpool.ac.uk

Gender

Female

Collaboration (if any)

Primary author: SLATER, Beth (University of Liverpool)

Co-author: JONES, Rhiannon (University of Sheffield)

Presenter: SLATER, Beth (University of Liverpool)

Session Classification: Poster session and reception 1

Track Classification: Sterile neutrinos