CIDMA CENTRO DE I&D EM MATEMÁTICA E APLICAÇÕES
CENTER FOR R&D IN MATHEMATICS AND APPLICATIONS

universidade de aveiro

Gravitational Geometry and Dynamics Group Seminar

Wed., Jun. 12th, 2024, at 11h00.

Room: Sousa Pinto and **Zoom ID:** 989 6252 0928
(*Password: contact graposo@ua.pt)*

Vedran Brdar

Oklahoma State University

Short Baseline Neutrino Anomalies: Explanations within and beyond the Standard Model

Several neutrino experiments have observed an anomalous neutrino flavor transition across relatively short baselines which is in conflict with the three-flavor neutrino oscillation paradigm and therefore represents a hint for physics beyond the Standard Model.

In the first part of the talk, I will address the anomalous findings of the MiniBooNE experiment, which have been touted as either a possible hint for new physics, or a reflection of our poor understanding of neutrino-nucleus interactions. I will address this anomaly by critically examining a number of theoretical uncertainties affecting the event rate prediction at MiniBooNE, focusing on charged current quasielastic events, single-photon events, and those from neutral pion decay. This will allow me to discuss the dependence of the statistical significance of the anomaly on such uncertainties. I will also critically examine new physics explanations of MiniBooNE anomaly, focusing on eV-scale sterile neutrinos.

In the second part of the talk, I will discuss experiments studying neutrinos from intense radioactive sources which have reported a deficit in the measured event rate for the process of neutrino capture on gallium-71 through which germanium-71 is produced. Such a deficit, that goes by the name of gallium anomaly, has by now reached a statistical significance of 5σ. I will discuss several avenues for explaining this anomaly, both within the Standard Model and beyond. In particular, I will talk about possible biases in the predicted cross section as well as the radioactive source intensities and efficiencies for the extraction of germanium. Finally, I will outline a representative explanation beyond the Standard Model featuring interaction of neutrinos with ultralight dark matter.

More about Gr@v
at: *gravitation.web.ua.pt*

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