CSU PHYSICS COLLOQUIUM
“Frontiers in Neutrino Oscillations: Precision and New Phenomena”

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120 Engineering (Hammond Auditorium)

Abstract

Despite being a well established phenomenon, neutrino oscillations are extremely important in both particle physics and astrophysics. On the one hand, the mass-mixing parameters governing oscillations are still being measured, giving insights on the underlying flavor symmetries and CP violation in the lepton sector. The level of precision reached in these measurements poses unprecedented problems and opportunities: extremely refined statistical analysis of current and prospective data are now required. At the same time there is an increased sensitivity to physics beyond the Standard Model.

On the other hand, neutrinos are now commonly used as messengers from astrophysical sources. In this case a full understanding of oscillations is mandatory for a precise characterization of the sources. However, in very dense astrophysical environments (core-collapse supernovae, neutron star mergers, ...), flavor evolution is still under theoretical investigation, even in the context of the Standard Model, where new collective oscillation effects can occur. In my talk I will review the current issues, recent advancements and future prospects for both frontiers: precision and new physical phenomena.