National Institute of Technology Rourkela

Progress Seminar

Seminar Title	: Study of role of right-handed neutrinos in beyond standard model physics
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Venue	: MC 126
Date and Time	: 15 Feb 2024 (11 am)
Abstract	: The Standard Model, while successful in explaining a significant portion of the universe, falls short of being a complete theory. Its limitations are evident in its inability to incorporate gravitational interactions, explain the matter dominance in our universe, and address dark matter and dark energy. A notable crack in the model emerges from the phenomenon of neutrino oscillation, providing evidence for the non-zero mass of neutrinos, which contradicts their assumed masslessness within the standard model. These shortcomings necessitate an exploration beyond the standard model of particle physics. In the realm of beyond-standard model physics, the focus shifts to the existence of non-interacting right-handed neutrinos, also known as sterile neutrinos. These particles have gained significance by not only accommodating oscillation anomalies but also playing a crucial role as messengers in the neutrino mass generation mechanism through the type-I seesaw mechanism. Being standard model singlets can acquire Majorana-type mass, thereby triggering lepton number violation (LNV) and charged lepton flavor violation (cLFV) processes. Motivated by these considerations, our research delves into a thorough study of neutrinoless double beta decay, a topic of a priori interest in the context of LNV processes. The results obtained from our model parameter space are further verified in accordance with cLFV processes and the nonunitary aspect. Our research aims to extend into the dark sector by exploring the possible connection between the dark sector and the visible sector through right-handed or sterile neutrinos.