

## Abstract

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### NuLat: A New Compact Anti-Neutrino Detector

We are developing a new detector, called NuLat, for the future use of neutrino reactor monitoring and the study of electron anti-neutrinos a few meters from a nuclear reactor. All reactors produce a flux of electron anti-neutrinos which cannot be shielded nor faked and can be used to verify the operational state of the reactor. We can also use the detector to search for sterile neutrinos, a fourth flavor which if found can help with several inconsistencies in currently understood physics and herald a revolution in physics. Our detector employs a “Raghavan Optical Lattice” consisting of  ${}^6\text{Li}$  loaded plastic scintillator cubical cells 6.3 cm (2.500”) on a side. Cell boundaries have a 0.127 mm (0.005”) air gap, resulting in total internal reflection guiding most of the light down the 3 cardinal directions. The ROL detector technology for NuLat gives excellent spatial and energy resolution and allows for in-depth event topology studies. These features allow us to discern inverse beta decay (IBD) signals and the putative oscillation pattern, even in the presence of other backgrounds. We are making progress on GEANT based simulations, whilst the operation of the prototype at VTU is nearly stalled due to the quarantine. Plans to take the detector to a reactor are currently on hold.