Abstract Submitted
for the APR15 Meeting of
The American Physical Society

NuLat: 3D Event Reconstruction of a ROL Detector for Neutrino Detection and Background Rejection[1] ZACHARY YOKLEY, Virginia Tech, NULAT COLLABORATION — NuLat is a proposed very-short baseline reactor antineutrino experiment that employs a unique detector design, a Ragahavan Optical Lattice (ROL), developed for the LENS solar neutrino experiment. The 3D lattice provides high spatial and temporal resolution and allows for energy deposition in each voxel to be determined independently of other voxels, as well as the time sequence associated with each voxel energy deposition. This unique feature arises from two independent means to spatially locate energy deposits: via timing and via optical channeling. NuLat, the first application of a ROL detector targeting physics results, will measure the reactor antineutrino flux at very short baselines via inverse beta decay (IBD). The ROL design of NuLat makes possible the reconstruction of positron energy with little contamination due to the annihilation gammas which smear the positron energy resolution in a traditional detector. IBD events are cleanly tagged via temporal and spatial coincidence of neutron capture in the vertex voxel or nearest neighbors. This talk will present work on IBD event reconstruction in NuLat and its likely impact on sterile neutrino detection via operation in higher background locations enabled by its superior rejection of backgrounds.

[1]This research has been funded in part by the National Science Foundation on award numbers 1001394 and 1001078.

Zachary Yokley
Virginia Tech

Date submitted: 09 Jan 2015 Electronic form version 1.4