

Abstract Submitted  
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**Investigation of the Sensitivity of WATCHMAN to Measure the Neutrino Mass Hierarchy**<sup>1</sup> DAINE DANIELSON, University of California, Davis, WATCHMAN COLLABORATION<sup>2</sup> — WATCHMAN is a gadolinium-doped water-Cherenkov reactor-monitoring antineutrino detector currently under development for nuclear nonproliferation purposes. Experimental sites under consideration lie 13 km and 20-25 km away, respectively, from the nearest nuclear reactor. We simulate the response of a WATCHMAN-type detector receiving a 100 GW·kt·yr exposure from a reactor 13 km away. We transform the detected electron-antineutrino disappearance oscillation spectrum from  $L/E$  space into the  $|\Delta m^2|$  frequency domain. There, we perform a shape analysis on the Fourier peak geometry in the hierarchy-dependent region around  $|\Delta m_{31}^2|$  to attempt a mass hierarchy reconstruction. We find that the WATCHMAN detector at 13 km lies in a previously undiscovered region of sensitivity to the ordering of the neutrino masses, and that for some regions of the oscillation parameter space, a mass hierarchy determination is achievable.

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