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# GEONU: An Open-Source Toolkit for Geoneutrino Signal Predictions and Applications to SNO+

GEONU (an open-source MATLAB toolkit) is a computational framework for geoneutrino signal predictions. It was first introduced by Wipperfurth et al. (2019) and made publicly available on GitHub in 2024. The framework supports multiple global crustal datasets, propagates uncertainties in density, thickness, and abundances of heat-producing elements (HPEs), and allows for global signal predictions of geoneutrinos at multiple detector sites.

Motivated by the geoneutrino analysis at SNO+, which requires proper modeling of both regional and global contributions to interpret the observed signal, this work presents an overview of the original and rewritten versions of the GEONU tool. The rewritten GEONU improves modularity, computational performance particularly in terms of speed, and parameter flexibility.

In this talk, I'll present applications of the tool to SNO+, including evaluations of the impact of neutrino oscillation, IBD cross sections, and geoneutrino spectra, as well as ongoing developments to integrate local crustal field modeling in the near future. The original GEONU framework was developed by Tytrice Faison, Laura Sammon, Yu Huang, Scott Wipperfurth, and William McDonough, whose contributions are gratefully acknowledged.

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