Abstract Submitted
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Optimization of VANDLE for β-delayed neutron decay studies using Geant4[1] SERGEY ILYUSHKIN, FREDERICK SARAZIN, Colorado School of Mines, ROBERT GRZYWACZ, MIGUEL MADURGA, STANLEY PAULAUSKAS, UTK, JOLIE CIZEWSKI, Rutgers, WILLIAM PETERS, ORAU, VANDLE COLLABORATION — The Versatile Array of Neutron Detectors at Low Energy (VANDLE) is a plastic-scintillator array designed for various experimental setups including β-delayed neutron spectroscopy and (d,n) transfer reactions in inverse kinematics. The neutron energy is determined through the time-of-flight technique. The array has energy resolution of $\sim$ 120 keV @ 1 MeV and energy threshold of $\sim$ 100 keV. We have developed a Geant4 simulation of VANDLE to optimize array geometry for different types of experiments and test neutron scattering models provided by Geant4. A typical β-delayed neutron decay study involves coupling with γ detectors to collect β-γ coincidence information. The experimental assembly including VANDLE bars, β plastic scintillators, HPGe detectors, along with the detector support structure was modeled to assist in the fine-tuning of the setup and give a detailed understanding of the array performance. The simulation was validated by comparing to available experimental data and could serve as an important guide for the design of future experiments.

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Sergey Ilyushkin
Colorado School of Mines

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