

Sensitivity Tool for Antineutrino Monitoring of Small Modular Reactors

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While reactor antineutrino detection has been performed at current commercial and research reactors, their detection at advanced reactors poses new challenges. The NuTools study identified that neutrino detection could play a role in the safeguards of advanced reactors, such as small modular reactors (SMRs). Several SMR concepts focus on the operation of multiple modules, often within the same reactor building, to be flexible to load demand. This concept of operations would likely require more intensive safeguards, e.g., more frequent inspection visits. We focus on the sensitivity of multiple neutrino detectors at SMR sites. Cases of interest include total and individual reactor signals for operational status, power level, and the possibility at fissile content determination. Results show that operational status is relatively simple to determine for the sum of the modules but the sensitivity of discriminating all units on versus all but one of the units on to be difficult depending on the proximity of the detector to the individual reactor unit. Power level quantification is still underway.

Abstract title

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