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Monitoring Reactor Antineutrino Flux for Nonproliferation FANGFEI SHEN, CHRISTOPHER JONES, Massachusetts Institute of Technology, GREGORY KEEFER, Lawrence Livermore National Laboratory, LINDLEY WINSLOW, Massachusetts Institute of Technology, ZELIMIR DJURCIC, Argonne National Laboratory, ADAM BERNSTEIN, Lawrence Livermore National Laboratory, JANET CONRAD, Massachusetts Institute of Technology — Under the Non-Proliferation Treaty, the International Atomic Energy Agency has installed nuclear safeguard systems to monitor reactors. These systems, while effective, lack certain attractive features: they cannot provide real-time monitoring of reactor activities and some of them interfere with reactor operations. Antineutrino detectors can provide a continuous, real-time, and less intrusive method for monitoring reactors. This proposed safeguards system, tested at reactors in Russia and the United States, spins off from antineutrino experiments, many of which use reactors to produce antineutrinos. Monitoring antineutrino flux can detect illicit activities in reactors, such as the diversion of plutonium. Sensitivity to changes in fissile content in a few months using only antineutrino data has been demonstrated at the level of 70 kg of plutonium with >99% confidence. As part of the monitoring technique, it is useful to have accurate predictions of the evolving antineutrino flux that results from reactor fuel burnup. Simulations predicting the evolution are being developed and tested in present antineutrino reactor experiments.

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