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Anti-Neutrino Flux from the EdF Hartlepool Nuclear Power Plant

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We present the first detailed simulation of the antineutrino emissions from an Advanced Gas-cooled Reactor (AGR) core, based upon operational data from the UK Hartlepool reactors and reactor calculations for each of the 2592 assemblies in each of the two cores. An accurate description of the evolution of the anti-neutrino spectrum of reactor cores is needed to assess the performance of antineutrino-based monitoring concepts for non-proliferation, including estimations of the sensitivity of the antineutrino rate and spectrum to fuel content and reactor thermal power. The antineutrino spectral variation we present, while specific to AGRs, helps provide insight into the likely behaviour of other reactor designs that use a similar batch refuelling approach, such as those used in RBMK, CANDU and other reactors. Comparisons will be shown with PWR reactor anti-neutrino emissions and the effects of different refuelling approaches.

Abstract title

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