Poster session 1 - Monday 4 July

P1.083 **Results from the VIDARR near-field Antineutrino Detector at Wylfa Power Station**

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Advancements in detection technologies have opened up the possibility of utilising fission reactor antineutrino emissions for nuclear non-proliferation purposes. The isotope content of an active reactor core can be unfolded by measuring the flux and energy spectrum of its antineutrino emissions. Through continued monitoring, it is then possible to detector the un-authorised removal of fissile materials from the core. Unfolding the flux and spectrum measurements requires robust and well understood predictions. However, observed neutrino flux shows a deficit of up to 6% when compared with current reactor fission models. While a statistically significant excess is observed in the antineutrino energy spectrum at ~5 MeV compared to predictions. Among other technical challenges, further work must be undertaken to understand these anomalies before antineutrino detection technology can be successfully applied in a non-proliferation setting.

The 'miniaturised', state of the art anti-neutrino detector, VIDARR, has been developed at the University of Liverpool for non-proliferation reactor monitoring. The meter-cubed VIDARR is based on the T2K Near Detector Calorimeter. Its design adheres to the strict safety requirements for deployment close (~10 m) to reactor cores and gives proven robustness for easy transportation. In accordance with IAEA recommendations the detector is able to operate above ground and uses non-flammable, non-toxic plastic scintillator. In addition to demonstrating technological readiness, this project aims to provide physics outputs through flux and spectrum measurements at different reactor sites.

This poster will give an overview of the detector and show the latest results from the first deployment at the Wylfa Magnox Power Station in the UK. The detector was deployed above ground roughly 60 m away from the 1.5 GW_{th} reactor.