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Chipir: A Fast Neutron Beamline for Single-Event-Effect Tesing / Thermal and mono-energetic neutron beams at the ISIS Neutron and Muon Source

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Chipir: A Fast Neutron Beamline for Single-Event-Effect Testing
Chris Frost

Neutron single-event-effects are an increasing problem in modern electronic devices and systems, causing a range of substantial reliability issues and failures. To address this problem the UK's ISIS Neutron and Muon Source designed and now operates ChipIr, a fast-neutron beamline that mimics the atmospheric-like neutron spectrum in the 1-800MeV regime, but with a highly enhanced neutron flux, >10^6 n/cm2/s. Using this instrument, industrial and academic researchers perform accelerated fast-neutron testing on a wide variety of electronics to understand the detrimental effects of the natural atmospheric cosmic-ray neutrons on their device and systems and to mitigate their effects. In this talk we will discuss some of the design consideration of the beamline, how it was incorporated onto an existing spallation target station at ISIS and finally how it has been addressing industrial problems in the electronics' industrial sector.

Thermal and mono-energetic neutron beams at the ISIS Neutron and Muon Source
Carlo Cazzaniga

The ISIS Neutron and Muon source in the UK is expanding its irradiation capabilities of microelectronics to meet increasing demand of academia and industry.
Two thermal neutron beamlines, EMMA and Rotax, firstly designed for other applications, have been characterised and used for single event effects testing. Thermal neutrons are produced by the moderation of fast neutrons in materials, and can be a concern for microelectronics when boron is present. Recent studies have shown that in some cases the Failure In Time due to thermal neutrons can be comparable to the FIT due to fast neutrons in terrestrial applications. EMMA and Rotax have thermal fluxes in the order of 10^6 n/cm2/s, and different moderator temperatures (300 K vs. 100 K).
A new facility with DT (14 MeV neutrons) and DD (2.5 MeV neutrons) compact generators is under construction and will start commissioning within the year. We will discuss how the use of this facility will be complementary to ChipIr and how it is designed to meet the requirements of users.

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