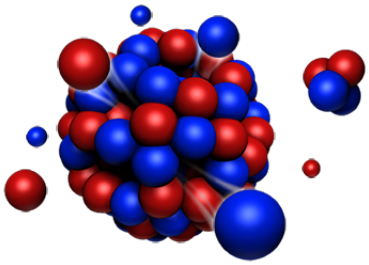

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The ISIS TS1 Project: Instrumentation for the measurement of the moderator time structure and neutron flux across the ISIS instrument suite.

Monday 14 October 2019 16:30 (2 hours)

In 2020 ISIS will perform a major refurbishment of Target Station 1, modernising the target, reflector and moderator assembly (TRAM). The so-called "TS1 Project"[1][2] is the first major modification to the target station since it came online in the early 80's, with the primary aim of improving its reliability, maintainability and safety. This £15M project will affect a diverse suite of twenty neutron instruments, including diffractometers, SANS instruments, reflectometers and inelastic spectrometers. We report here on the development of novel instrumentation to measure two key performance indicators for the TS1 project: the moderator time structures (MTS) and the neutron flux delivered to sample. The measurements performed will be used to measure the success of the TS1 project against one of its secondary aims: that the changes to the TRAM will not be detrimental to any instrument's performance and improve the resolution and flux of instruments where possible.

To measure the MTS and flux at the sample position in an equivalent and methodical way across the instrument suite, we developed a calibrated rig that can be placed at the sample position for all ISIS instruments. This rig measures the neutron flux using a bead of GS1 scintillating glass in the beam and simultaneously performs high resolution backscattering diffraction, enabling extraction of the MTS. The MTS measurements use a standard CeO₂ powder and a pair of ³He gas detectors with B₄C masks to define partial Debye-Sherrer rings at 2θ=168^o. To ensure the rig is compatible with all instruments, it has to be both free-standing for 'table-top'sample areas (the reflectometers) and mountable into a standard vacuum vessel (on the diffractometers for example).

We report on the development of the calibration rig and present the MTS and flux data from a variety of instruments at ISIS.

[1] https://www.isis.stfc.ac.uk/Pages/TS1-Project-Spring-2019-update.aspx
[2] ISIS TS1 Project progress summary –paper to be submitted as part of ICANS XXIII

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