



Contribution ID: 114

Type: **Oral Presentation**

Current Status of Scintillation Detector Development at ISIS

Tuesday, 15 October 2019 11:25 (25 minutes)

Scintillation detectors using $\text{ZnS:Ag}/^6\text{LiF}$ are currently used and being developed in a number of facilities such as J-PARC [1], SNS [2], CSNS [3] and ISIS[4]. At ISIS, these scintillation detectors have been employed for more than two decades and service approximately half of the instruments. There are currently three types of $\text{ZnS:Ag}/^6\text{LiF}$ detectors in use on ISIS, scintillator viewed by photomultiplier tubes (PMTs) which are air coupled with aluminised reflector guides, scintillator coupled to PMTs with clear optical fibres [5] and scintillator coupled to multi-anode PMTs (MAPMT) with wavelength shifting fibre (WLSF).

Recent advances in scintillator detector technology at ISIS are presented here. WLSF detector technology is being developed for multiple applications at ISIS. Progress in mechanics and signal processing for reflectometry, single crystal and powder diffraction applications will be discussed. Improvements include neutron positioning to better than 0.5mm, higher rate capability and significant reduction in production cost.

In addition to the development work being carried out at ISIS with $\text{ZnS:Ag}/^6\text{LiF}$ based detectors, an extensive investigation of neutron sensitive scintillators has been undertaken. This investigation has been prompted by advances in neutron instrumentation which have led to large increases in flux delivered to the sample. $\text{ZnO:Zn}/^6\text{LiF}$ has been identified as a potential replacement of $\text{ZnS:Ag}/^6\text{LiF}$ for higher rate applications. Some characteristics of $\text{ZnO:Zn}/^6\text{LiF}$ based scintillation detectors will be presented.

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Session Classification: Instruments

Track Classification: Instrument