To the ESS Instrument Proposal Committee,

I am writing to express support for the proposed KVASIR backscattering neutron spectrometer for the European Spallation Source (ESS).

The KVASIR concept addresses an important gap in the current instrumentation landscape by providing simultaneous high resolution in both energy and momentum transfer. As described in the instrument concept paper, KVASIR aims to study small single crystals with energy resolutions on the order of a few μeV together with a momentum resolution of approximately 0.03 $Å^{-1}$.

This instrument will be uniquely suited for investigating quantum magnetic materials, correlated electron systems, and functional materials for which key dynamics occur in the μeV to sub-meV energy range, the spatial scale of which are very difficult to access with current instrumentation. The combination of high energy and spatial resolution and the possibility to perform experiments under strong magnetic fields or other extreme conditions will open new avenues for exploring emergent quantum phenomena.

Among my scientific interests are the study of quantum materials with novel types of interactions. Typical instruments for this field include the cold neutron spectometers IN5 at ILL (Magnetic and phononic dynamics in the two-ladder quantum magnet (C5H9NH3)2CuBr4, https://arxiv.org/abs/2510.24556, PRB accepted) and Hyspec at ORNL (Tam et al, in preparation). However, for small samples it is hugely advantageous to have a strong focusing option, which KVASIR will provide. In addition, studies of dynamical states of quantum spin ice (Gao, Desrochers, Tam et al. Neutron scattering and thermodynamic evidence for emergent photons and fractionalization in a pyrochlore spin ice. Nat. Phys. 21, 1203–1210 [2025]) would benefit from the ultra-low energy resolution in order to conduct follow-up experiments to directly search for the emergent “photon” mode under extreme conditions like high magnetic field. In this particular case, the energy is too low to be resolved with chopper instruments, thus requiring backscattering on single crystals, which is currently not offered at any backscattering instrument in Europe or the US.

KVASIR would provide exactly the type of experimental capability required to address these challenges at ESS.

I therefore strongly support the development of the KVASIR instrument and believe it will become an essential tool for the international condensed matter physics community.

Sincerely,

/s/ David W. Tam

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