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KVASIR: A backscattering neutron spectrometer for hard condensed matter at ESS

We present the instrument concept for KVASIR, a backscattering indirect time-of-flight neutron spectrometer for the European Spallation Source (ESS). KVASIR will probe low lying excitations in single crystals of hard condensed matter. The instrument follows the FARO/SHERPA concept, using mosaic prismatic PG analyzer crystals. KVASIR is simultaneously optimized for high resolution of energy- and momentum transfer, $\delta E = 4 \mu\text{eV}$ and $\delta q = 0.03 \text{\AA}^{-1}$ (FWHM), respectively. Detailed ray tracing simulations, considering the true geometry and aberrations of the analyser configuration, achieve $\delta E = 5.7 \mu\text{eV}$ and $\delta q = 0.03 \text{\AA}^{-1}$. The proposed concept has room for both polarisation analysis and extreme sample environments. With this instrument, we can enable inelastic neutron scattering studies of single crystal hard condensed matter, with a particular focus on quantum properties, at yet unseen spatial and dynamic precision under extreme conditions.

Session

Instrumentation

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