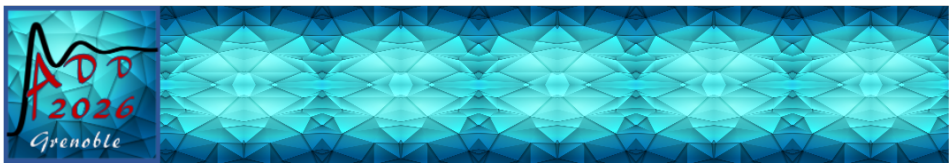

Abstract ID : **30**

Total scattering and PDFs using X-ray free-electron lasers: quality data in 30 femtoseconds

Content

X-ray free-electron lasers (XFELs) are the pinnacle of X-ray sources with unprecedented intensity concentrated into femtosecond pulses. Despite this they typically will only produce low-quality total scattering data and low-resolution PDFs. A group of us have recently been working to remedy this with a development programme at the European XFEL in Hamburg. This talk will describe how we have set about optimising XFEL total scattering by using the maximum available XFEL X-ray energies and an innovative detector geometry. As a result[1] we can now routinely obtain quantitative total scattering data over a Q-range of $0.35 < Q < 16.6$ Å^{-1} from a single XFEL X-ray pulse. This is a new opportunity for following ultra-fast structural changes in matter using total scattering/PDF methods.

[1] A F Sapnik *et al*, *IUCrJ* **12** (2025) 531 (https://doi.org/10.1107/S205225252500538X)

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