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Ultra-fast total scattering/pair distribution function measurements using hard XFEL beams

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X-ray total scattering (TS), and its Fourier transform the pair distribution function (PDF), has become the method of choice for determining structural disorder within materials since the advent of high-energy synchrotron X-ray diffractometers. To date these techniques have not transferred to XFEL facilities because of their more modest (< 20 keV) beam energies. This is slowly changing, and the increases in XFEL energies towards 30 keV is opening up the possibilities for uf-TS/PDF measurements with useful, albeit still modest, resolution. This talk will discuss how instrumentation using existing high energy XFEL beams might be optimised for uf-TS/PDF measurements and the scientific opportunities should higher-still X-ray energies become available at XFELs.

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