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Total-scattering methods as a probe of local structure and correlated disorder in materials

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The structures of materials under study are of ever-increasing complexity, now often exhibiting short-range order, nano-structure, or correlated disorder that affect their physical and/or functional properties. In order to quantify this increasing structural complexity, a maximal amount of information needs to be extracted from e.g. neutron diffraction patterns, whence the importance of total-scattering techniques accompanied by Fourier methods such as Pair-Distribution Function analysis. Proper interpretation of the experimental results requires an understanding of the space and time scales of the material's structure, as compared to those of the structural measurement.

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