

Total X-Ray Scattering

- In construction at X17A

$$S(Q, \omega) = \frac{1}{2\pi\hbar} \int G(r, t) \exp\{i(Q \cdot r - \omega t)\} dr dt$$

Total scattering → Bragg and diffuse scattering

Fourier transform → Pair Distribution Function (PDF)

What do we get from PDF?

– Probabilities of finding atom pairs separated by distance r

- Short, intermediate, and long-range structure
- Fit structural models
- Crystal size

Analysis is performed in real space!

- Fixed energy at 75 keV selected by a side-scattering (511) silicon Laue monochromator
- In-situ/ time-resolved measurements (**0.5 s resolution**)
- Rapid PDF: directly probe formation of particle (e.g. Pt on a TiO₂ surface)
- Differential PDF: study host-guest compounds
- PDF at high pressure

