Applications of Coherent Diffraction

- Thermodynamic fluctuations
  - May be too hard because of beam-induced effects, sample damage
- Probe of structure on nm scale
  - 1D, 2D and 3D
  - non-periodic object gives continuous $F(\mathbf{q})$
- Oversampling (reciprocal space) permits solution of the phase problem

Coherent X-ray Diffraction for Mapping of Strains in Nanocrystals

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Outline

- Principles of Coherent Diffraction
- The Phase Problem
- Oxide growth on Silicon
- Nanocrystal Shapes
- Applications to Strain Mapping

Conclusions

- “Diffuse” scattering acquires fine structure
- Scattering —> Diffraction
- Surface/interface morphology
- Shapes of small particles
- Potential applications
  - Atomic-scale fluctuations
  - Imaging of strain fields