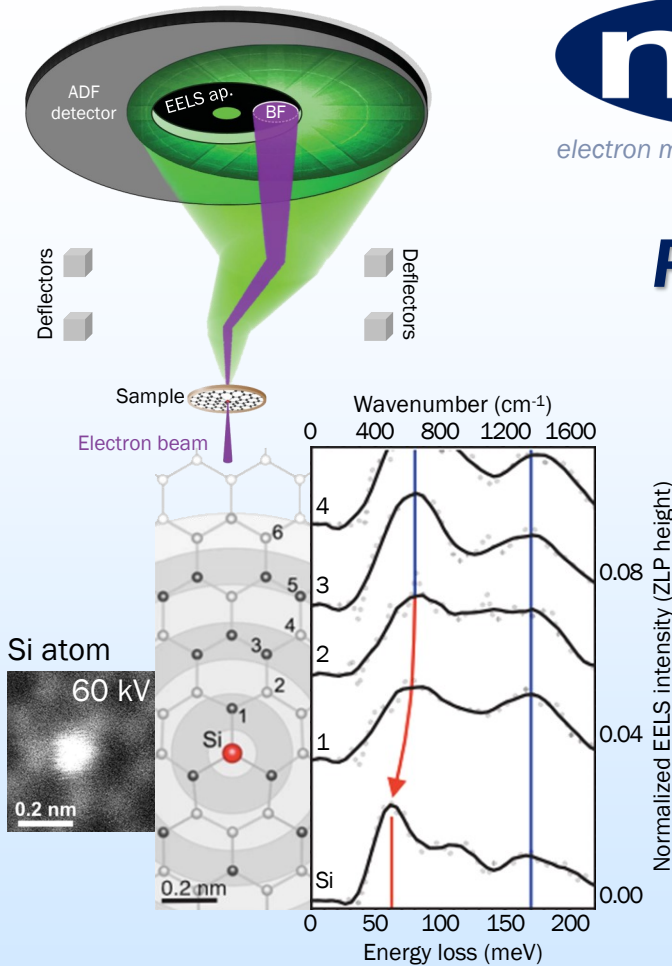
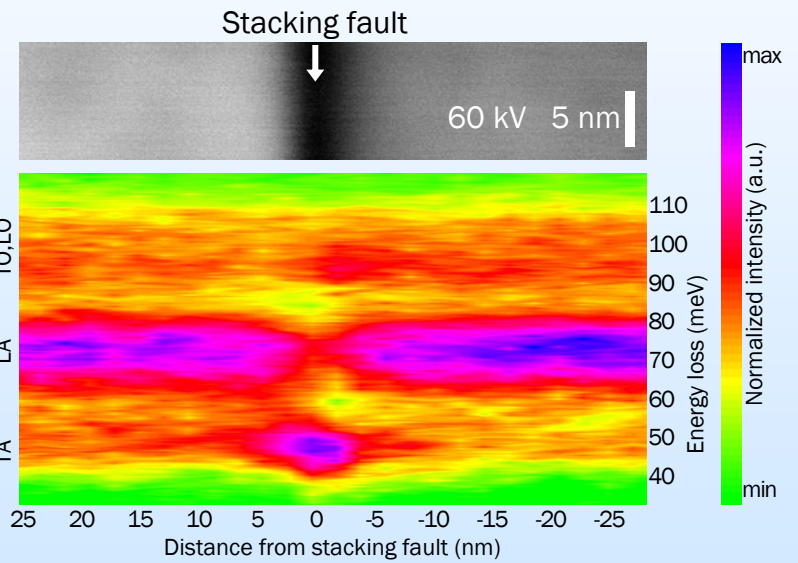


Phonon spectroscopy at the nanoscale

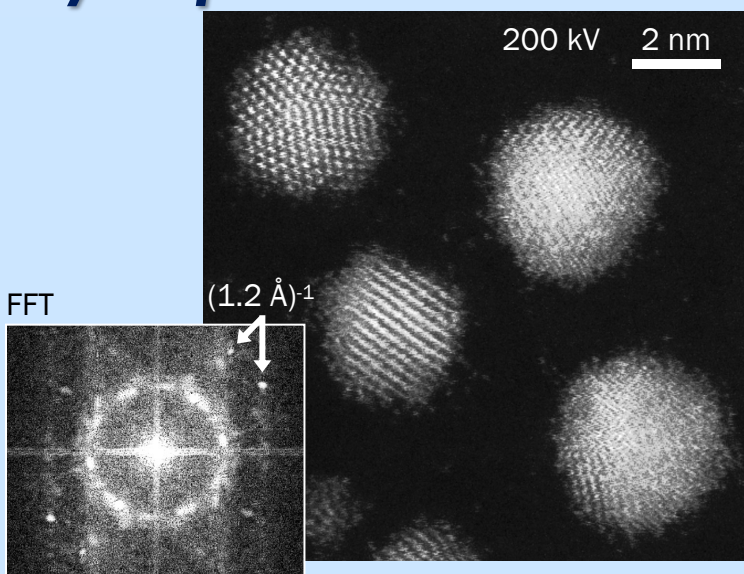


Phonon spectrum from a single silicon atom
Hage et al., Science 367 (2020) 1124–1127



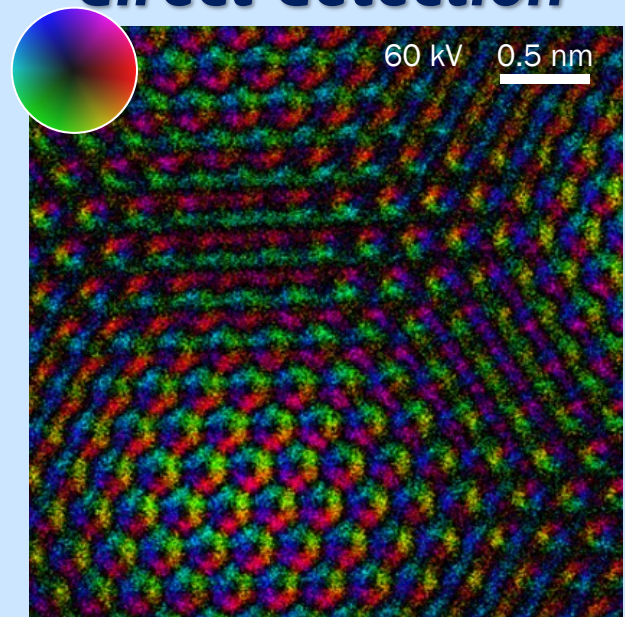
Phonon spectrum across a stacking fault in SiC
X. Yan et al., Nature 589 (2021) 65–69

Flexible and stable cryo operation



HAADF STEM image of Au nanoparticles at liquid N₂ temp, no cryofinger used, typical ice contamination rate < 1 monolayer/hr

4D-STEM with direct detection



Electric field map in twisted (8.8°) bilayer graphene acquired with multi-frame 4D-STEM (<5 min)