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High-resolution imaging with coherent X-rays

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In the last decade, the development of techniques commonly grouped under the name “coherent diffractive imaging” (CDI) has greatly expanded the means whereby spatial information can be collected using radiation. These imaging techniques, which can be described as “microscopy without lenses” or “crystallography without crystals”, present a great potential for diffraction-limited imaging with short wavelength radiation. After giving an overview of the current state of the field, I will describe recent results obtained at the Swiss Light Source with a scanning method called “ptychography”. CDI techniques typically require much more data processing than traditional microscopy methods. Special emphasis will be put on the algorithmic developments that accompany and often enable new coherent imaging schemes.