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Spatial crystal imaging by means of atomic electron holography TOBIAS LUEHR, AIMO WINKELMANN, GERT NOLZE, CARSTEN WEST-PHAL, None — The determination of atom structures is the key for the understanding of basic functional properties of matter or for designing new high-tech materials. For structure determination, holography is a very attractive option, since this method enables lensless three-dimensional imaging. In principle, x-ray photo to to a microscopic holography setup. The electron diffraction pattern is highly sensitive to the local structure of the emitter environment, since the emitting atom is located in the near-field of the scattering atoms. Hence, holographic reconstructions of XPD-patterns should yield a spatial image of the sample's atom arrangement. However, anisotropic electron scattering and multiple scattering effects generally cause strong artifacts in the reconstruction. In this contribution we show how to circumvent this problem with electrons at kinetic energies of  $E_{kin} \ge 10$  keV. The resulting spatial images contain hundreds of clearly separated atoms at their correct locations. Furthermore, XPDpatterns allow an element-specific assignment of the reconstructed atoms within the image. This is the first demonstration of true atom imaging following Dennis Gabor's idea of electron holography.

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