

Prize Talk PV X Thu 13:00 HSZ 01
The Route toward Sub-Å and 0.1eV Analytical Electron Microscopy — ●HARALD ROSE — Institute of Applied Physics, Darmstadt University of Technology, 64289 Darmstadt, Germany — Träger des Robert-Wichard-Pohl-Preises

The ultimate goal of analytical electron microscopy is the elucidation of the atomic structure, the chemical composition, and the local electronic states of real objects. Sub-Å resolution at voltages below 300kV can only be achieved for a large field of view by correcting the spherical aberration and the coma of the objective lens. In order to obtain precise information on the inter-atomic bonding, an energy resolution

of about 0.1 eV is necessary. To satisfy these conditions, the electron microscope must be equipped with (a) a quasi-monochromatic electron source, (b) a corrector compensating for spherical aberration, chromatic aberration and off-axial coma, and (c) a highly dispersive aberration-free imaging energy filter or spectrometer, respectively. We realize corrected systems by means of quadrupoles and octopoles or hexapoles. Feasible designs for both types of correctors will be presented together with a novel monochromator and imaging energy filter. The new electron microscopes are being realized within the US TEAM Project and the German SALVE Project. First results will be presented demonstrating atomic spatial and 50 meV energy resolution.