Calculated Transmission for PHOIBOS 150 NAP R2

Technical Notes

The Hemispherical Analyzer PHOIBOS 150 NAP R2 with a mean radius R_0 (150 mm) measures the energy of charged particles in a near ambient pressure environment. The transfer optics are a crucial part of the NAP electron spectrometer design. The first aperture, or nozzle, is shaped conically with a half angle of 35 °. This aperture, with a diameter of down to 0.3 mm, maximizes the differential pumping and brings the pressure down to the 10^{-3} mbar range a few millimeter, from the sample. Behind the nozzle, a wide-angle deceleration lens using a focussing mesh with high transparency creates an image of the sample region that is analyzed at the entrance aperture of the second lens stage with negligible spherical aberration. Electrons entering the analyzer through the entrance slit are deflected into elliptical trajectories by the radial electrical field between the inner hemisphere and the outer hemisphere.

The transmission for specific lens mode settings and excitation spots are calculated using electron optical Monte Carlo simulations. The values are mean values for the whole detector area.

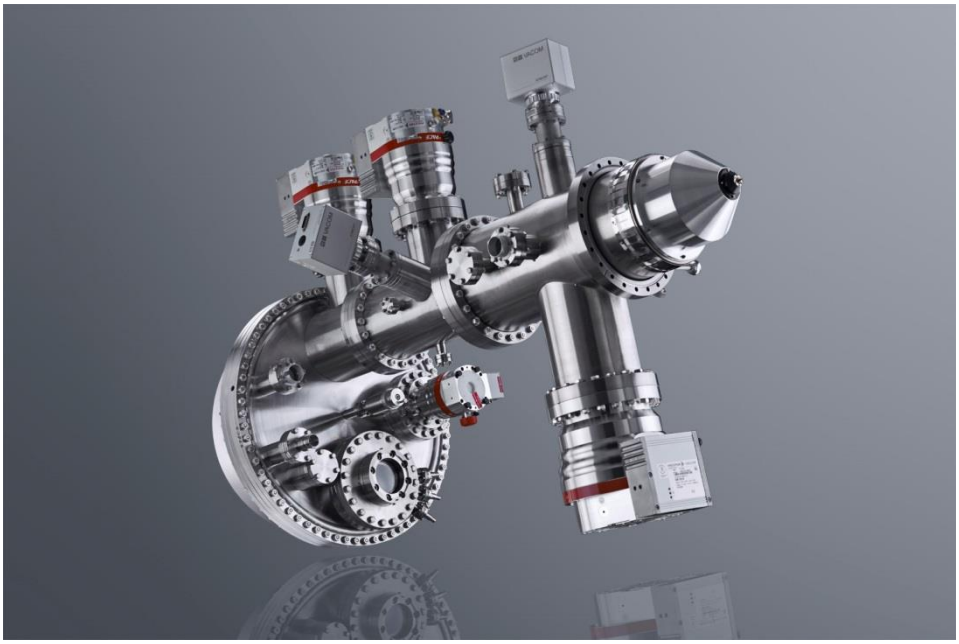


Figure 1: PHOIBOS 150 NAP R2

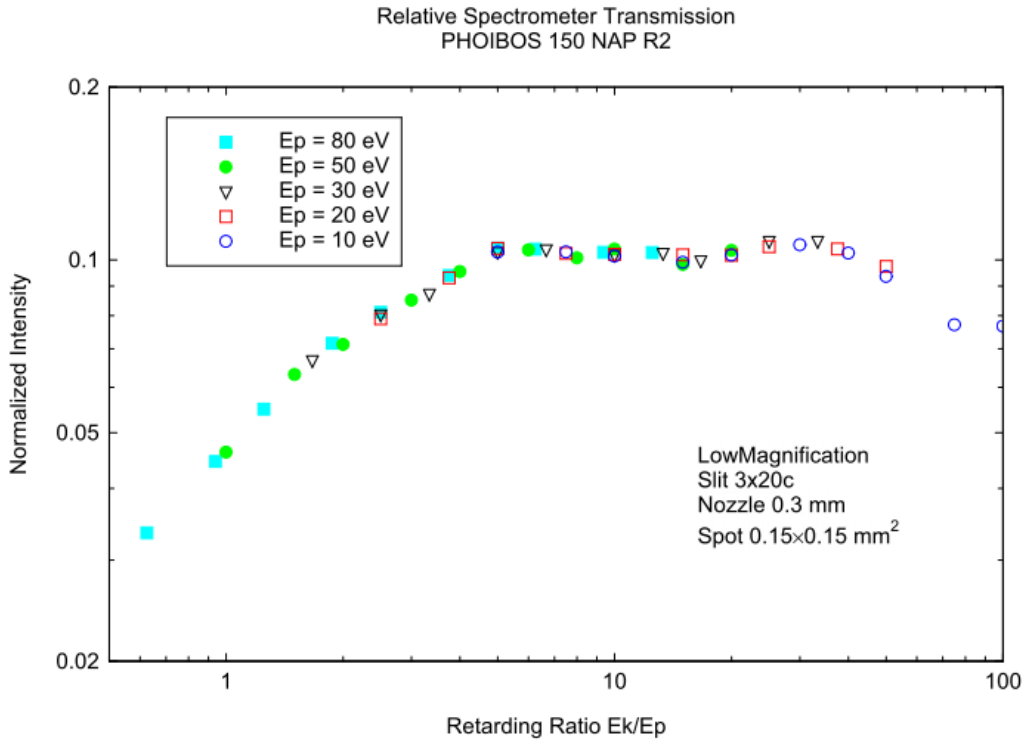
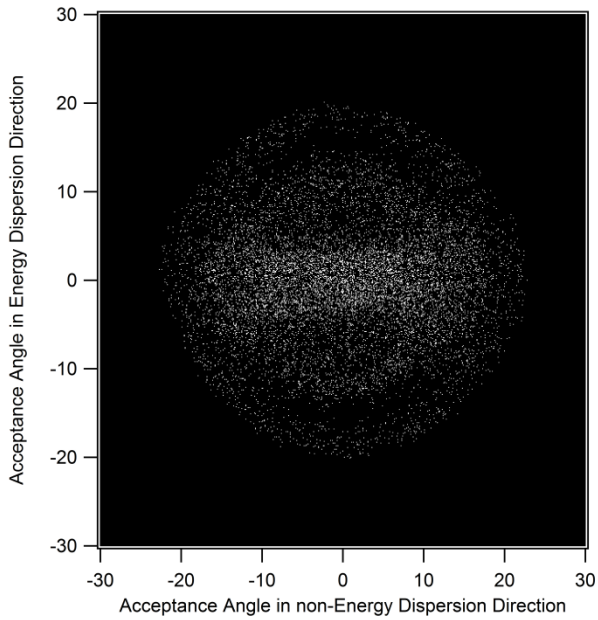


Figure 2: Relative transmission function for the PHOIBOS 150 NAP R2 using a 0.3 mm diameter nozzle.

The relative transmission function for the Low Magnification Mode (LM, transmission mode) was calculated by electron optical simulation. The transmission between $5 \leq E_k/E_p \leq 50$ is nearly constant. The acceptance angle FWHM in this range is about $\alpha = \pm 9°$ (energy direction) and $\beta = \pm 13°$ (non-energy direction) for a 3×20 mm² curved slit.



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