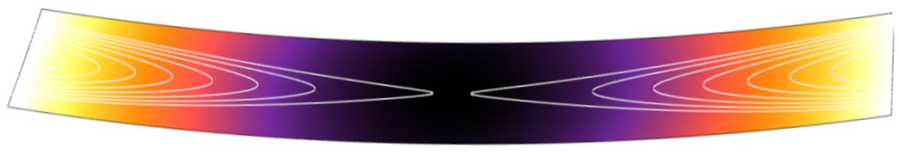
Two-dimensional VLS gratings from Berlin

Heike Löchel
NOB Nano Optics Berlin GmbH, Krumme Str. 64, 10627 Berlin
Contact: heike.loechel@nanooptics-berlin.com

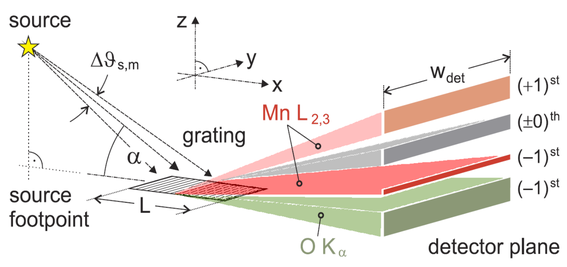
Technological features
- Laminar gratings up to 5000 l/mm
- VLS gratings with up to 1000% period variation
- 2D VLS gratings, curved substrates



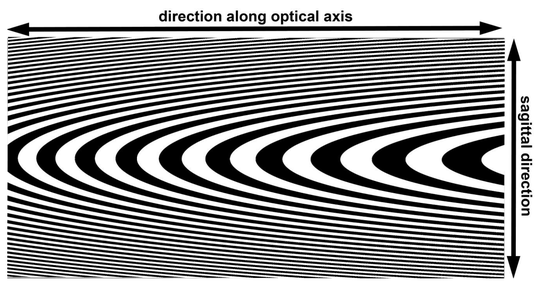
2D-VLS on curved substrate

Applications
- Aberration corrected gratings for Hettrick-Underwood spectrometers
- Multi-channel spectrometer optics
- Special optics for fs spectroscopy

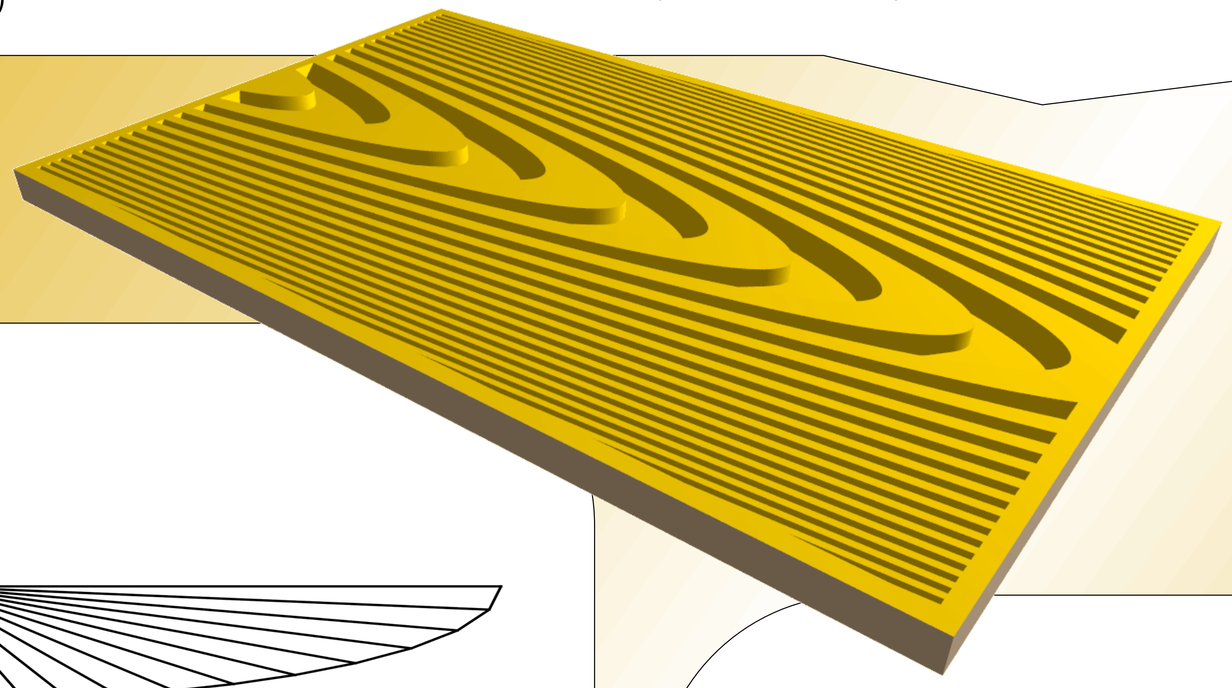
Based on scientific research done at HZB (Alexei Erko, Alexander Firsov, Helmholtz-Zentrum Berlin)



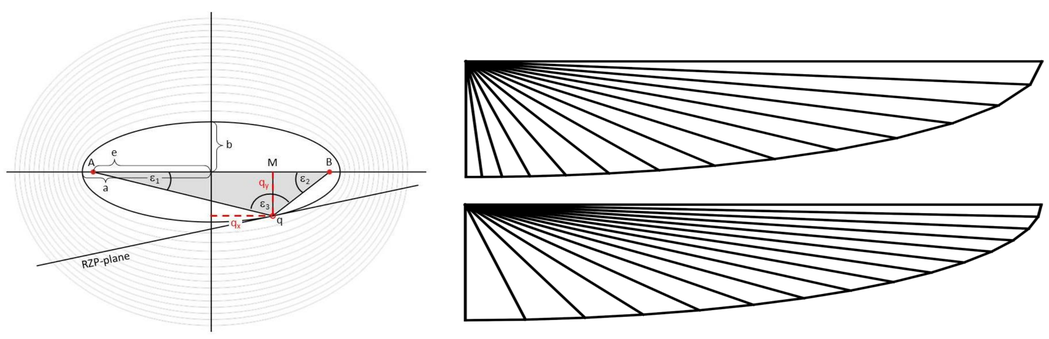
Spectrometer layout



2D zone structure

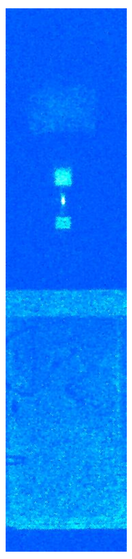


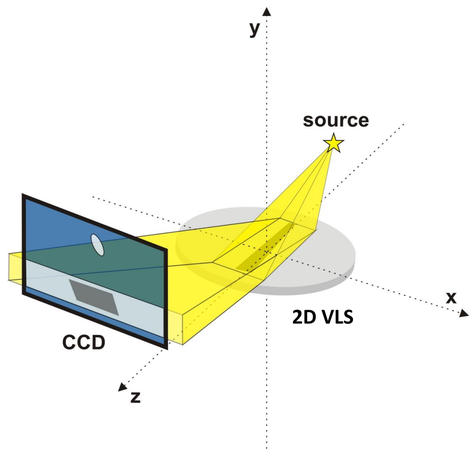
Design and Simulation



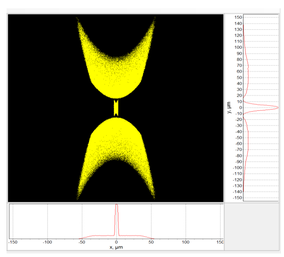
Basic geometry of fresnel zones

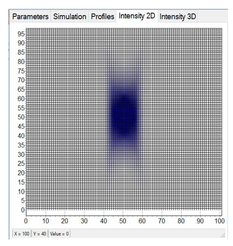
Data volume minimization and curve accuracy, fast calculation in minutes



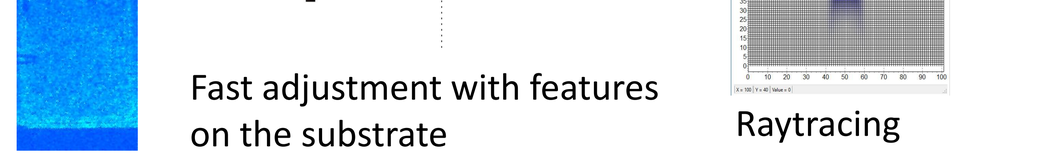


Fast adjustment with features on the substrate





Raytracing



Calculated ready-to-write zone structure, GDSII format

AFM topography

Fabrication with E-beam- or Laser lithography

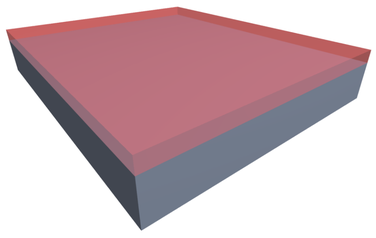
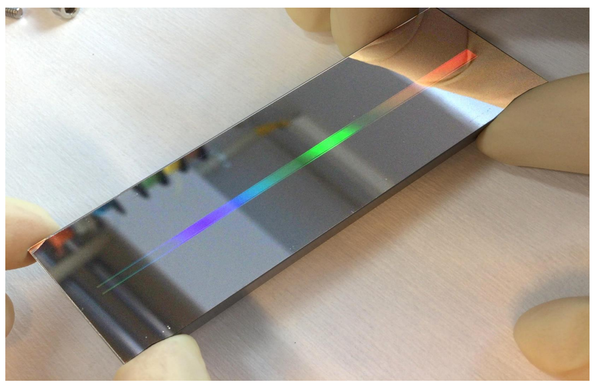
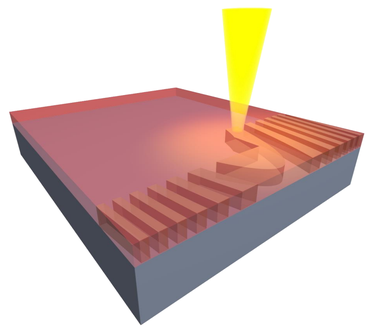


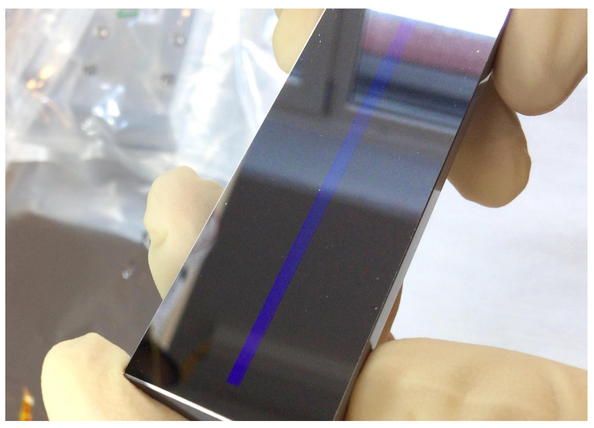
Photo resist on super polished Si substrate



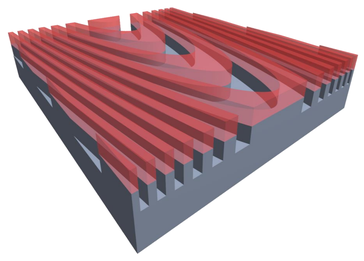
277 eV (Carbon K_α, up to 1900 l/mm)



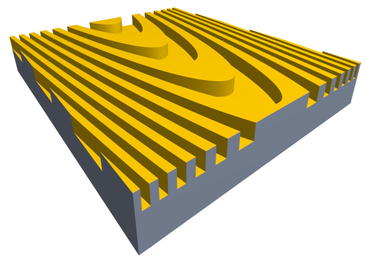
E-beam/laser writing



526 eV (Oxygen K_α, up to 3800 l/mm)



Ion etching



Coating (Au, Ni)

Aberration corrected VLS-gratings: 700 l/mm, 1250 l/mm, 2400 l/mm