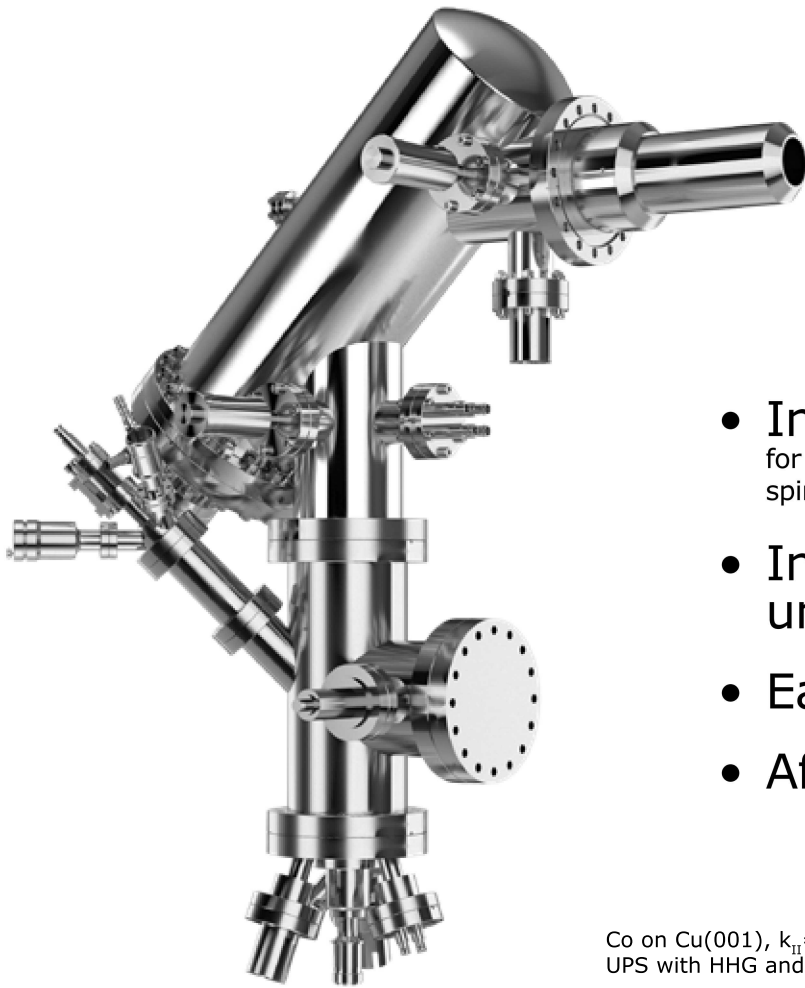


EasySPIN

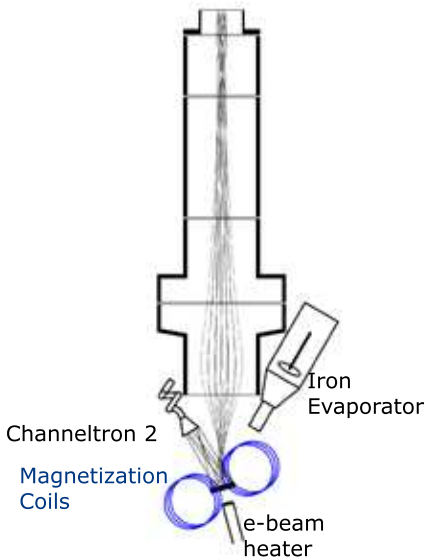
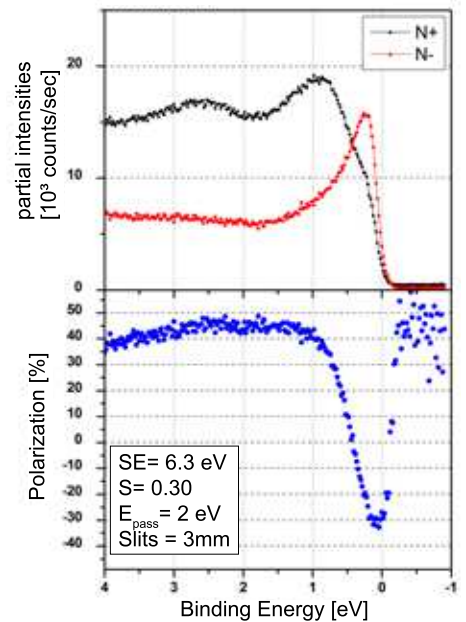
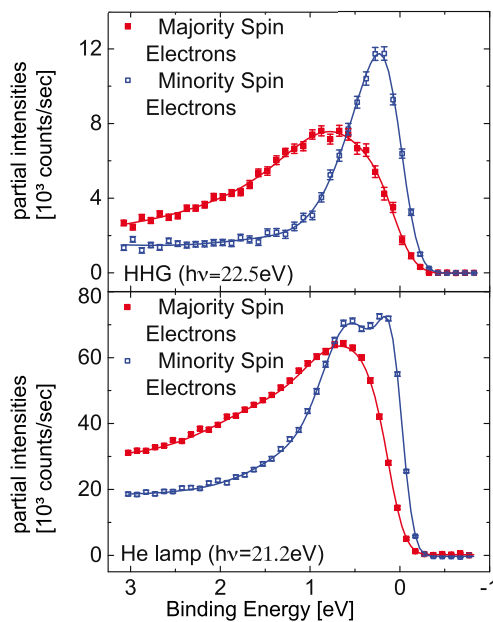
SPIN FILTERED SPECTROSCOPY



- Intrinsic 90° deflection for in- and out-of- plane spin polarization measurements
- Integrated FERRUM with unsurpassed figure of merit
- Ease of operation
- Affordable

Co on Cu(001), $k_{||}=0$
UPS with HHG and HeI

Fe on W(100) 70° emission
UPS with HeI



FERRUM operation principle for spin resolved measurements

M. Plötzing et al.
Rev.Sci.Inst. , 87 (2016)

Ref.: M.Escher et al.
e-J. Surf. Sci. Nanotech., 9 (2011)

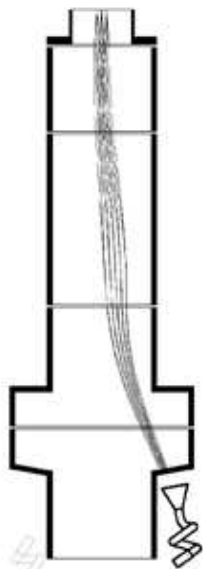
EasySPIN is a compact electron energy and spin analyzer combining the 90 °- deflection of a cylindrical sector analyzer with the FERRUM spin detector for simultaneous in- and out-of-plane spin polarization measurements. (The second in-plane component is either measured after 90° sample rotation or using the optional spin-rotator).

Spin detection is based on Very-Low-Energy Electron Diffraction (VLEED) where the incoming electron beam is scattered at a magnetized and oxygen passivated iron film grown on a tungsten crystal.

The EasySPIN enables unsurpassed fast spin resolved spectroscopy in a user friendly and affordable manner.

The spin integrated mode (separate channeltron) supports both standard Auger and XPS up to 1.6 keV kinetic energy and UPS down to 10 meV resolution.

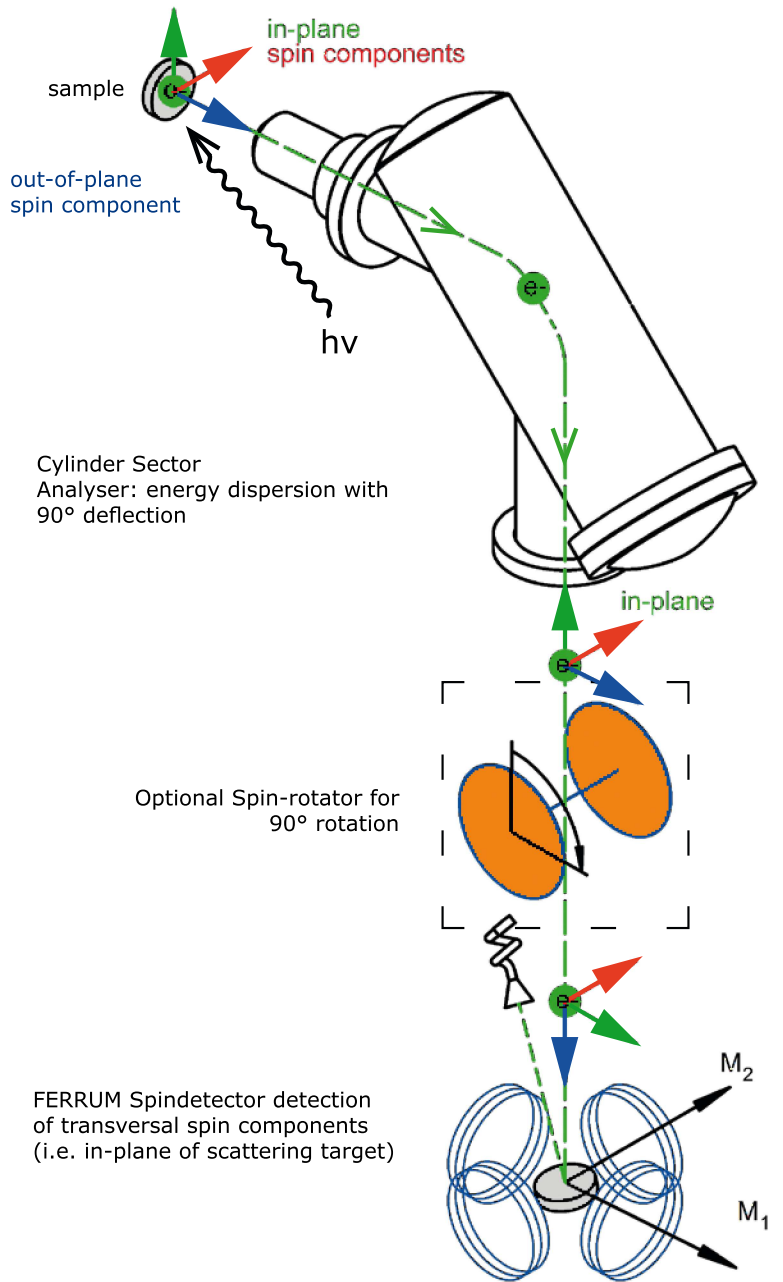
Independently variable entrance and exit slits provide high flexibility in determining transmission and energy resolution. The angular acceptance can be configured from +/- 1° to +/- 8°.



Channeltron



FERRUM operation principle for spin integrated measurements (I_0)



Cylinder Sector Analyser: energy dispersion with 90° deflection

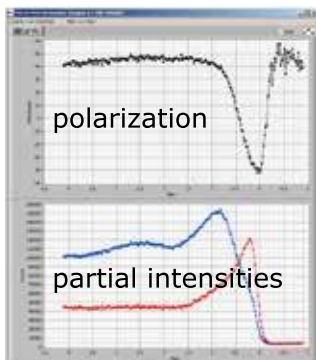
Optional Spin-rotator for 90° rotation

FERRUM Spindetector detection of transversal spin components (i.e. in-plane of scattering target)

All techniques required for preparation of the scattering target are included in the set-up. A re-preparation of the scattering crystal is required after venting only. Full electron optical design: no transfer of scattering crystal

APPLICATIONS

In today's research environment the value of an analytical method is determined by its ease of use. Pro EasySPIN software provides a straight forward interface to control data acquisition of spin polarized spectra.



Display of spectra

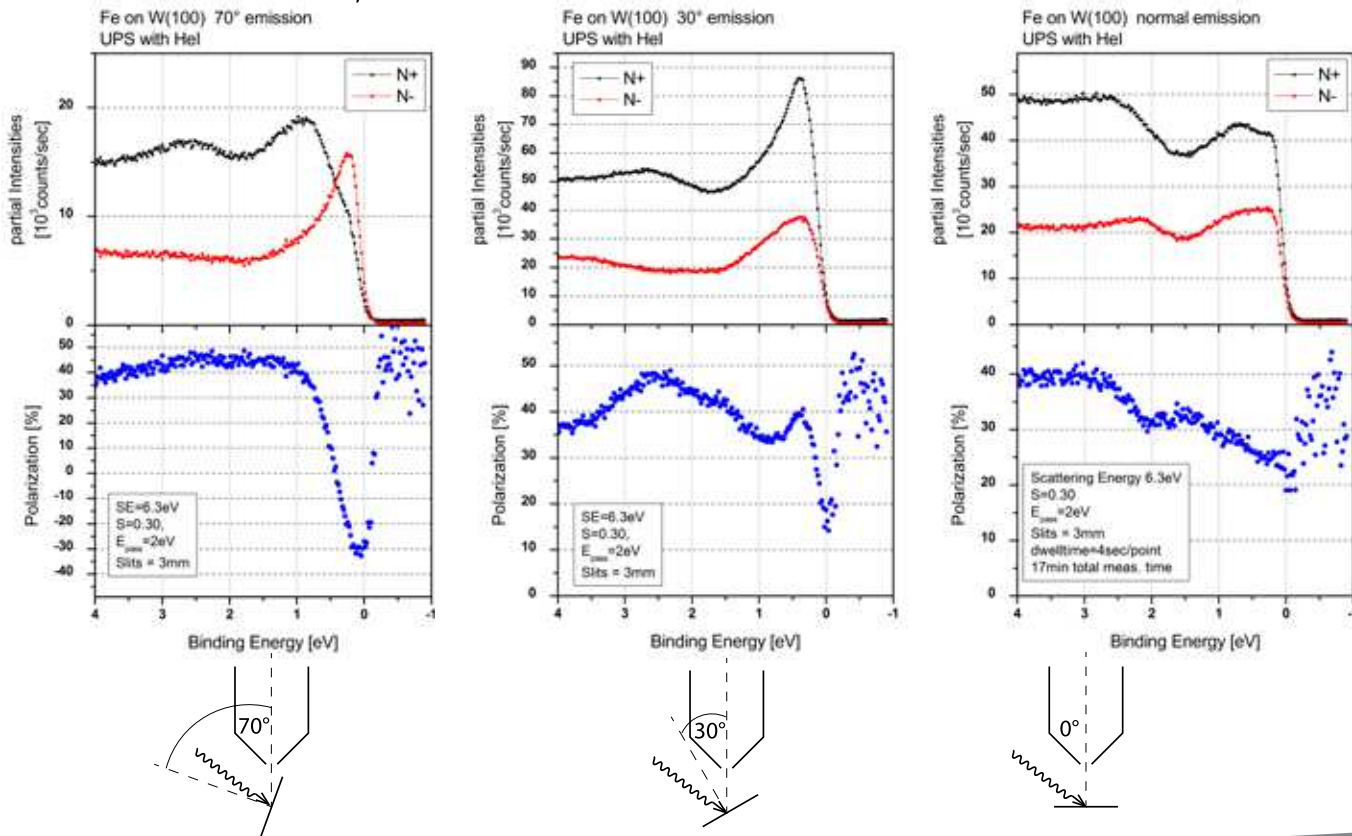
The user selects the acquisition of a spin integrated or a spin selective measurement with pre-defined parameters for both the spectrometer and the



Control window for EasySPIN

FERRUM spin filter. Two subsequent measurements with opposite magnetization for the FERRUM scattering crystal deliver the partial intensity for one spin direction of the sample. The FERRUM magnetization is automatically switched during a spin polarization measurement. Partial intensities and polarization for each spin direction are directly displayed and stored with the raw data. The second spin direction is obtained with orthogonal magnetization of the scattering crystal.

Emission angle dependent secondary electrons polarization (He I excitation) from a magnetized Iron film on W (100). Angular acceptance $\pm 6^\circ$. Measurement: M. Escher, FOCUS GmbH



Technical data EasySPIN

CSA (Electron energy analyser)

zoom- entrance lens with selectable magnification
 3 in-situ exchangeable slits for selectable energy resolution: 1,3,9 mm
 $E_{kin} = 0$ to 1600 eV (step resolution 2.5 meV)
 $E_{pass} = 1$ eV - 200 eV
 50 mm working distance
 Mounting flange: CF 100 ID

FERRUM (spin detector)

Scattering energy: 6.3 ± 0.1 eV
 Sherman function: $S = 0.28 \pm 0.01$
 Reflectivity (I/I_0): $R > 10.6\%$
 Figure of merit : $FoM = 8.8 \times 10^{-3}$
 Unlimited Lifetime under UHV conditions
 (venting requires re-conditioning of scattering crystal)

Integrated components:

- Iron evaporator
- electron beam heating
- Oxygen doser
- solenoids for magnetization of scattering crystal
- two single channeltrons with up to 5 MHz countrate
 - One channeltron for spin resolved measurements (I)
 - One channeltron for spin integrated measurements (I_0)



Photograph of the FERRUM spin-detector. The detector is mounted on a CF100 flange. Chamber and μ -metal screens are removed for clarity.

