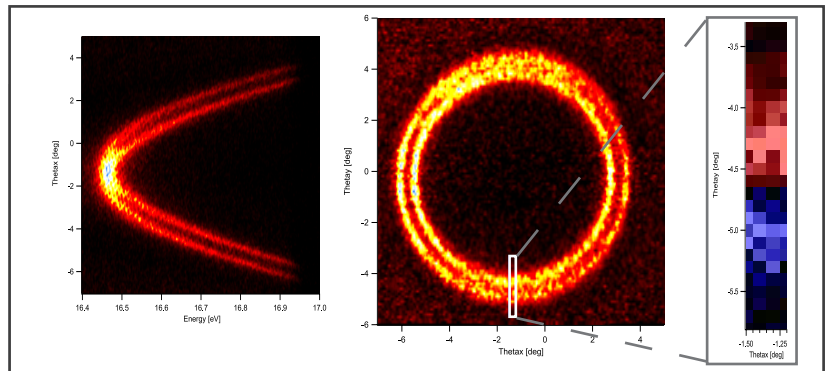


Spin resolved ARPES 2D/3D Ferrum VLEED Detector for DA30-L

This 2D or 3D spin detection utilises the exchange scattering mechanisms to be 50x more efficient than Mott schemes. One or two Ferrum VLEED detectors mount on a proprietary transfer lens with high speed switching between channels. The DA30-L's unique deflection mode directs any part the full acceptance cone to the spin detectors without sample rotation. Integrating the Ferrum and the DA30-L creates the highest quality and most efficient spin ARPES measurements.

Successful spin measurements require quality ARPES measurements to verify sample properties and ensure critical sample alignment. The DA30-L's unique capability to quickly scan Θ_x and Θ_y while providing the highest energy resolution measurements revolutionises spin-ARPES. The Ferrum's integrated cycles for target surface regeneration and growth recipes provide reliable and easy operation. The regeneration requires no transfer or realignment of the target.



Au(111) data recorded with DA30-L, 2D Ferrum VLEED detector, the VUV5k UV source and using the analyser deflector capability for ARPES and Spin mapping. The complete ARPES data cube was recorded in 10 min and the high resolution Spin measurement to the right was recorded in 2 h, all with fixed sample/manipulator position.

Data courtesy: Prof. Dingsung Lin, Dept. of Physics, National Tsing Hua University, Taiwan

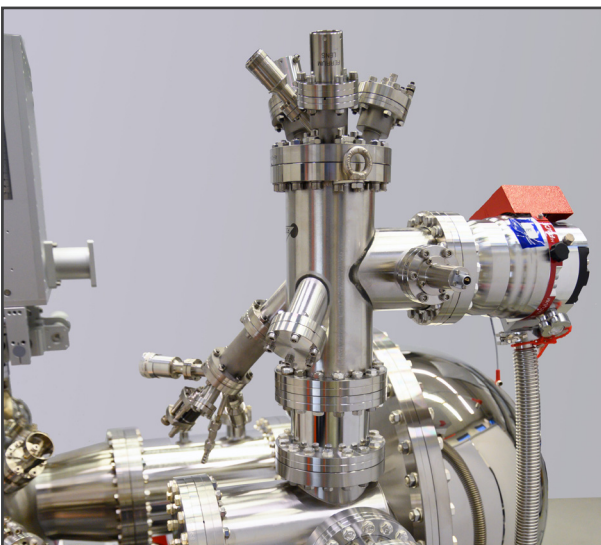
VLEED Efficiency

The Ferrum VLEED from Focus GmbH is based on exchange scattering at an oxidised iron film. Compared to the traditional Mott spin detection technique, the VLEED approach is 50x more efficient for a 2D measurement.

In each Ferrum two pairs of coils switch the VLEED target magnetization in $\pm x$ and $\pm y$ to access two orthogonal spin vectors. In the 3D version one Ferrum resolves both in-plane

components and the second resolves the out-of-plane component plus a duplicate in-plane vector. The duplicated in-plane component can be used for calibration.

The DA30-L deflection mode is ideal for VLEED measurements as the any Θ_x and Θ_y angle entering the lens system can be directed to the spin detector without sample rotation, increasing speed, precision and keeping the geometry constant throughout the experiment.



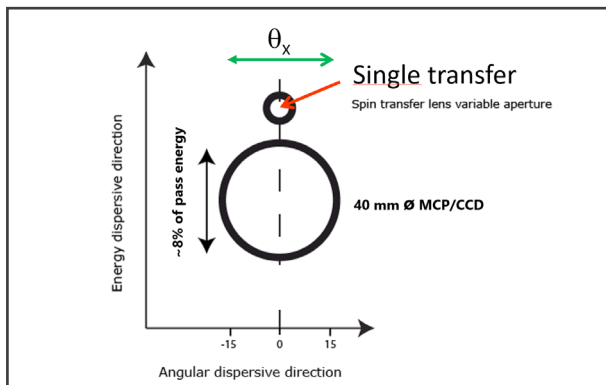
DA30-L equipped with Ferrum VLEED detector. The 2D version consists of one Ferrum VLEED detector and is easily upgraded by addition of a second Ferrum VLEED to full 3D capability.

Technical Highlights:

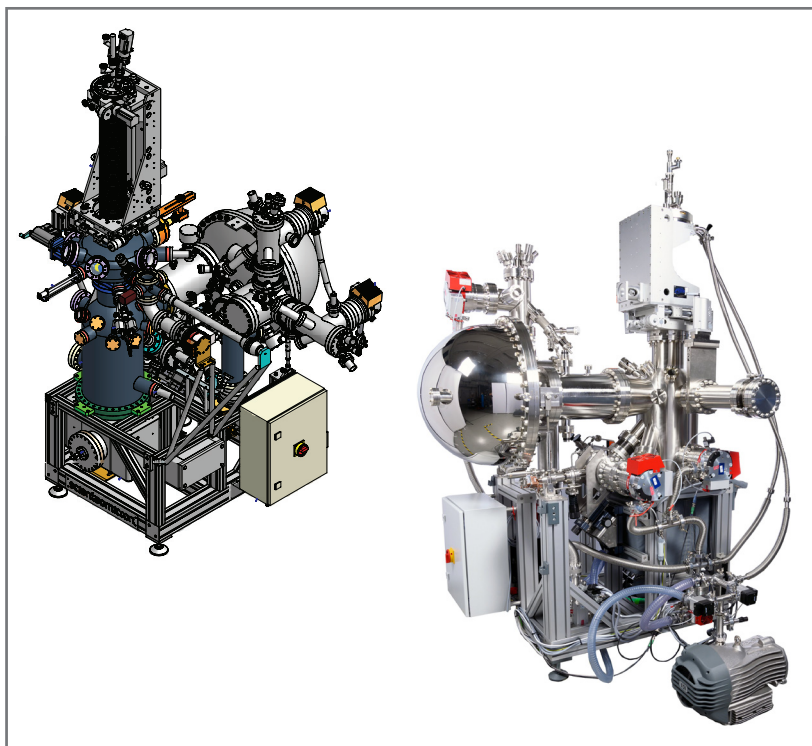
- 2D version built with 3D transfer lens for easy future upgrade
- VLEED + 40mm MCP/digital camera detector
- Selectable transfer lens aperture for tuning intensity/resolution
- One transfer system with two orthogonal exits
- Easy VLEED target preparation without transfer or realignment
- Market leading Sherman function and Reflectivity
- VLEED with several weeks lifetime between preparations

Spin Vector Integrity

The three spin vector directions are all defined by the geometry in the instrument. In each Ferrum detector the target magnetization gives two orthogonal directions. In the 3D version, two Ferrum detectors are mounted in orthogonal geometry. This ensures that the measured spin vectors are truly orthogonal.

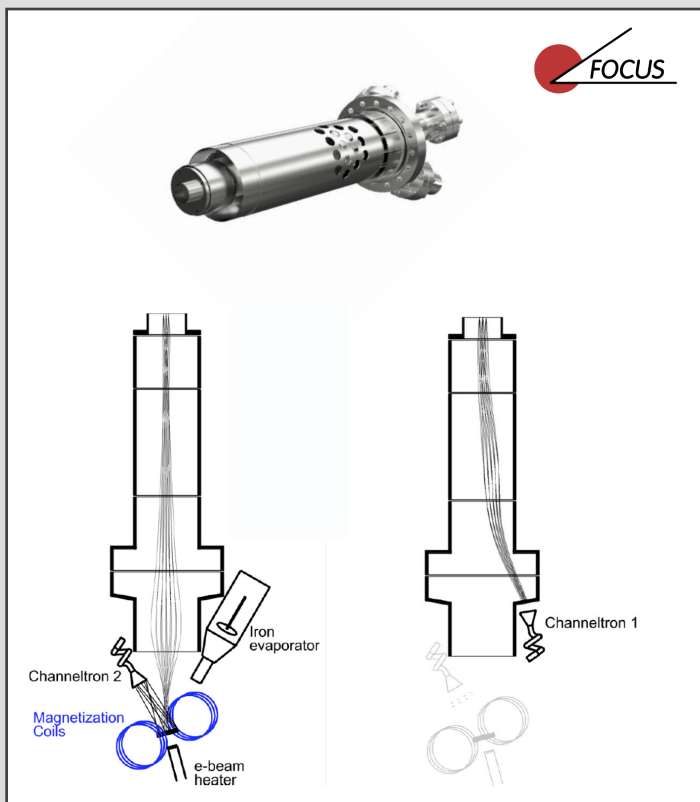


The spin transfer aperture is next to the 40 mm MCP/digital camera ARPES detector. It features a variable aperture with 4 optimised aperture sizes.



Complete spin-ARPES turnkey system.

Technical Data



Top: Ferrum detector without vacuum housing.

Bottom: The scattering Fe-film target is prepared in situ with easy handling of W-substrate preparation, Fe-film evaporation and oxygen dosing. Two pairs of coils are used to switch the detector magnetization in $\pm x$ and $\pm y$ to access two orthogonal spin components, in each Ferrum detector. Channeltron 1 is used for measuring I_0 and channeltron 2 for spin resolved experiments.

Property

Sherman function
Reflectivity (I/I₀)
VLEED scattering energy
Transfer entrance apertures
MCP/digital camera

Specification

S ≥ 28% (achieved > 30 %)
R ≥ 10% (achieved > 15 %)
6.3 eV (oxidised iron film)
4, with optimised sizes
>900 energy channels
>750 angular channels
150 °C
Double μ -metal shield

Bake out temperature
Magnetic shielding

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