Beam profile study with motorized iris

Hamza Amar

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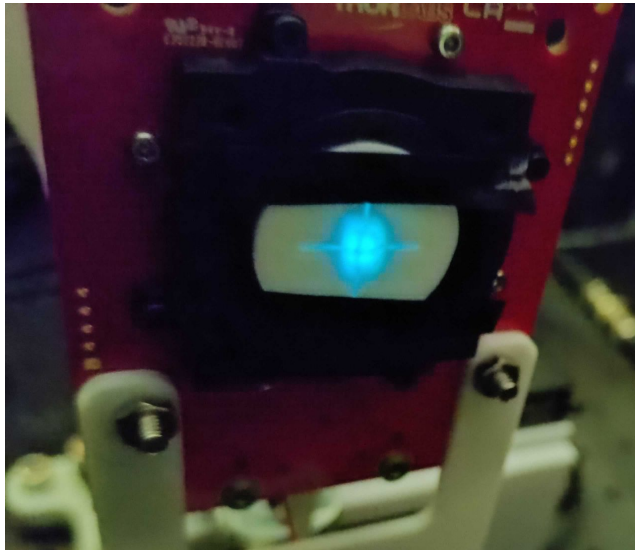
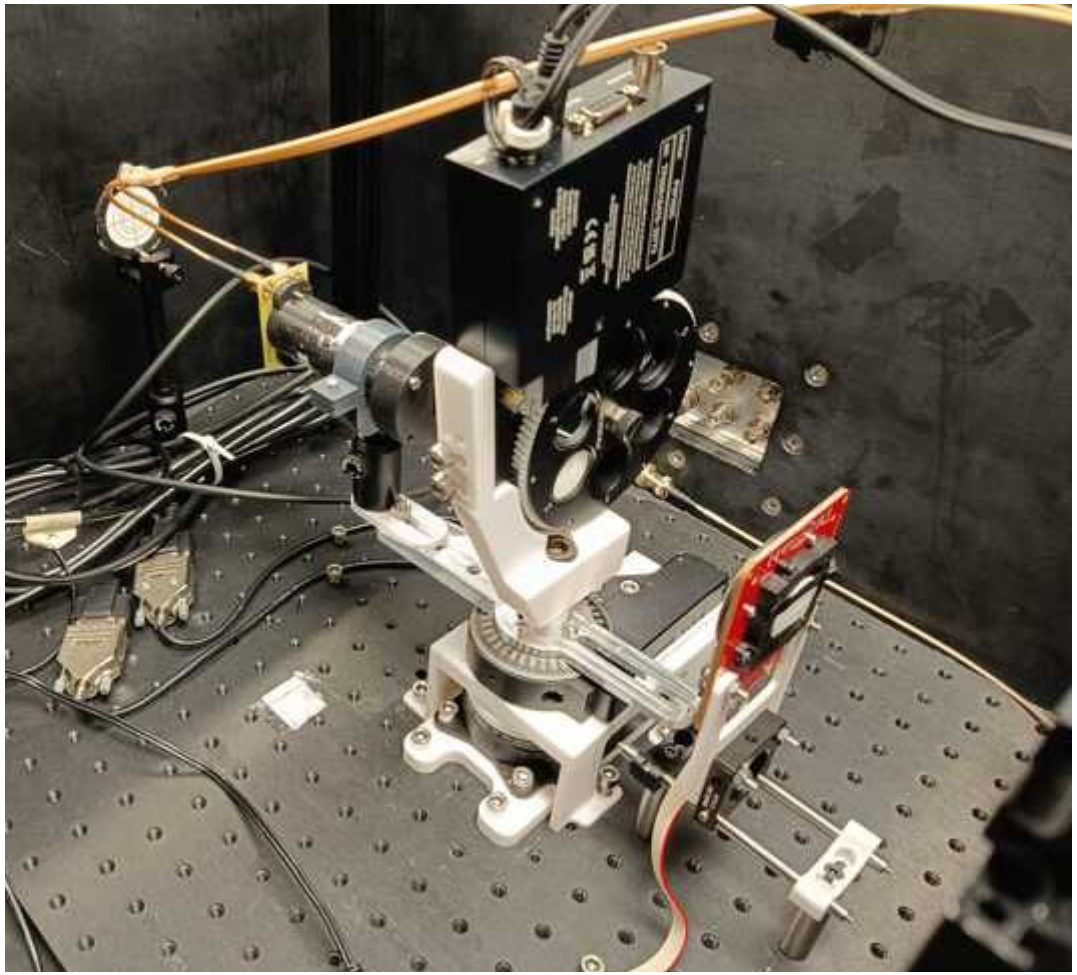
CSIC Consejo Superior de Investigaciones Científicas
Universitat de València
IFIC Institut de Física Corpuscular
Excelencia Severo Ochoa

Motivation

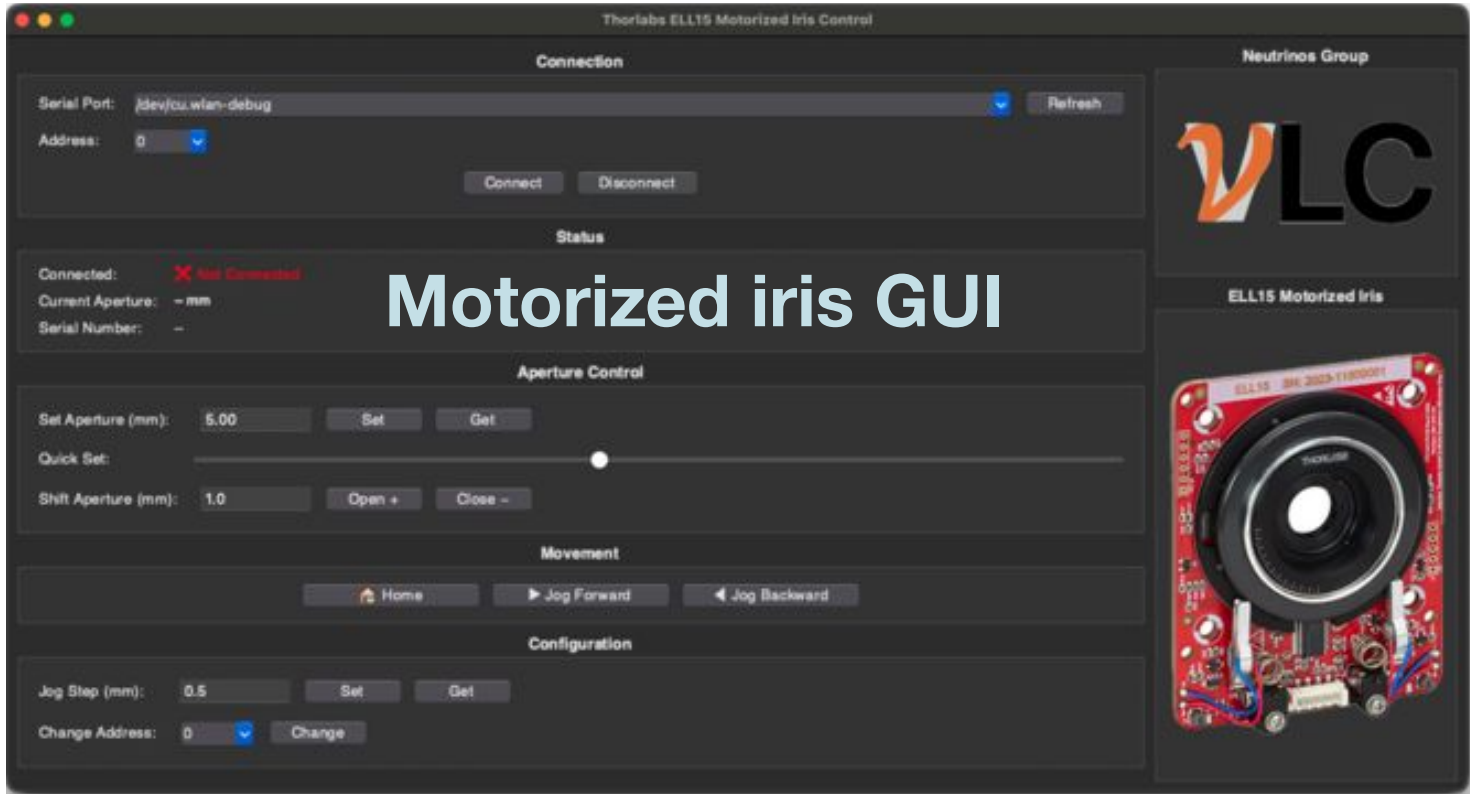
- **Rotary Setup Upgrade**: Motorized iris installed to precisely control the incident beam aperture.
- **Aperture Limitations (Caveat ⚠️)**: Due to the undesirable lack of collimation, two issues persist:
  - The beam spot size increases with longitudinal distance.
  - The beam profile is consistently non-circular/non-elliptical.



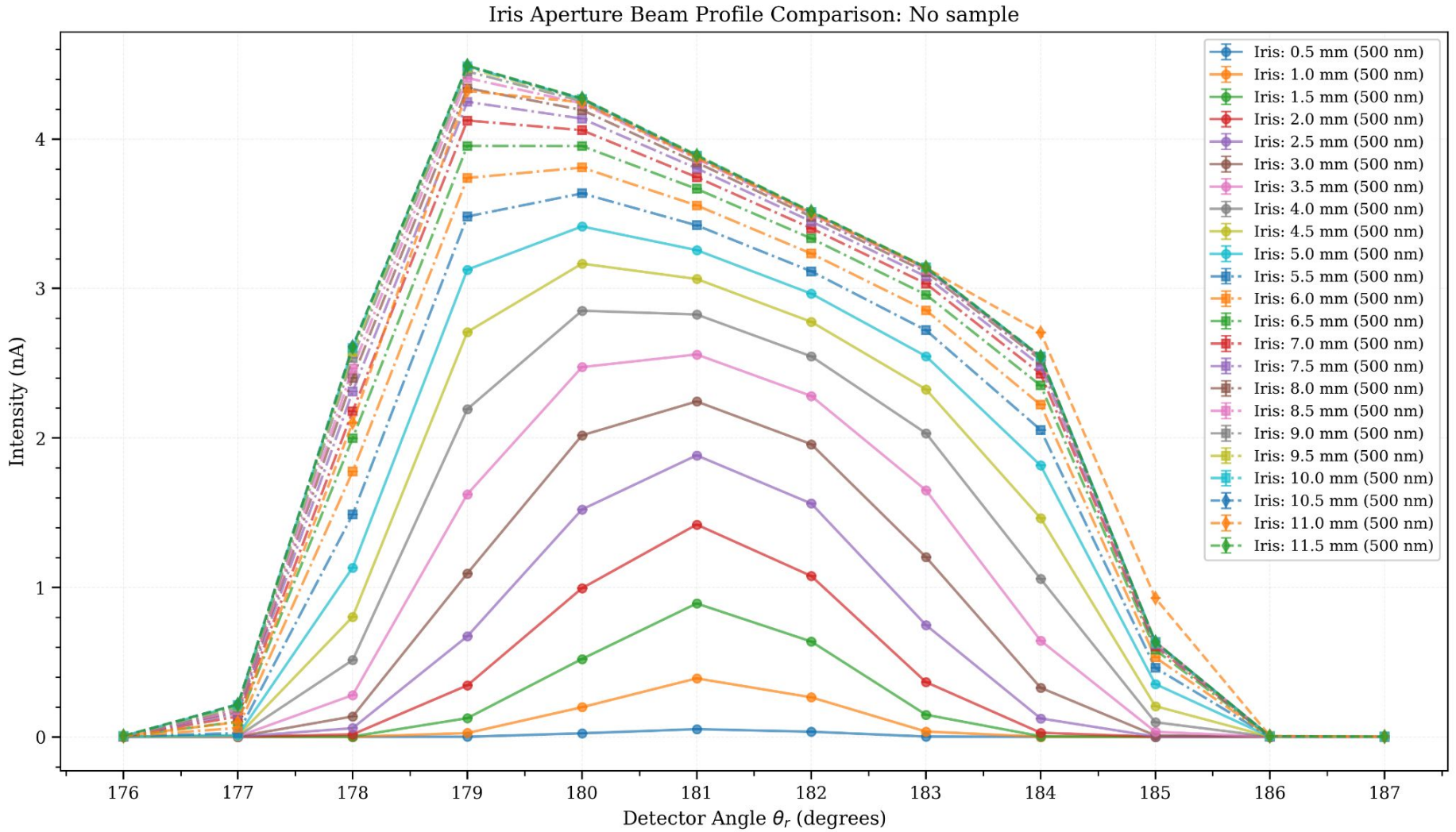


Goals

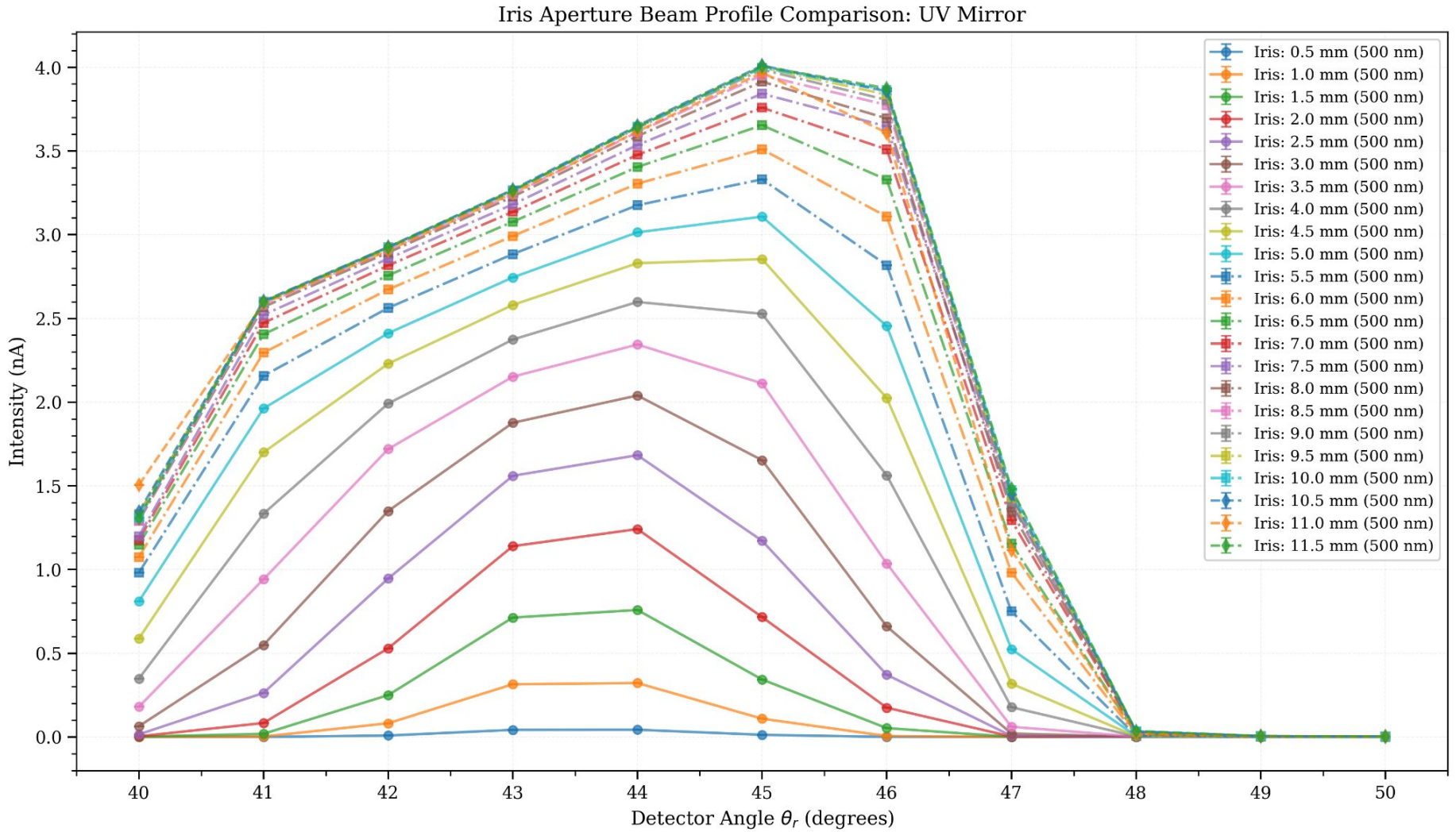
- **Characterize the beam profile** observed during a reflectance measurement with the rotary setup.
- **Determine the proper aperture** to ensure a tradeoff between a narrow beam spot, yet sufficiently intense to allow VUV light detection.
- This is carried out for two positions: incident and reflected beam @ 45º with a UV mirror.



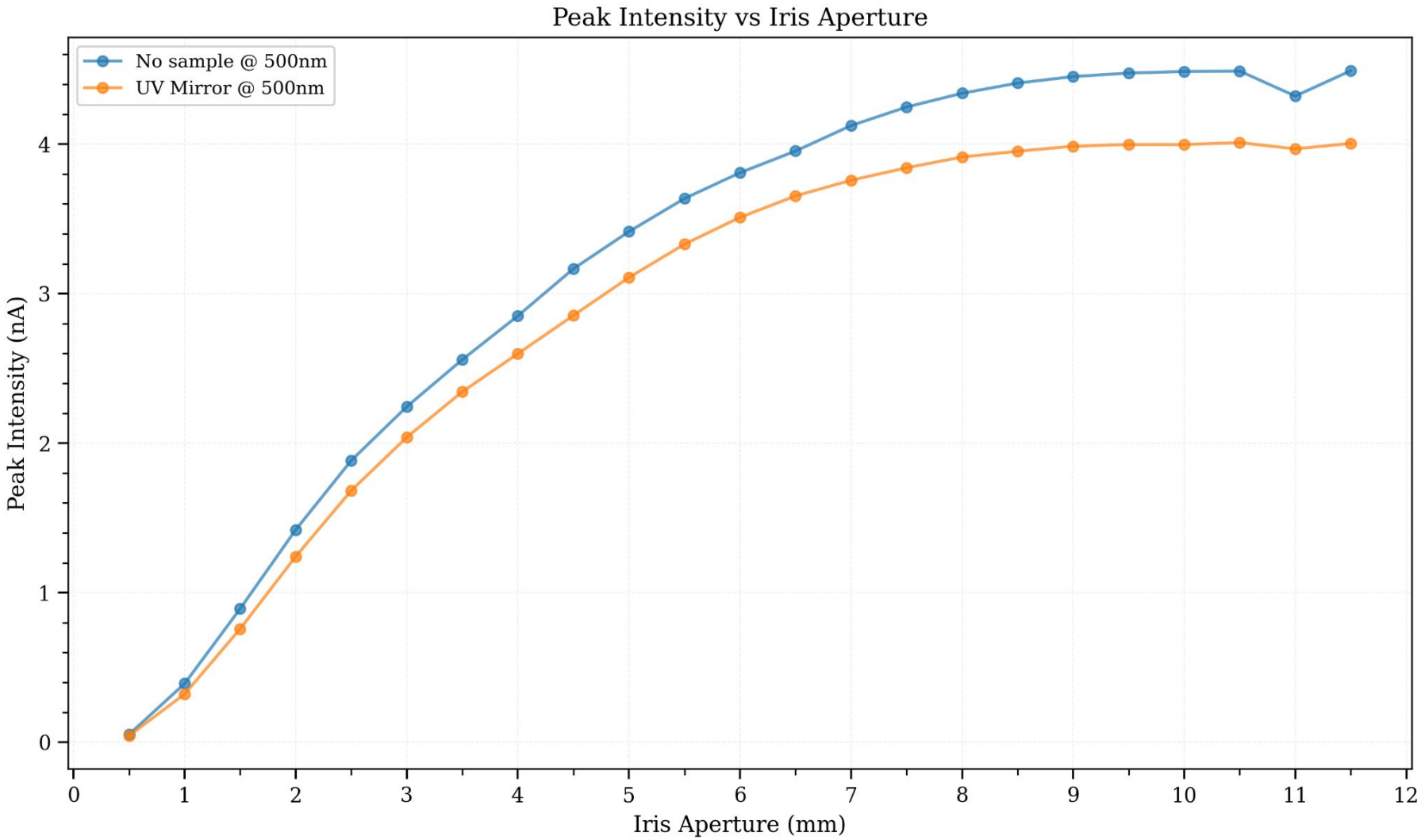
Incident beam profile



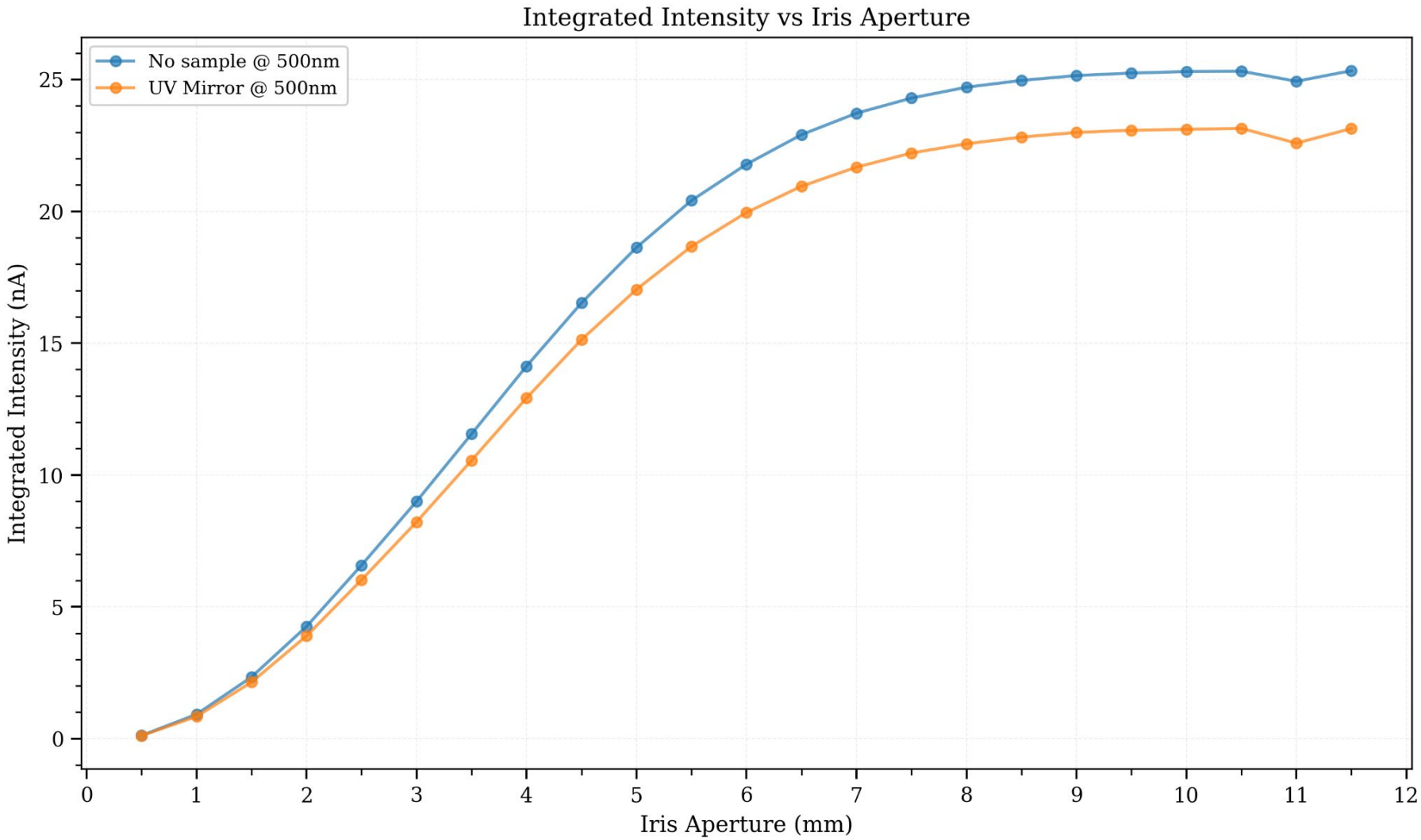
Reflected beam profile



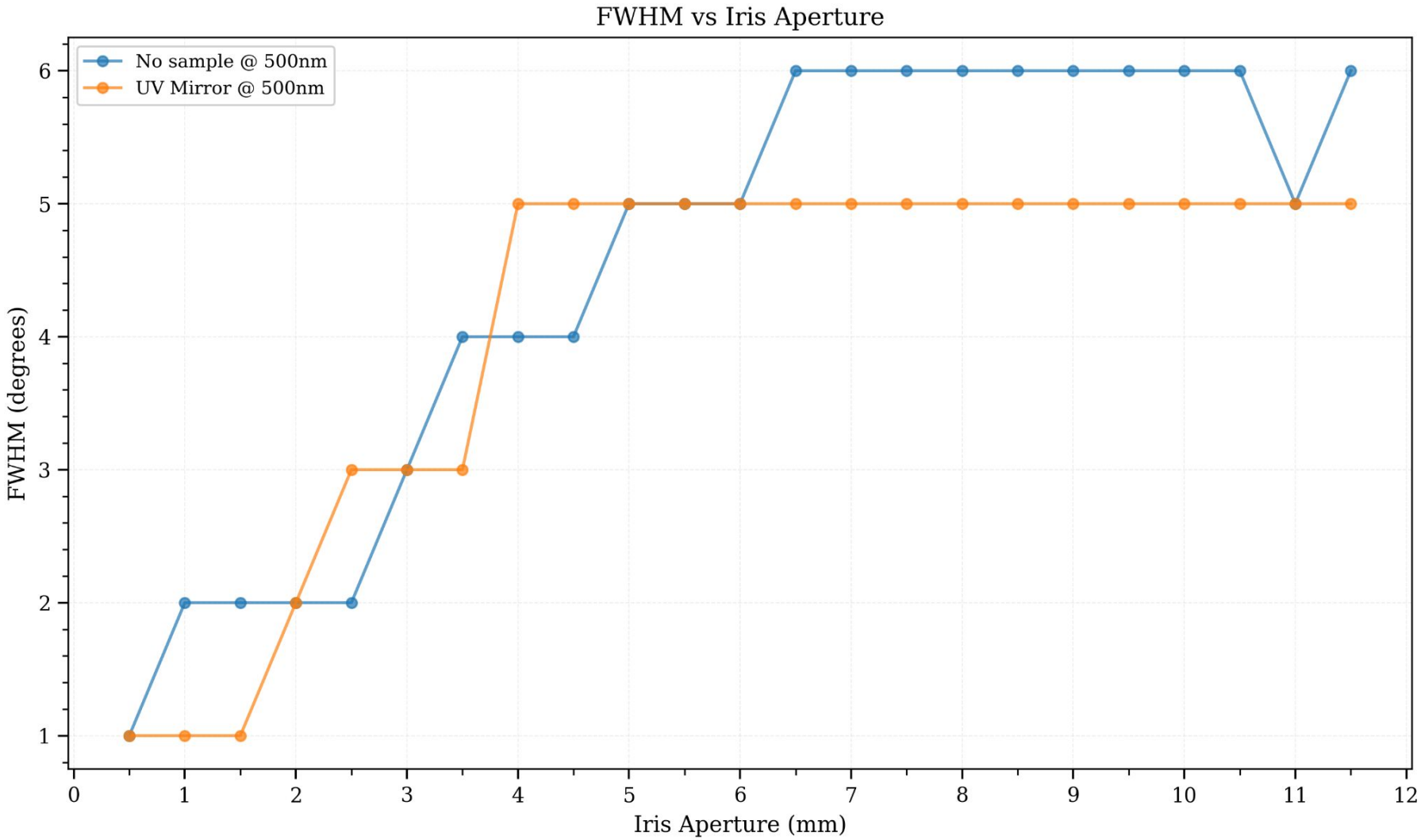
Peak intensity



Integrated (summed) intensity

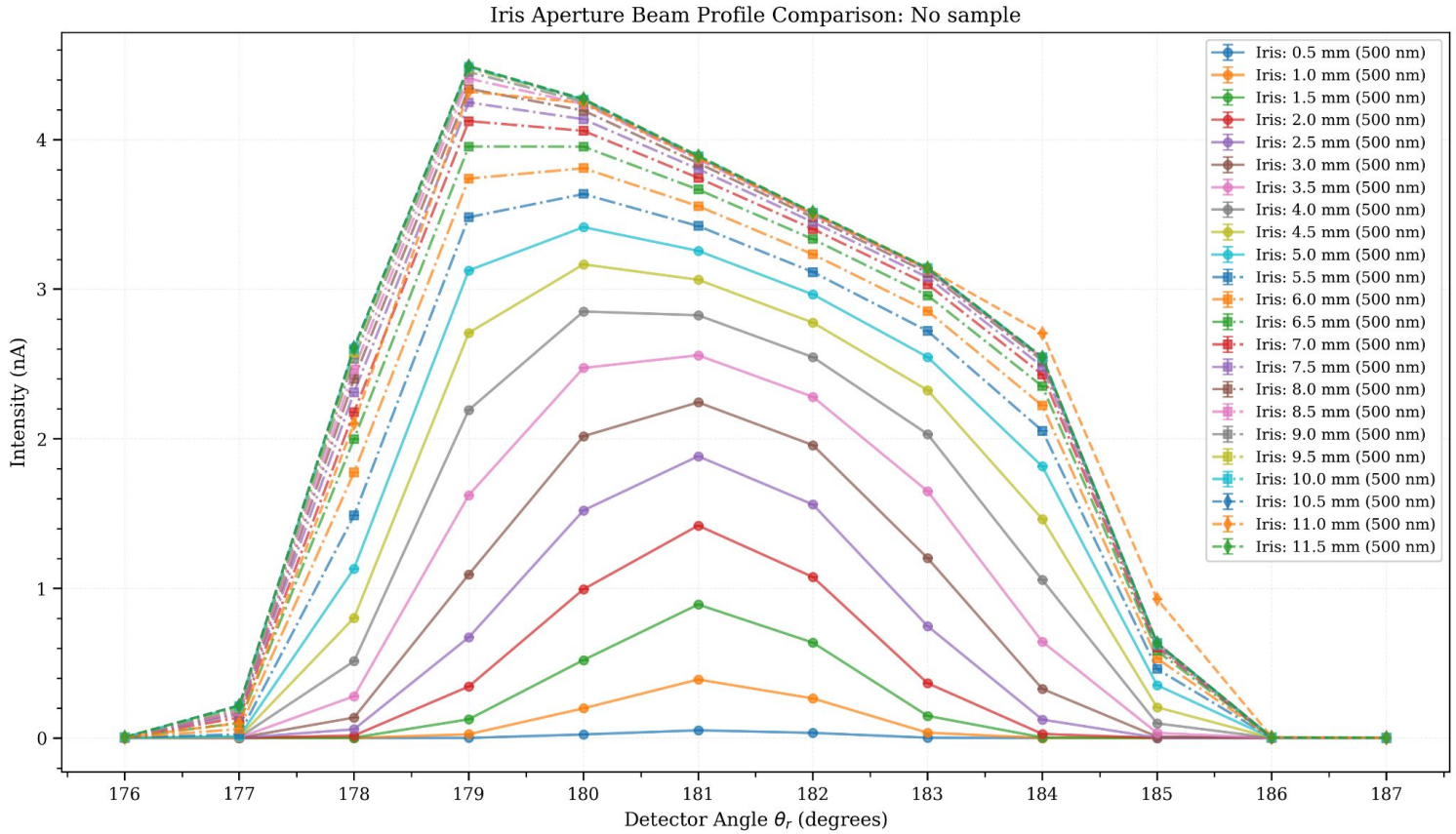


Specular reflectance measurements: mask effects



Takeaways

- **Asymmetric beam profile.** It can be corrected if the iris is not centered at the intensity peak and the aperture is small.
- **The wider the aperture, the more the intensity**. However, from 8.0 mm ø on, this effect is less pronounced.



Takeaways

- **Optimal aperture for VUV measurements,** based on experience with iris aperture ≈ 5 mm**.**
  - **Caveat ⚠️: distance-dependent due to collimation conditions.**
  - The peak intensity related to the reflected beam profile for stainless steel and aluminium samples was **a few pA @ 128 nm!!!**
  - Under the current conditions of the experimental setup, the peak intensity would be reduced by a factor 5 by utilizing an iris aperture between 2.5 and 3.0 mm.

λ (nm)	I_{peak} (pA)	Ratio (wrt 500 nm)	$I_{peak,\ expected}$ (pA)
128	197	0.02	40
150	977	0.10	200
175	262	0.03	50
200	678	0.07	140
500	~10000	1	2000