

Characterizing Polarisation at the BESSY II Booster

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A green circular logo in the bottom right corner contains the text 'DEELS' and '2024' in white. The background of the slide features a blue grid pattern that recedes into the distance, suggesting a tunnel or a particle accelerator structure.

DEELS
2024

Goal

Improving the optical diagnostic of the third generation light source booster:

- characterising the polarisation (linear & circular)
 - optimizing working point at 550 nm
- ➔ research beamline to study polarisation

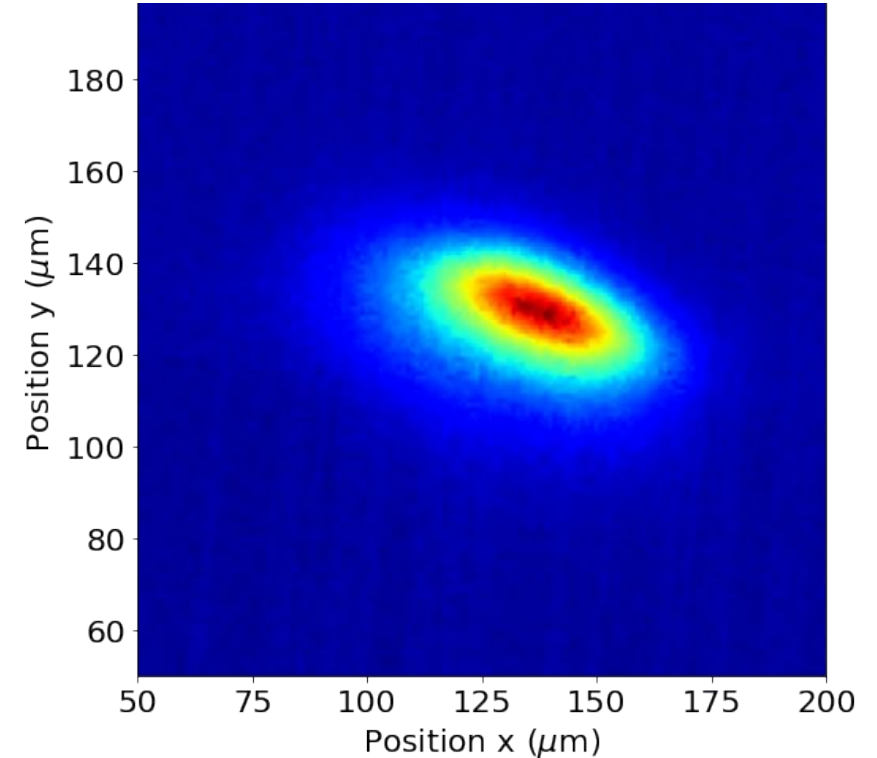


Fig. 1: Source point image on CCD camera

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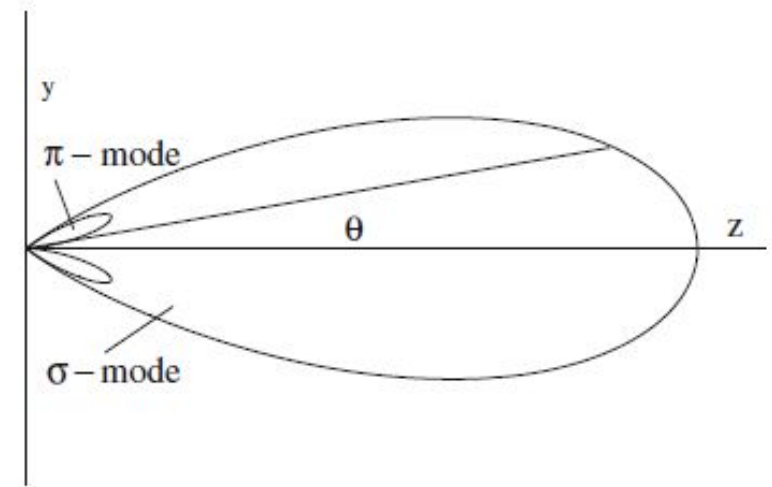


Fig. 2: Radiation lobes for linear (σ) and circular (π) polarization

Quelle: H. Wiedemann: Particle Accelerator Physics, Fourth Edition S.877

Measurement Set-up

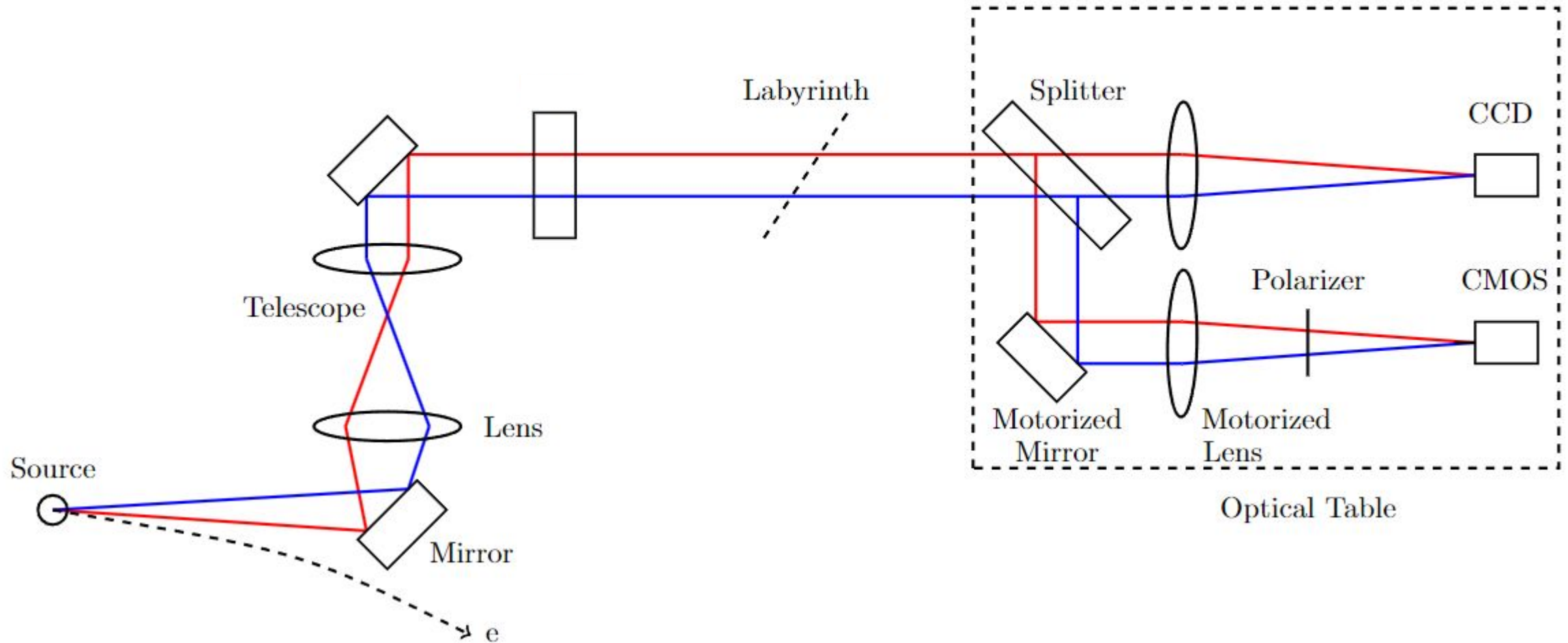


Fig. 3: Simplified Measurement Setup with Research beamline & diagnostic beamline

Measurement Set-up

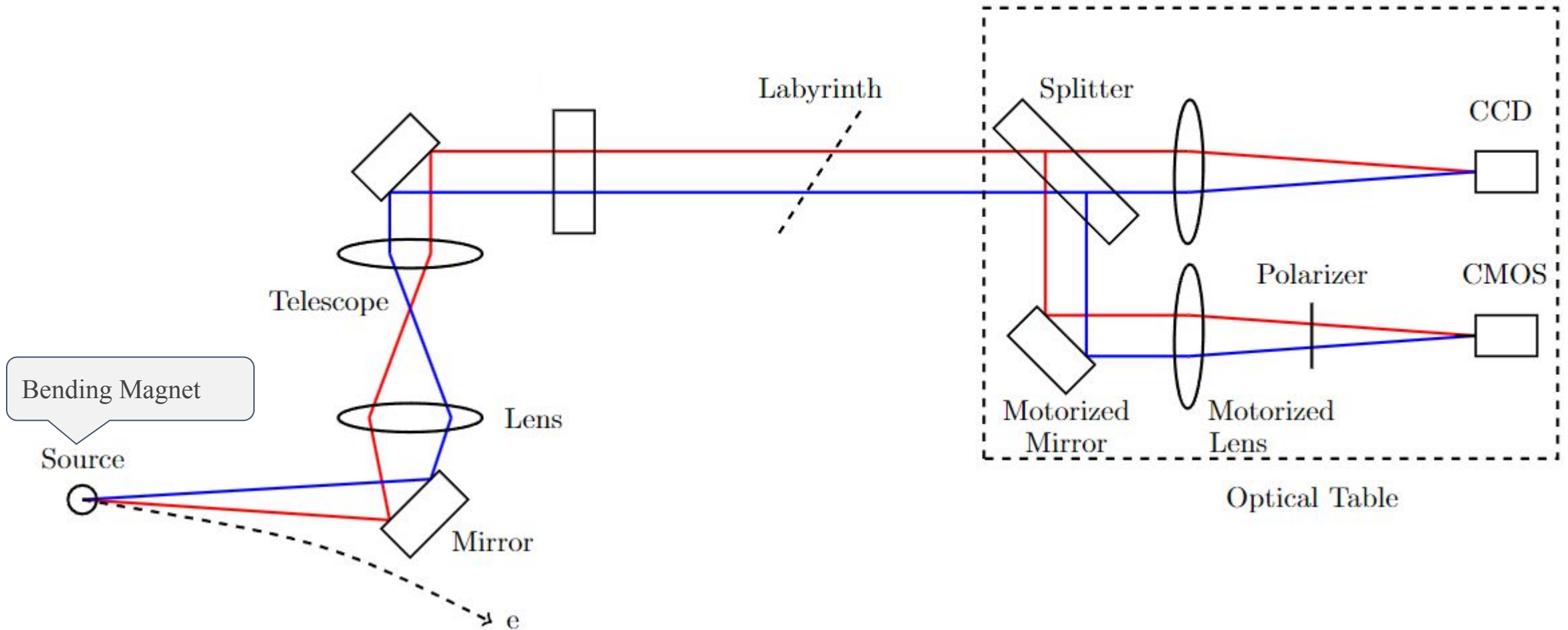


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Measurement Set-up

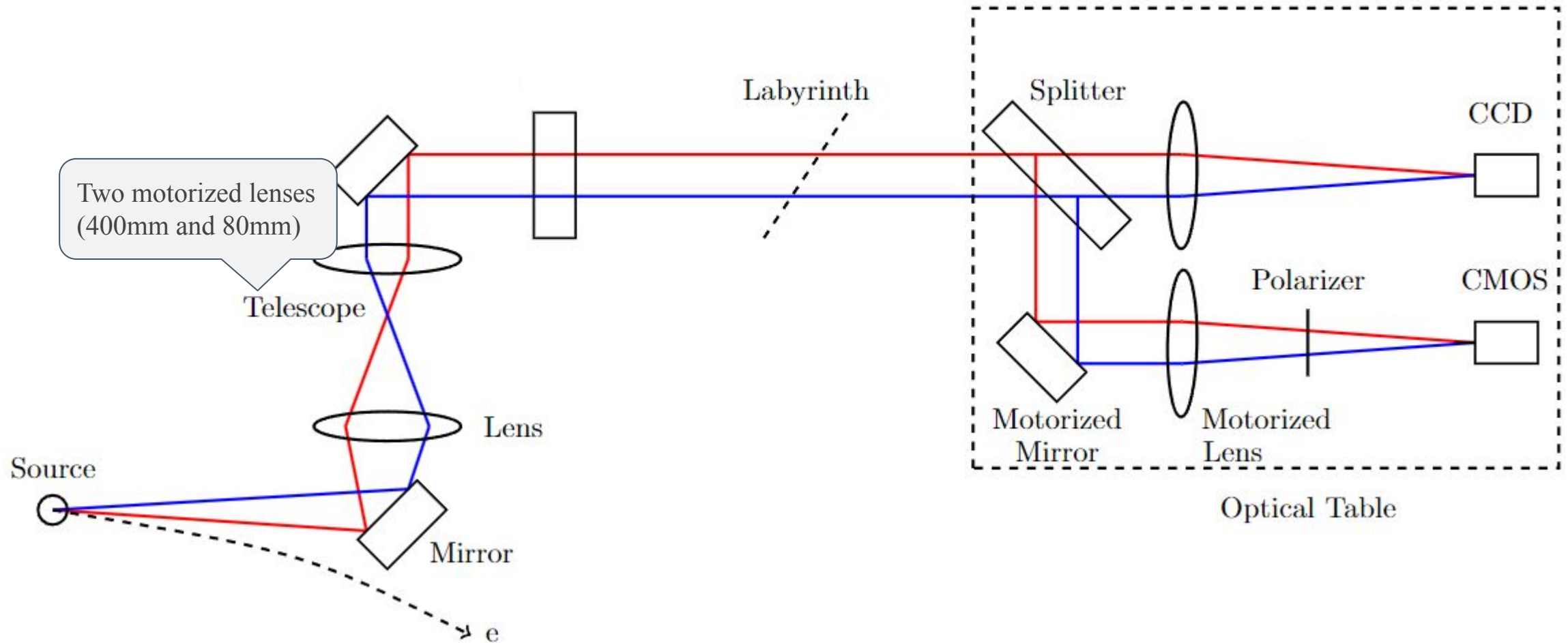


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Measurement Set-up

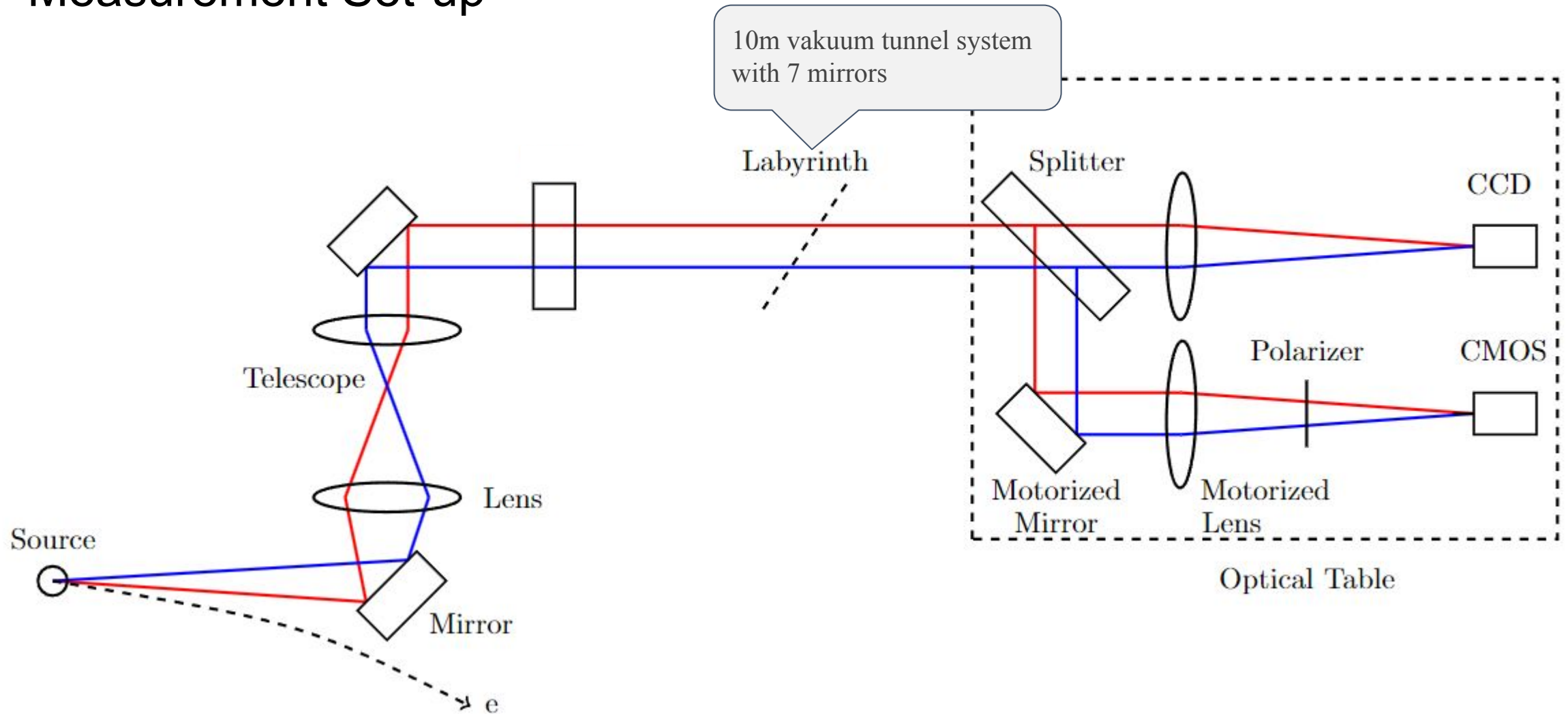


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Measurement Set-up

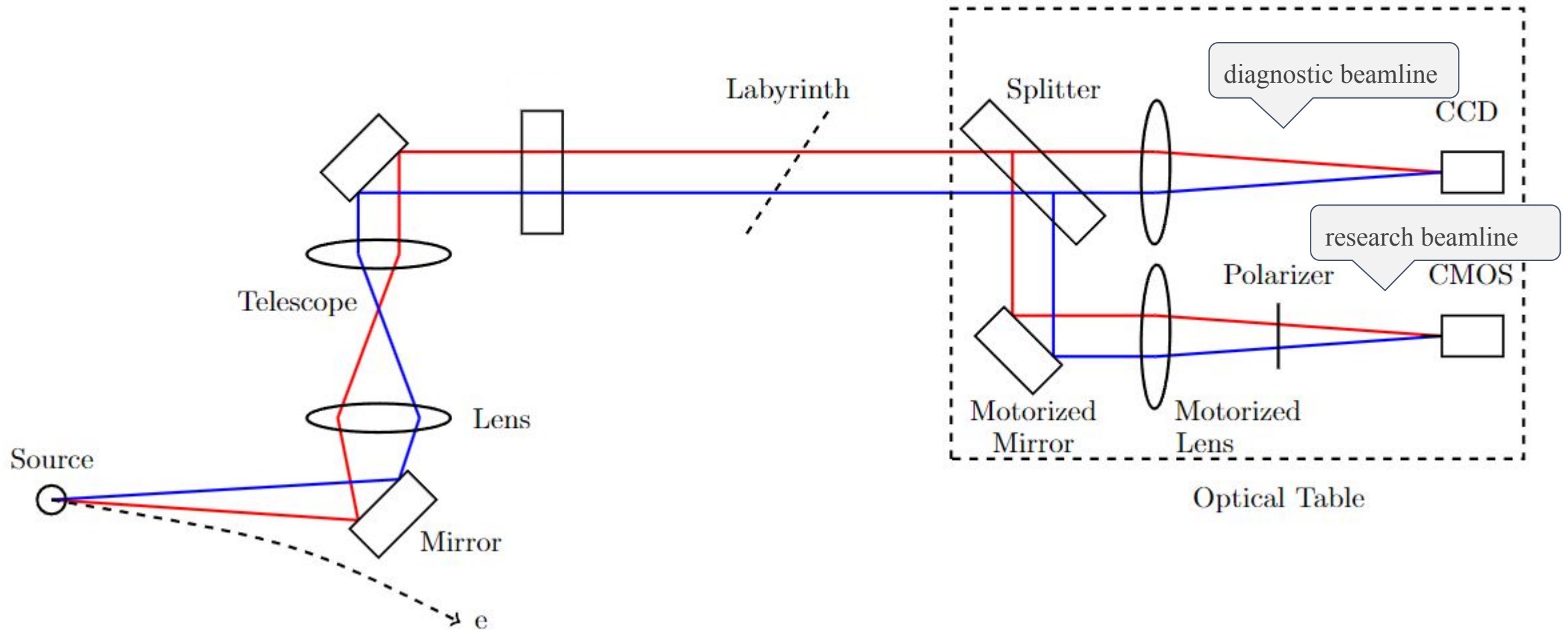


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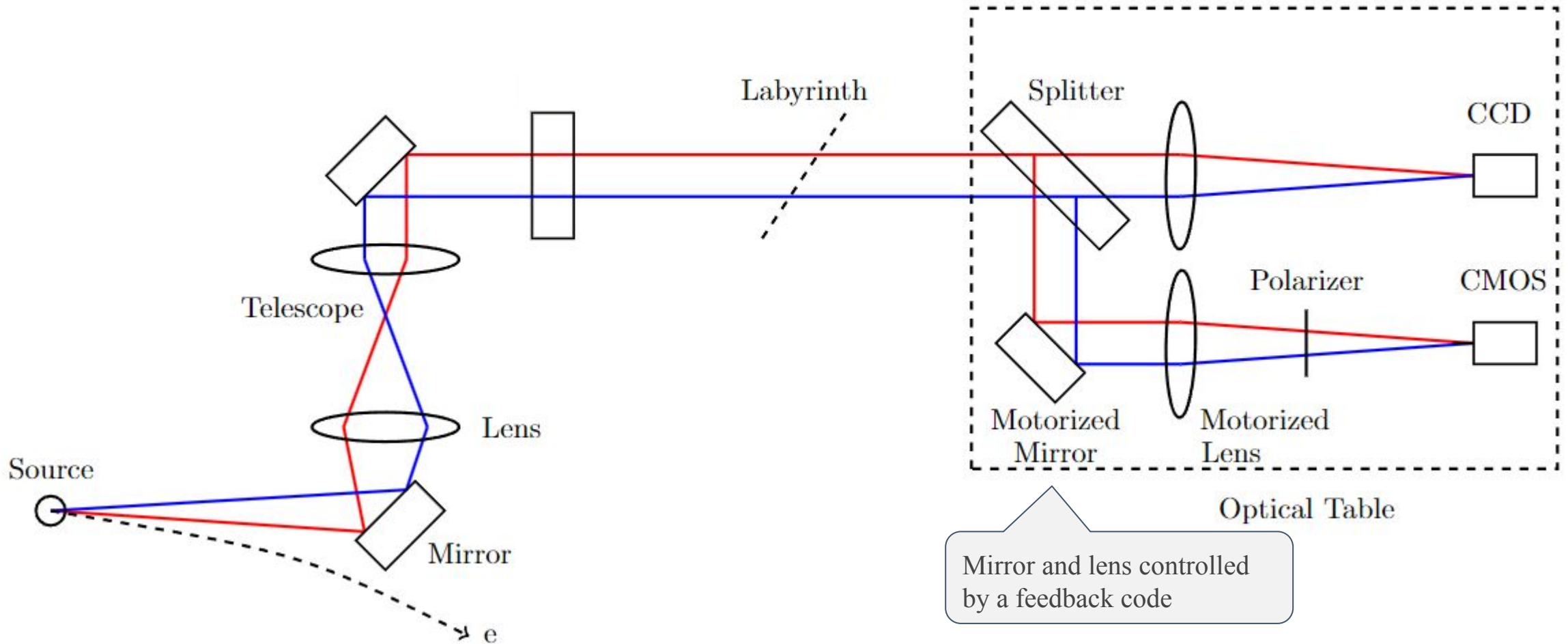


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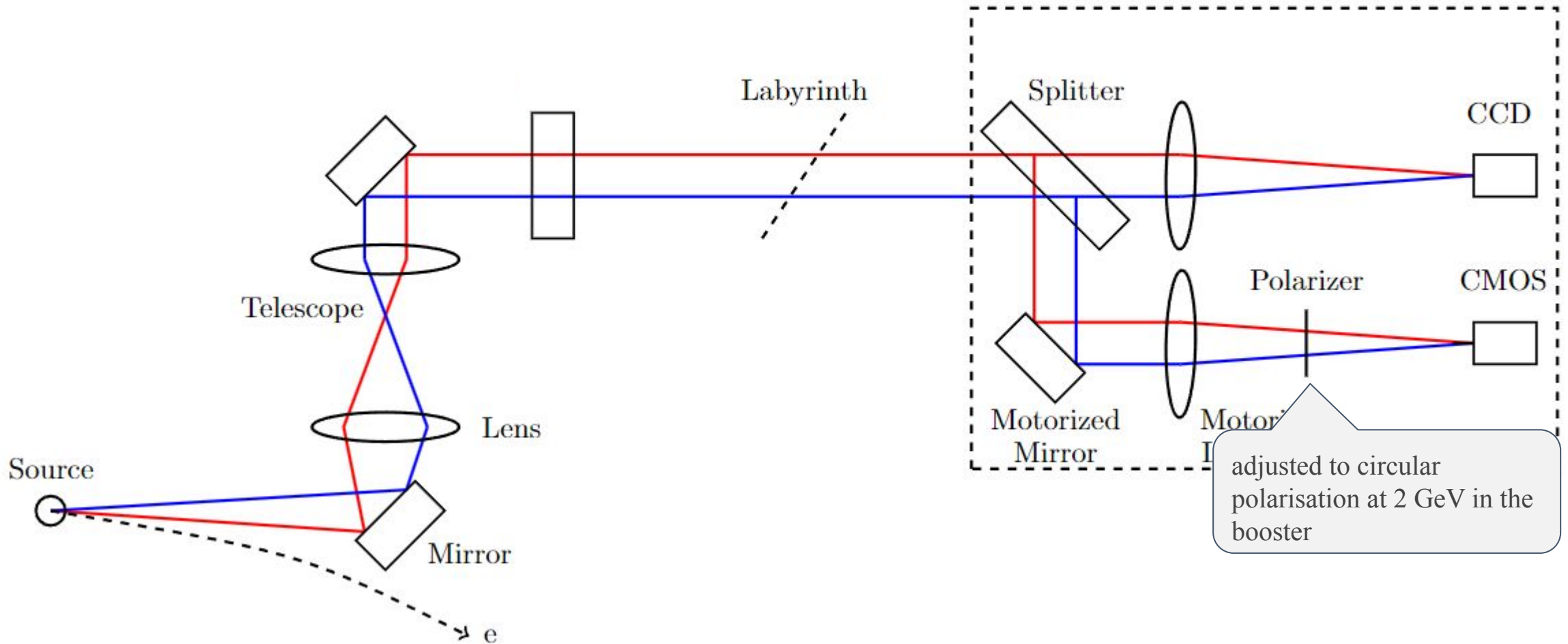


Fig. 3: Simplified Measurement Setup with Research beamline & diagnostic beamline

Hypothesis

Using linear optics:

- at focus point: no difference between linear & circular polarisation
- outside focus point:
 - for circular: two spots
 - for linear: one spot
- beam behaviour: similar on both sides of the focus (symmetry)

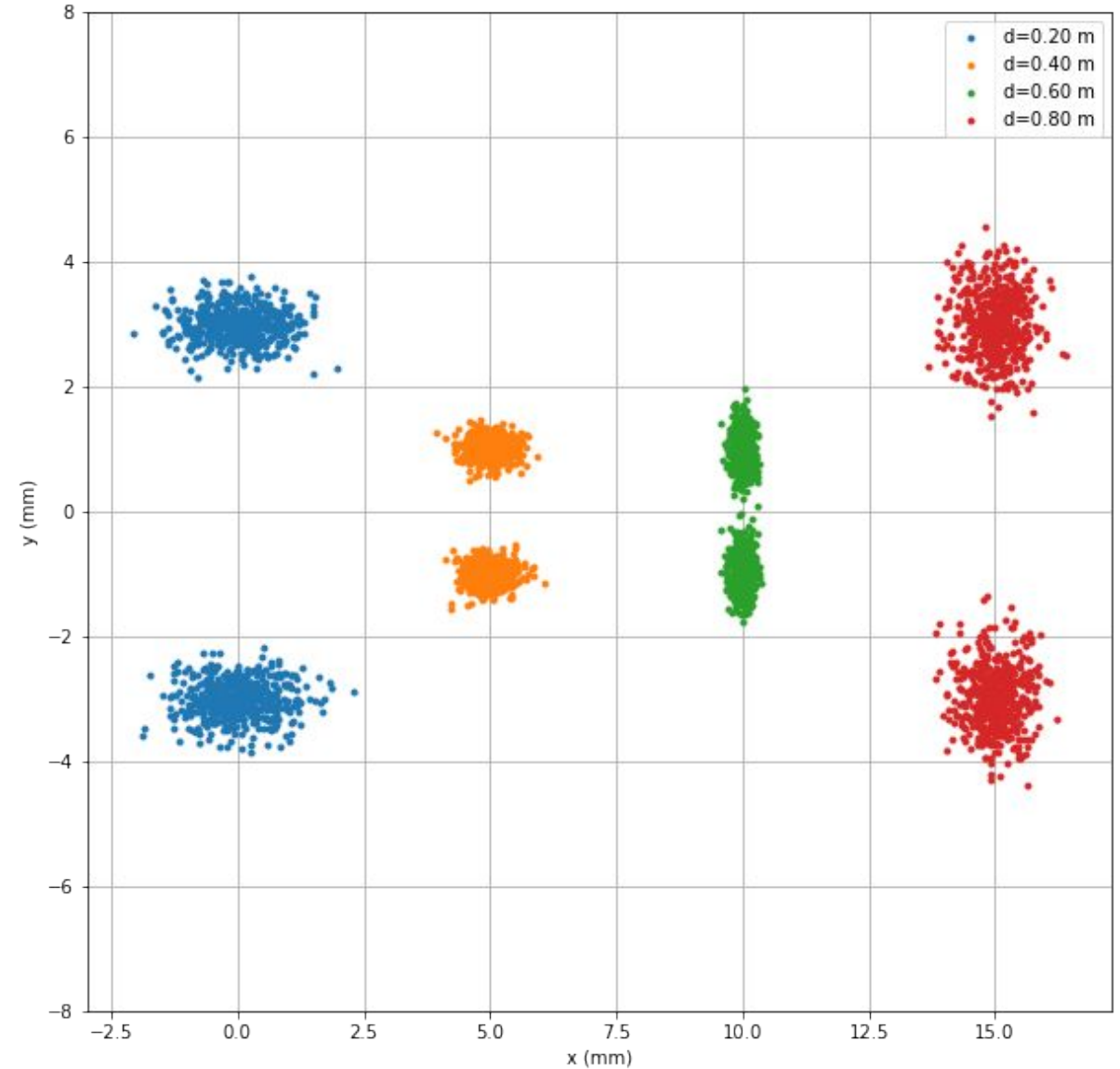


Fig. 4: Simulated beam behaviour at 550 nm with two lobes simplifying circular polarization

Results

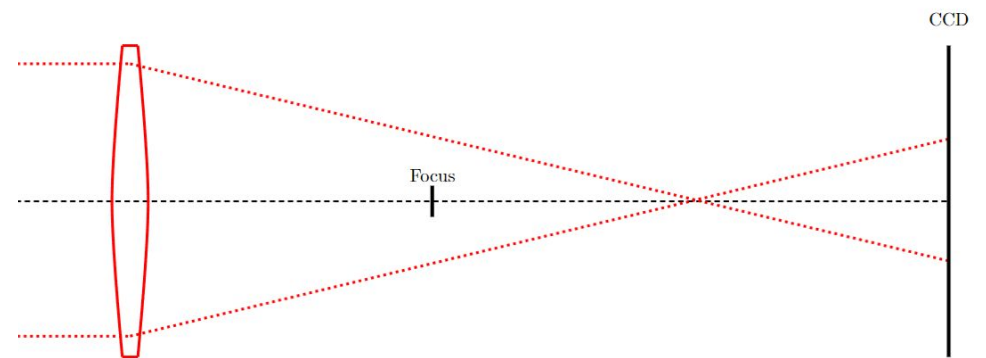
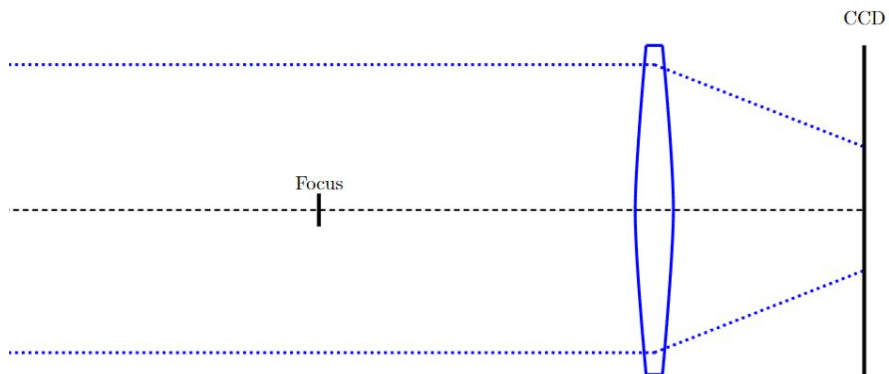
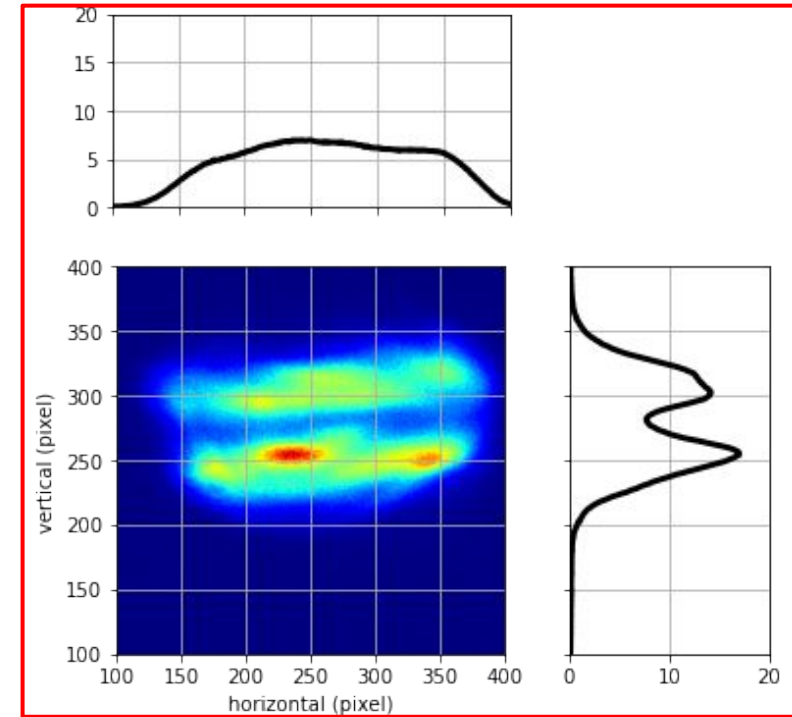
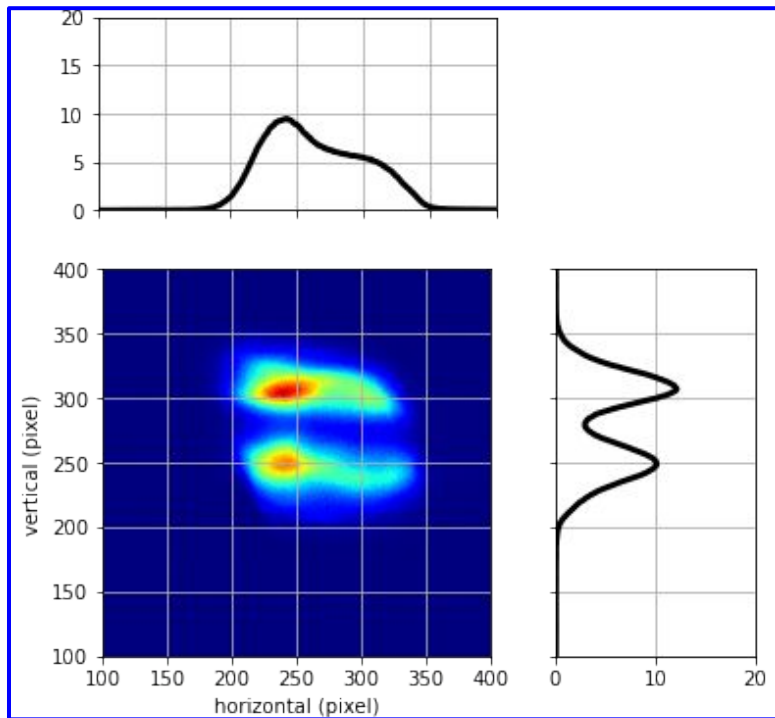


Fig. 5: Results of circular polarization with two different lens position

Thank you for your attention!

A green circle is positioned in the bottom right area of the slide. Inside the circle, the text 'DEELS' is written in a white, uppercase, sans-serif font, and '2024' is written below it in a smaller, white, uppercase, sans-serif font.



Error Elimination Process

through:

- good alignment
- different filter, lens, energy
- other beamline

to do:

Characterizing the polarisation intensity over the energy ramp