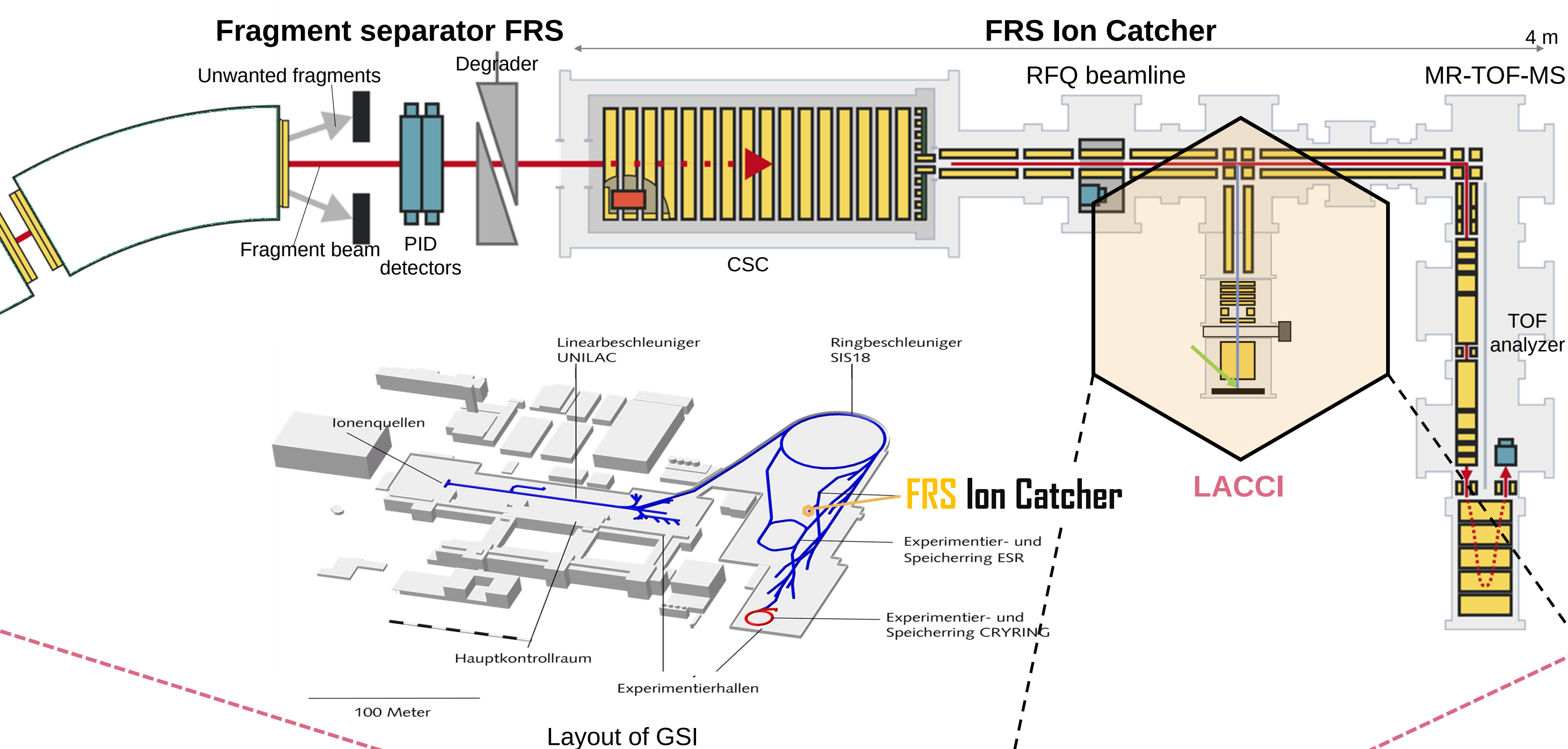


# A laser ablation carbon cluster ion source (LACCI) for high accuracy mass measurements with an MR-TOF-MS

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C. Scheidenberger<sup>1,2</sup> and the FRS Ion Catcher Collaboration

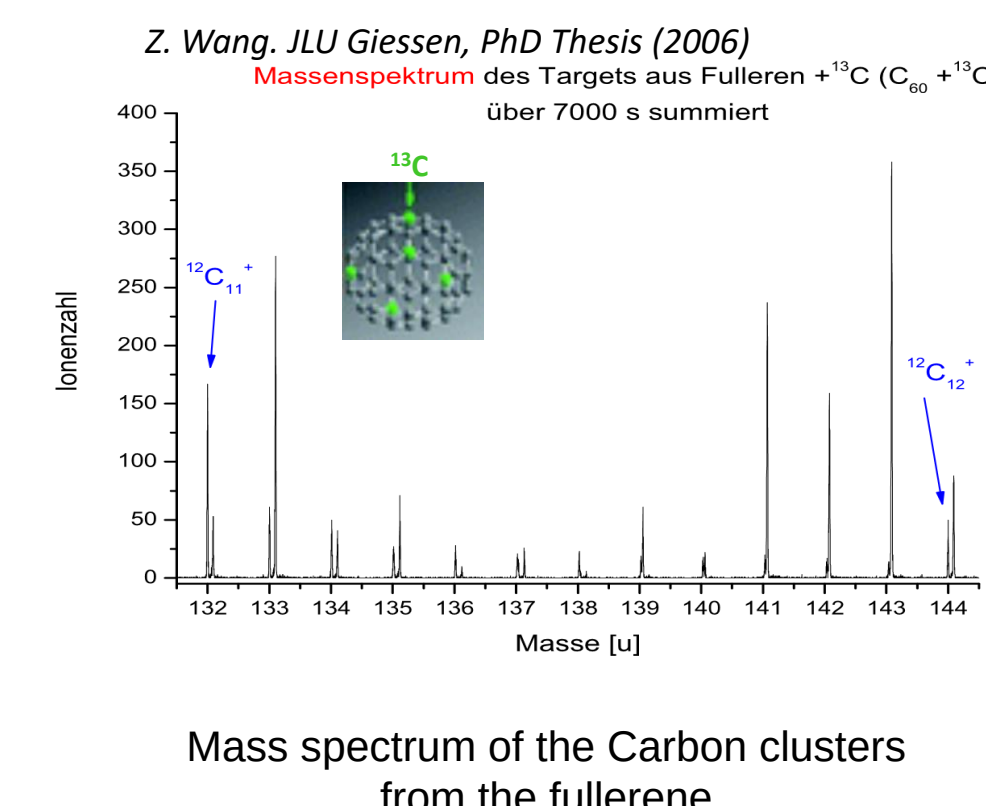
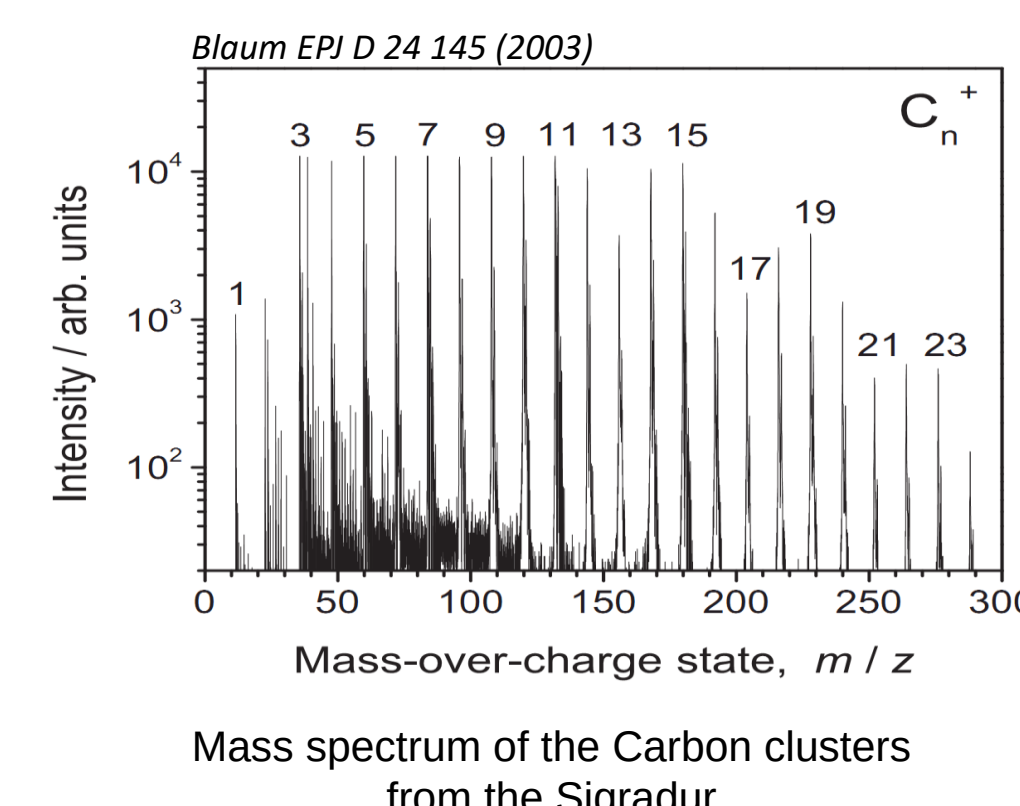
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## Where & How does LACCI work?

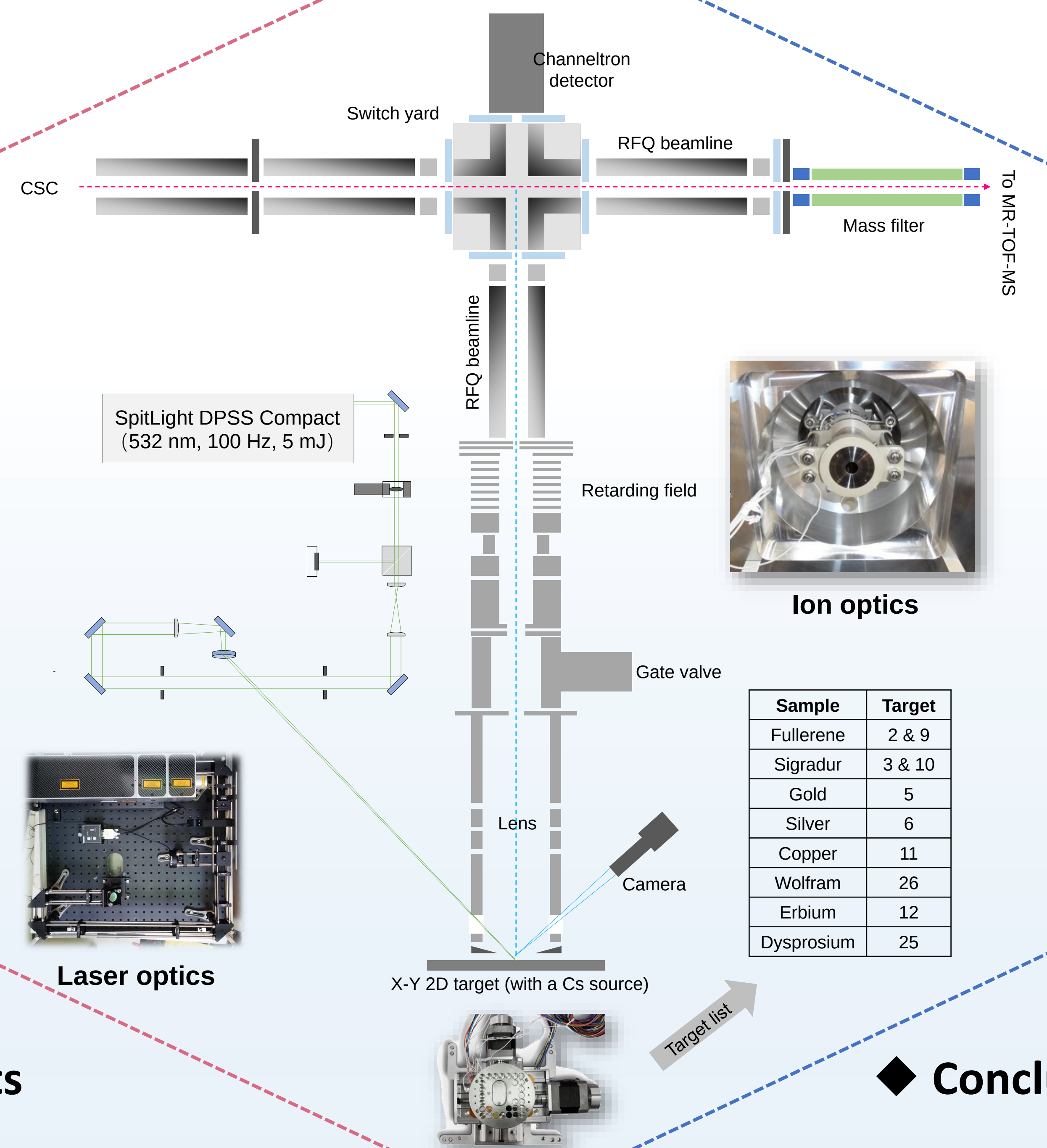
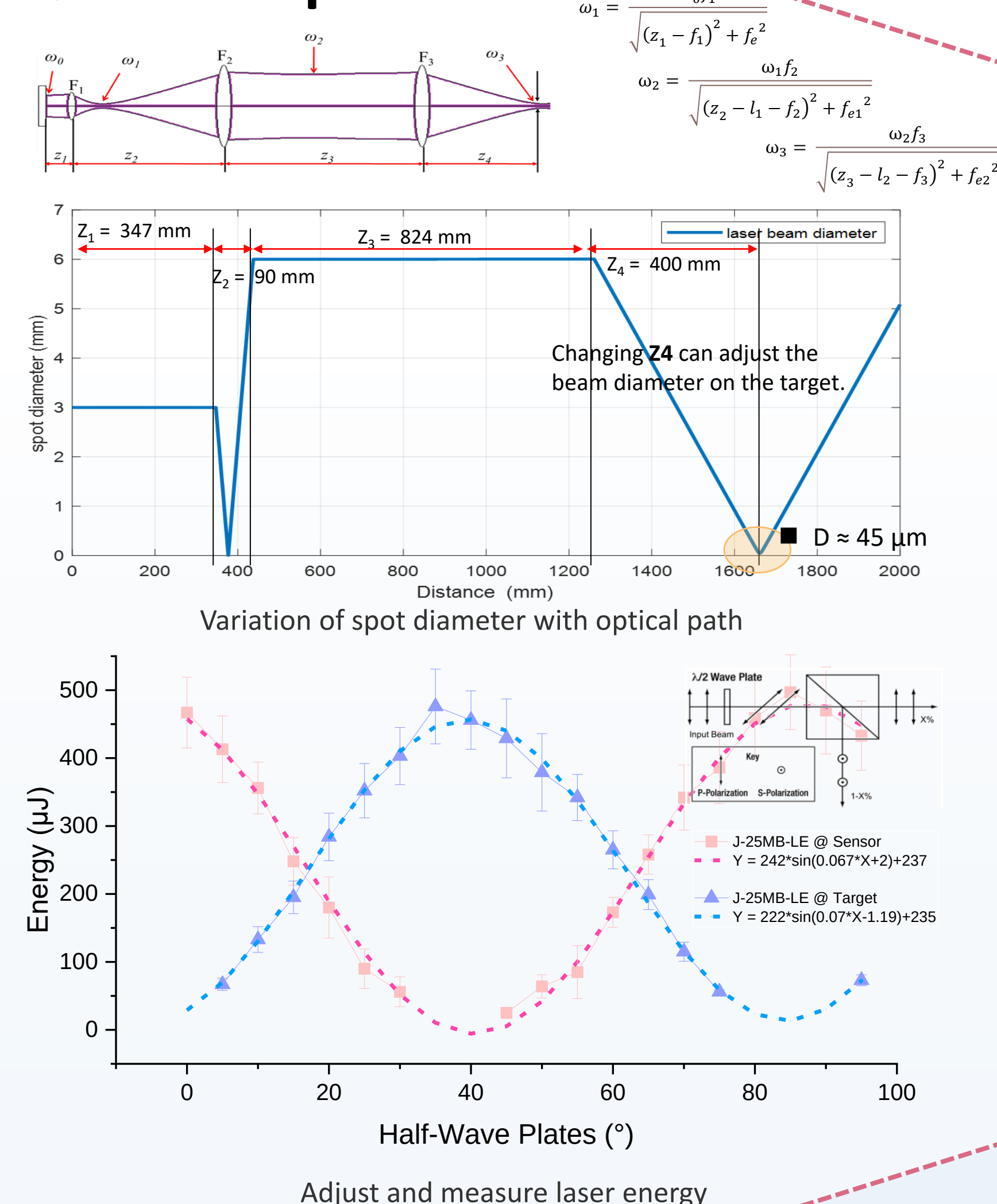


## Why do we need a LACCI

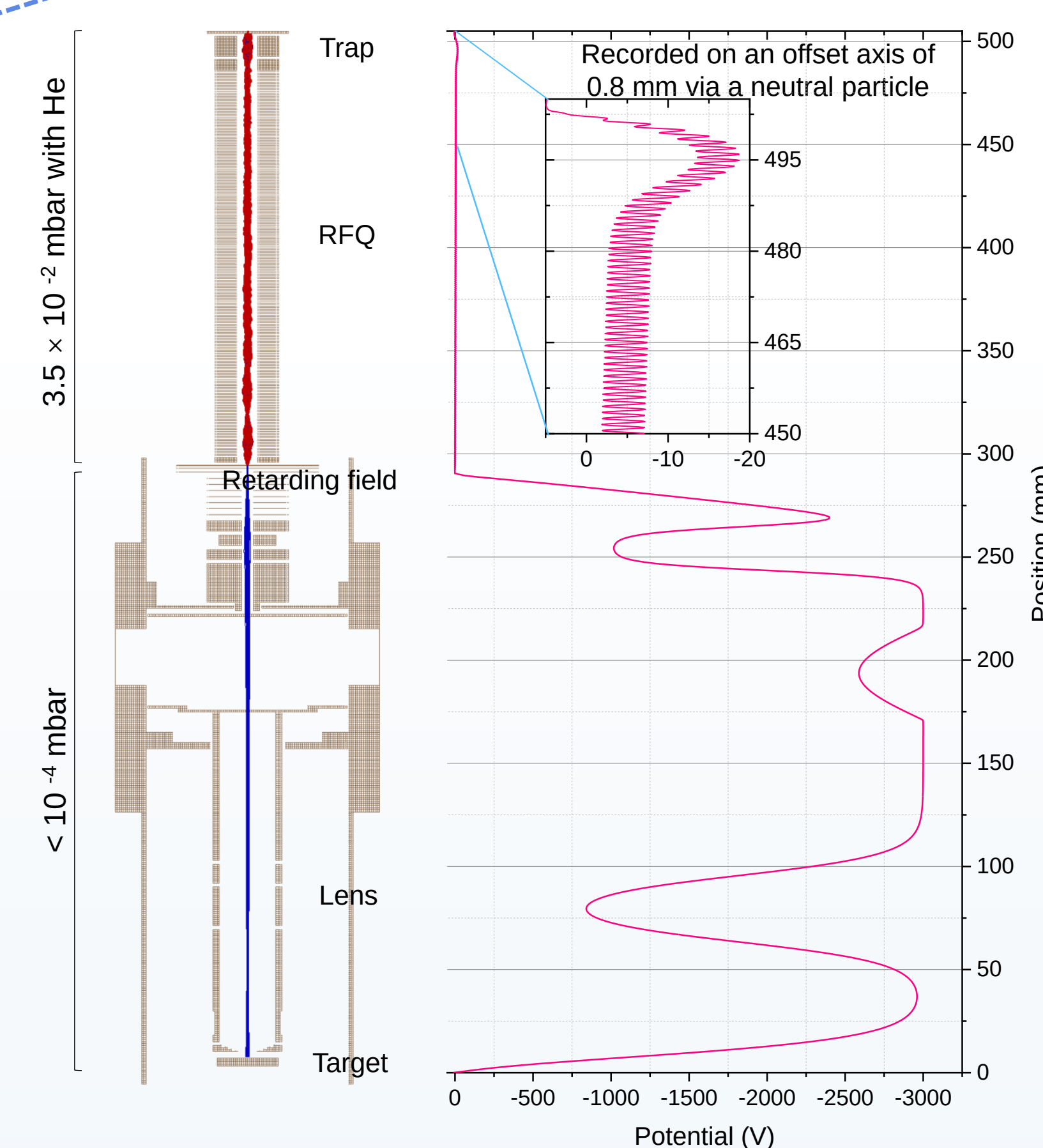
- Off-line Ion-Source for calibration
  - Broad mass range (carbon-cluster of Sigradur\*)
  - Isobars (carbon-cluster of <sup>13</sup>C enriched fullerene)
- Studies of the systematic errors over the whole mass range



## Laser optics



## Ion optics



## Results

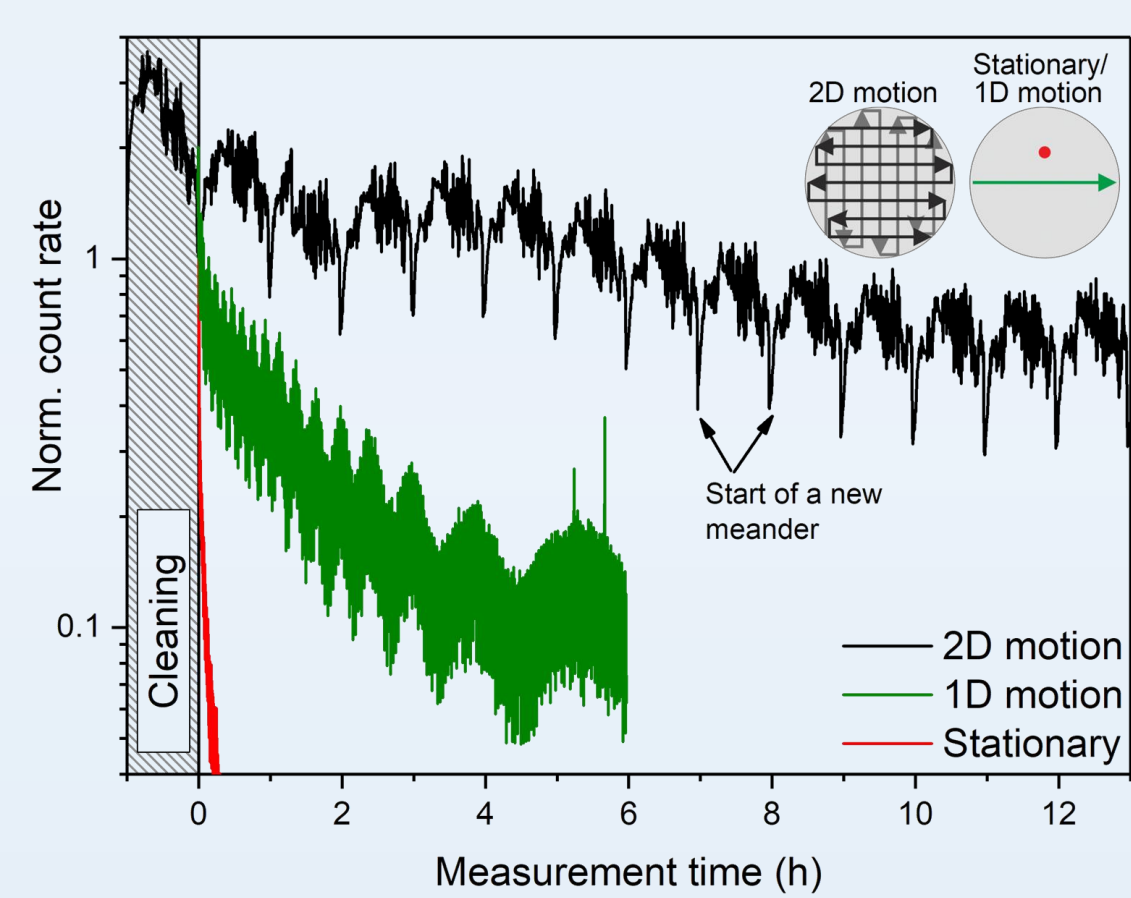
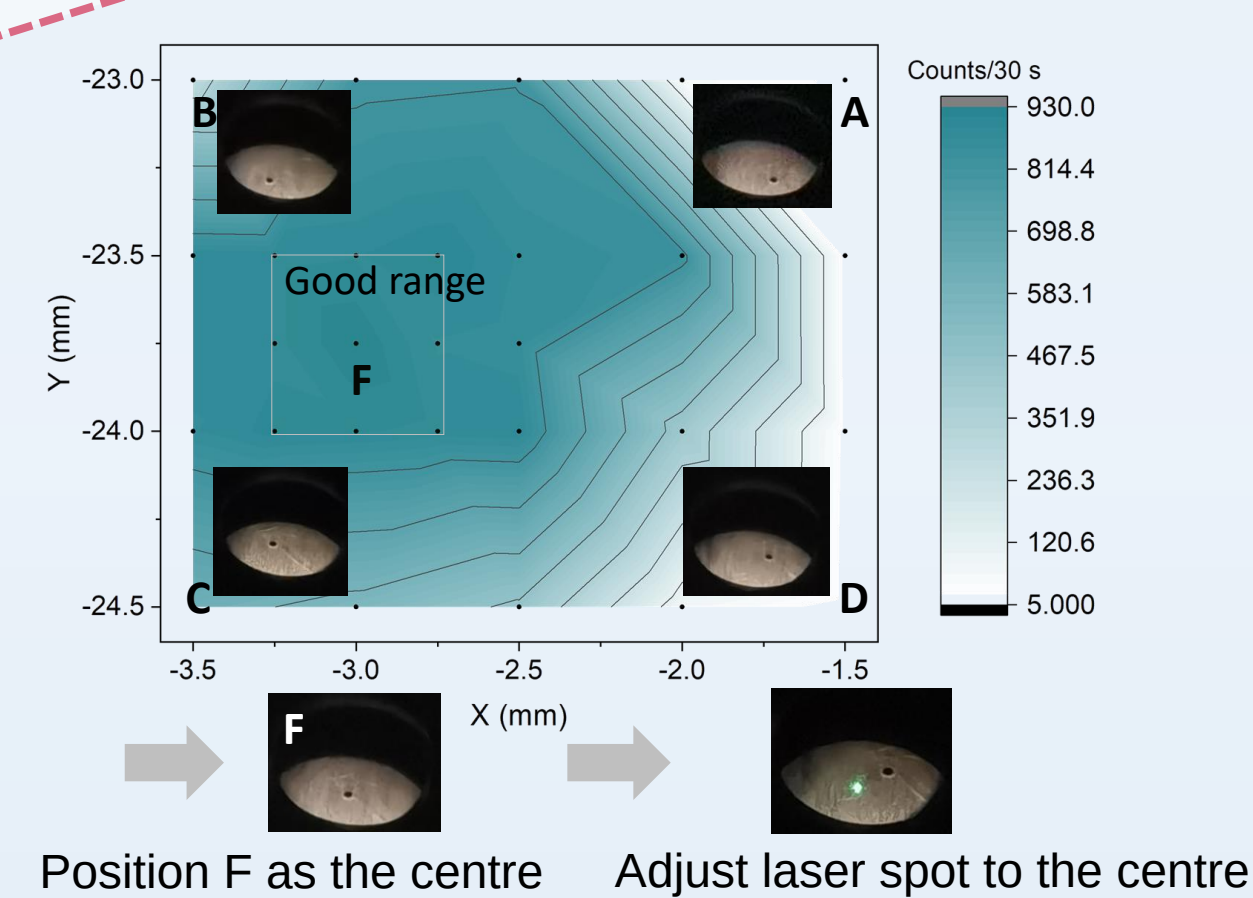


Fig 1. Calibrate target position via Cs course

Fig 2. Good long-term stability by using a 2D motion of the movable target. A 1 Hz operation of 50 days (Tested at 100 Hz for 12 h,  $4.4 \times 10^6$  shots)

Fig 3. Mass spectrum of the Carbon clusters from the Sigradur target (measured by linear TOF-MS without buffer gas). Carbon clusters in a mass range between 36 u and 240 u were produced by laser ablation

## Conclusion & Outlook

- Advantages of LACCI
  - More suitable for Mass spectrometry using in electric fields
  - The system can be run at 100 Hz, and more frequent calibration is possible
  - The calibrant from LACCI and Ion of interest can be in the same spectrum

### Design concept

|                                         |                                                                              |
|-----------------------------------------|------------------------------------------------------------------------------|
| Separate the laser source from the RFQ  | Protect the RFQ covered by the carbon layer from the effects of plasma       |
| Separate the two chambers by gate Valve | Quickly replace the target plate and maintain it without breaking the vacuum |
| 2D Movement target                      | Allow to operate for a long time during the beamtime                         |
| Camera                                  | Monitor the status of target plate and laser spot                            |

### Future plan

- Commissioning the LACCI + MR-TOF-MS
- Systematic error and mass accuracy studies

## References

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## Acknowledgements

FRS Ion Catcher Collaboration



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