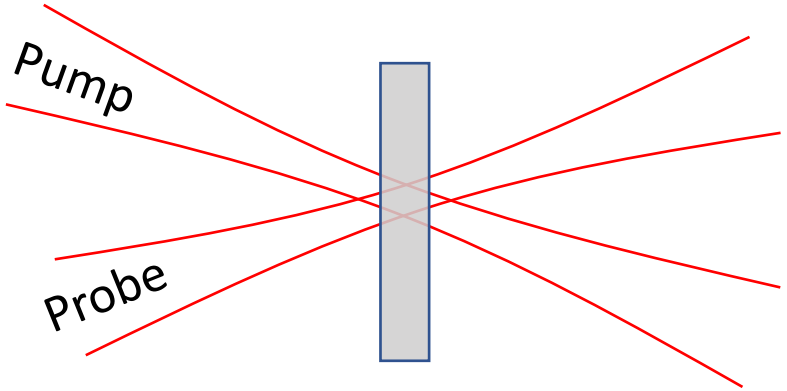
Quantification of the spatial overlap of two-beams for pump-probe studies



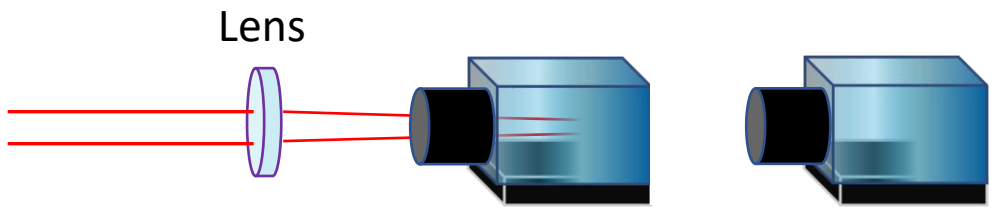
Madhusoothanan Rajaram

Thesis Director: Vincent Loriot

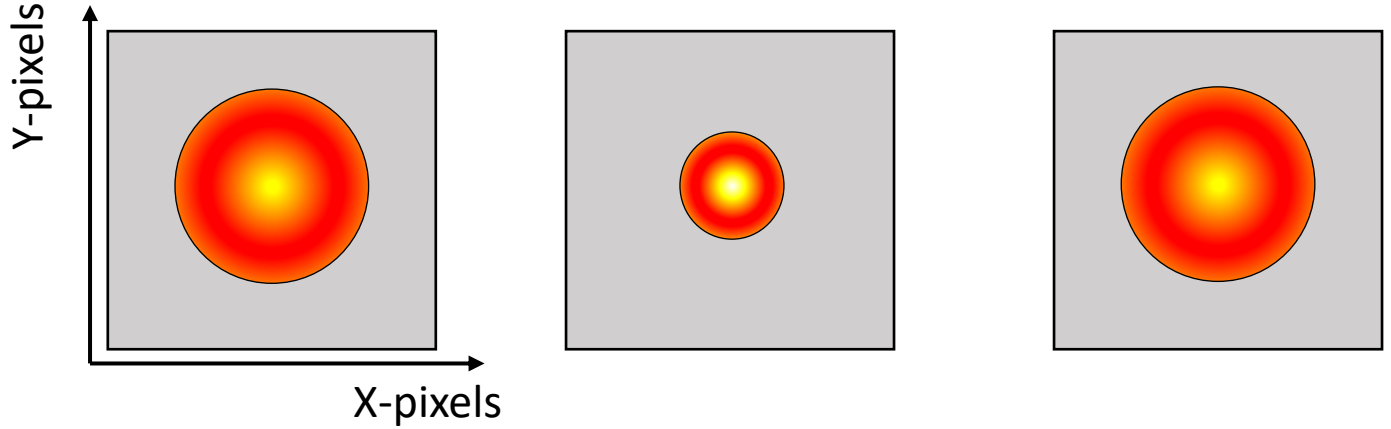
Group: Structure & Dynamique Multi-échelle des Édifices Moléculaires (DYNAMO)

Usual method for characterization of Beam

Usual method for Beams characterization



Camera Images:

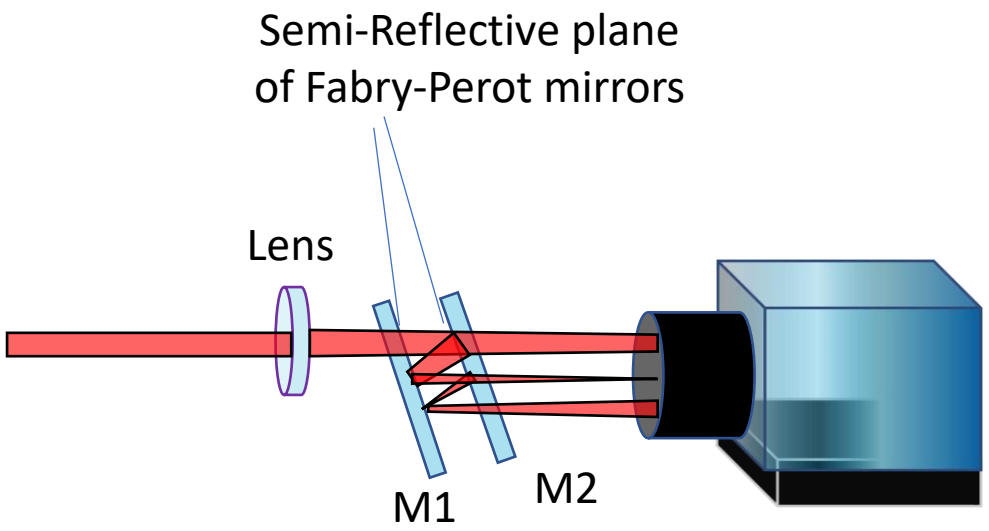


Single shot and real time acquisition cannot be done with this method.

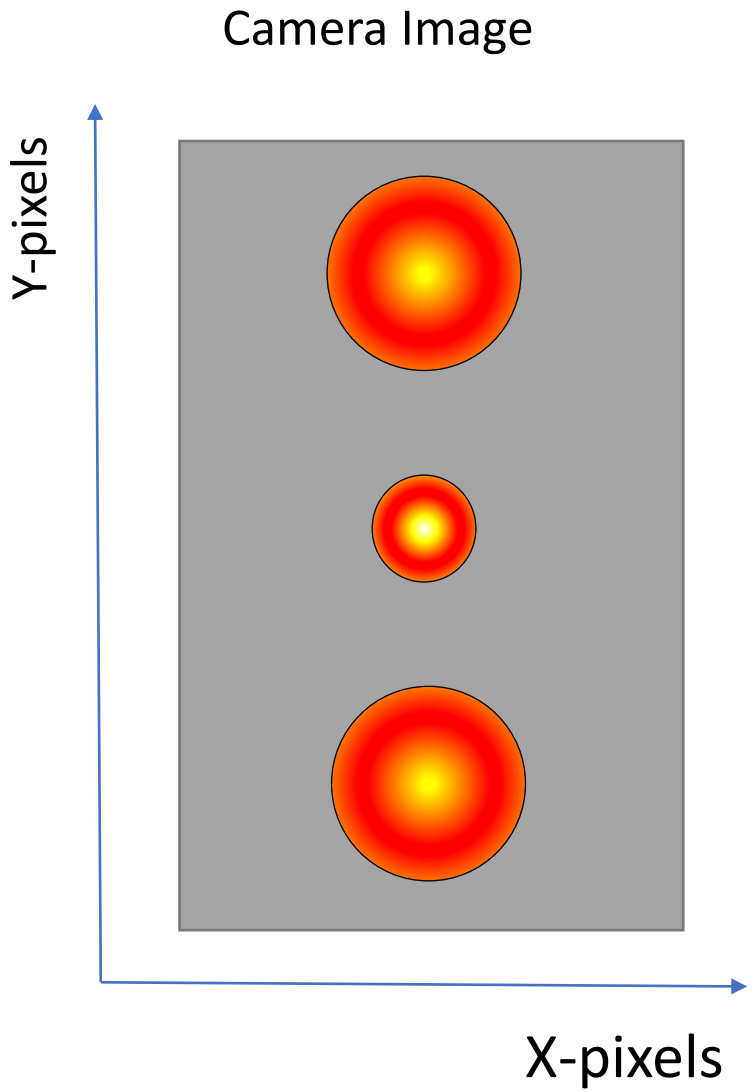
Ref: **ISO 11146-2:2021**

Off axis single shot Beam acquisition

Off axis Fabry Perot single shot Beam acquisition

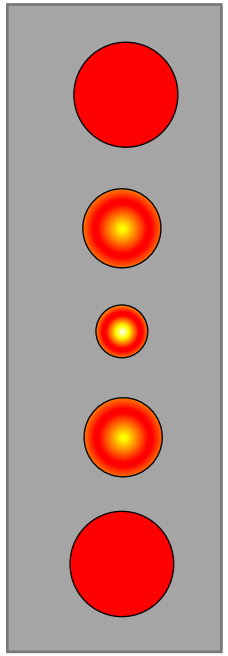


Off axis Fabry Perot duplicates and spatially separates the beam.

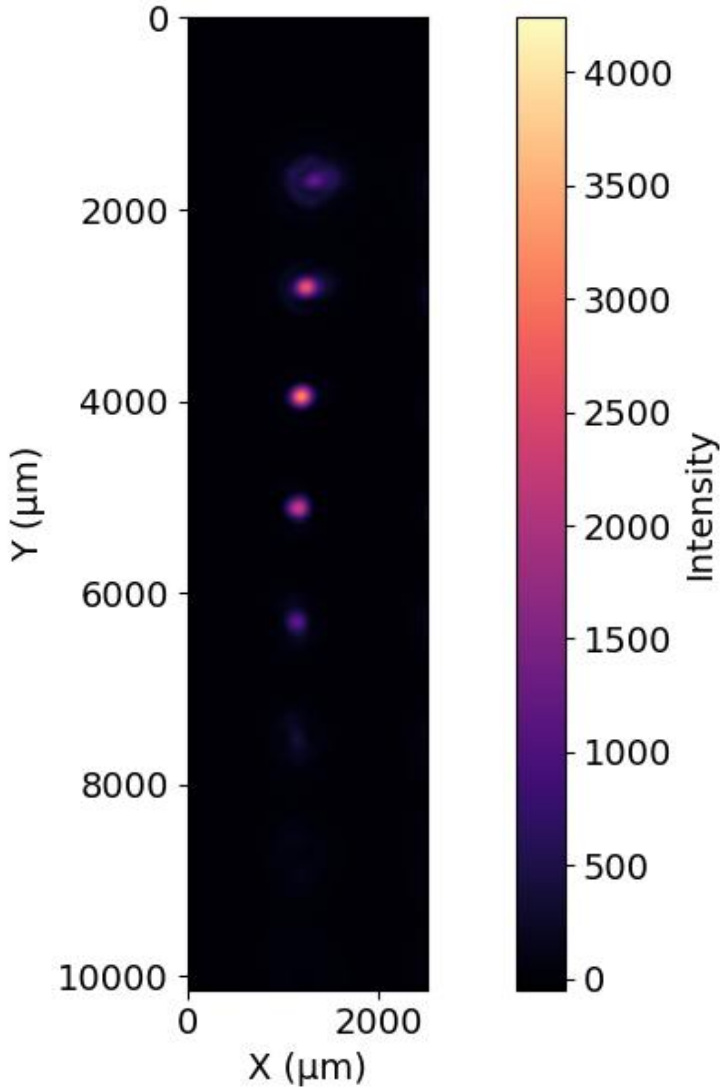


The same information as ISO standard in single shot.

Single shot Beam propagation Image

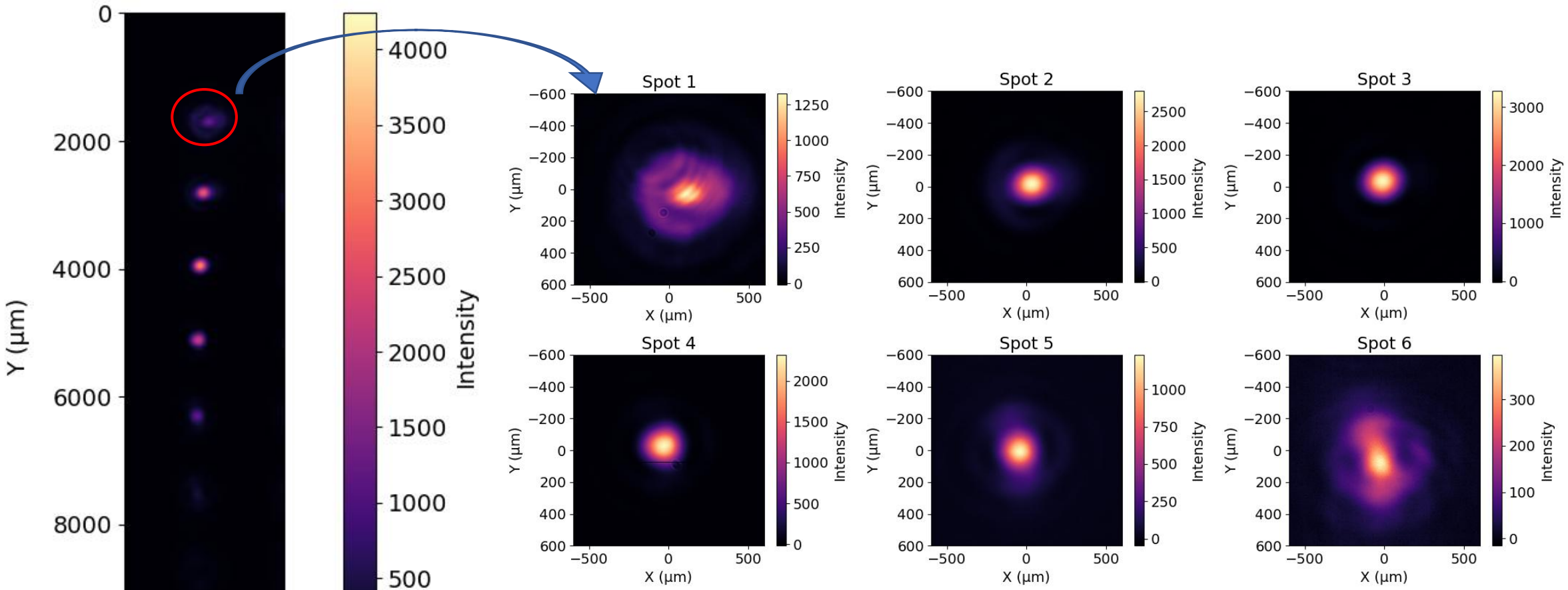


Expected Image

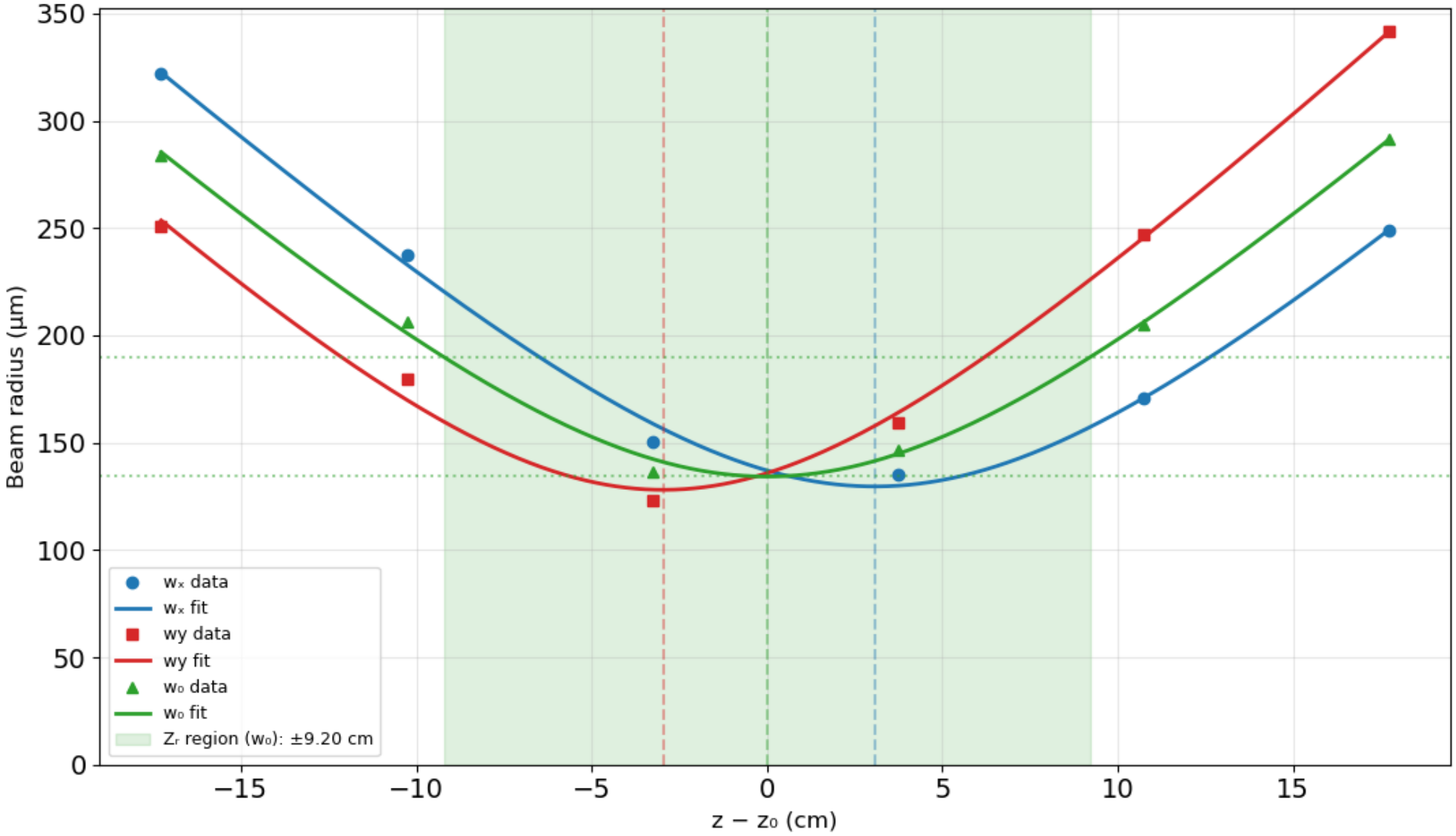


Camera Image

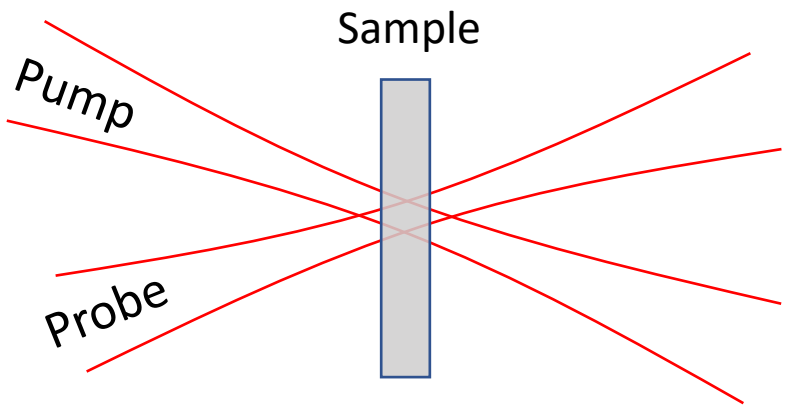
Single shot Beam propagation Image



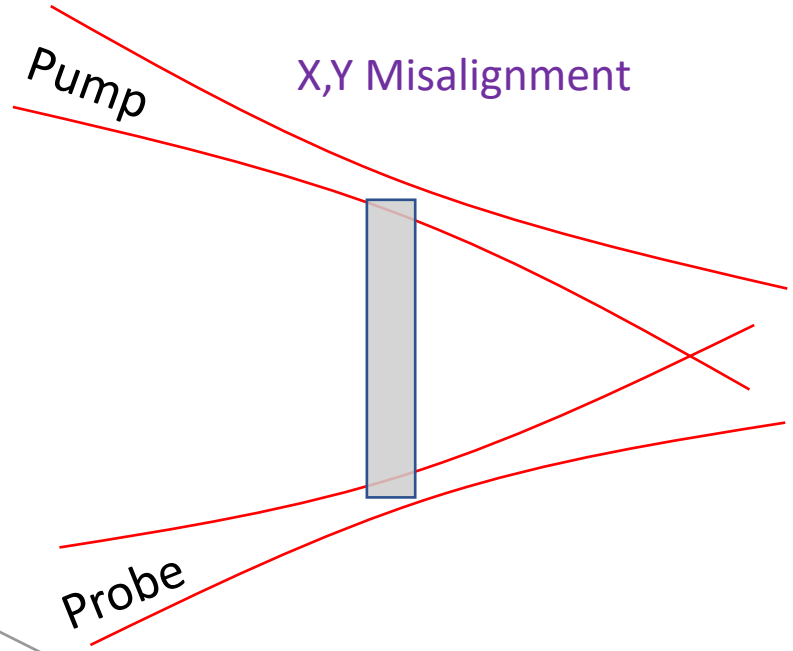
Results and Discussion

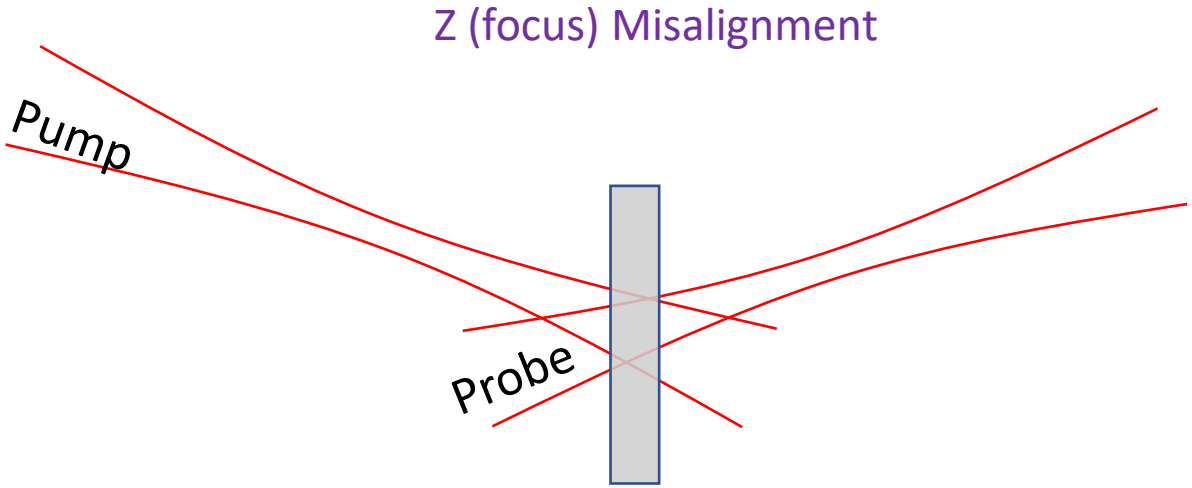


Two beam Crossings for Pump Probe Experiments

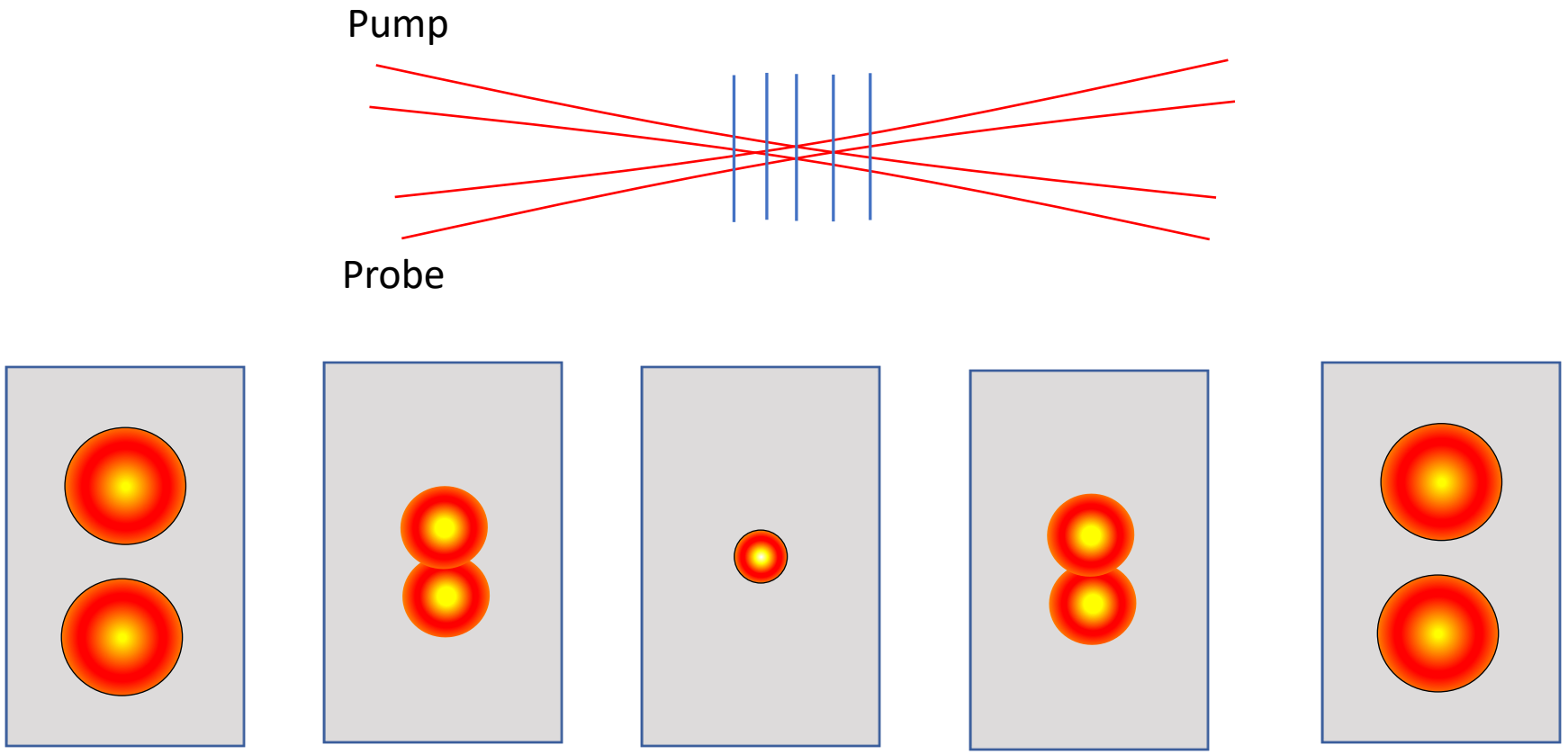


Pump – excites the system
Probe – measures the system



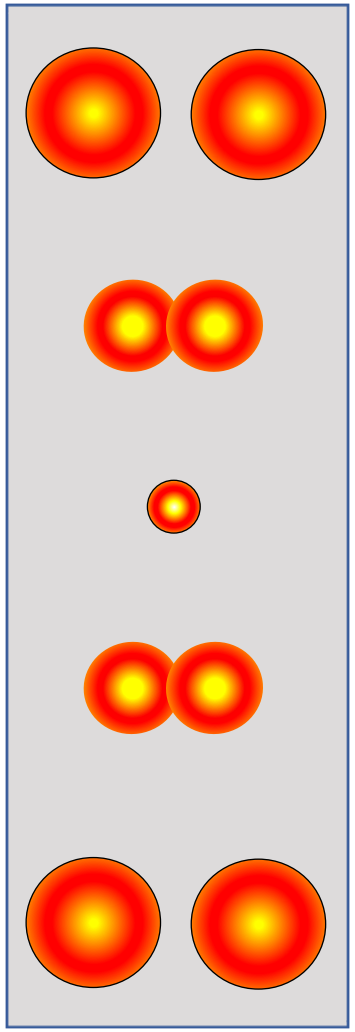


Two Beam XYZ Overlap Quantification

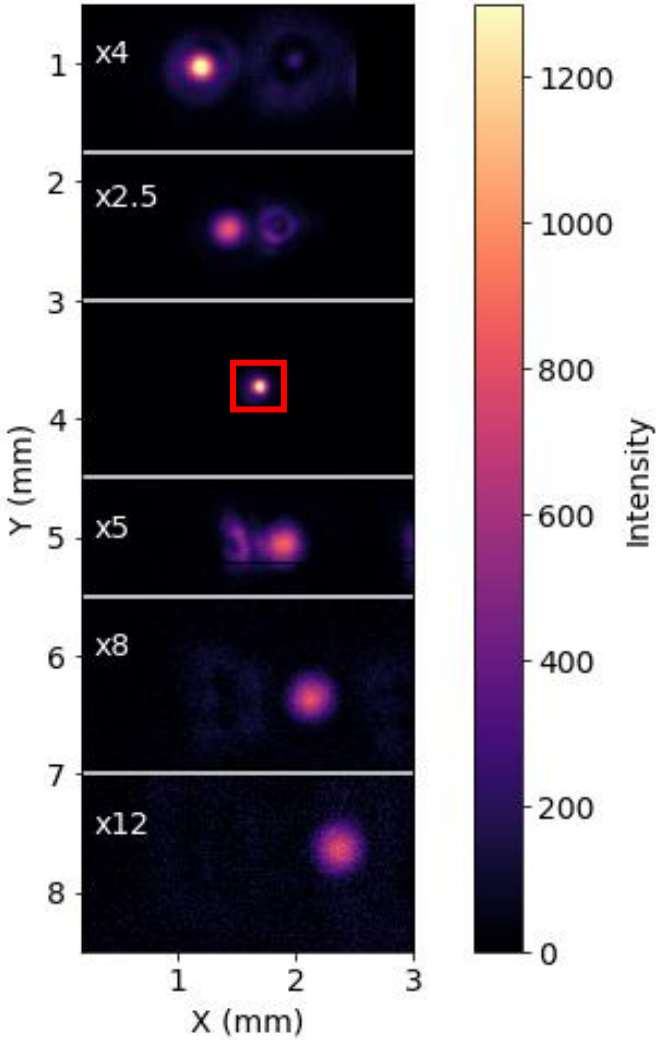


Two Beam XYZ Overlap Quantification

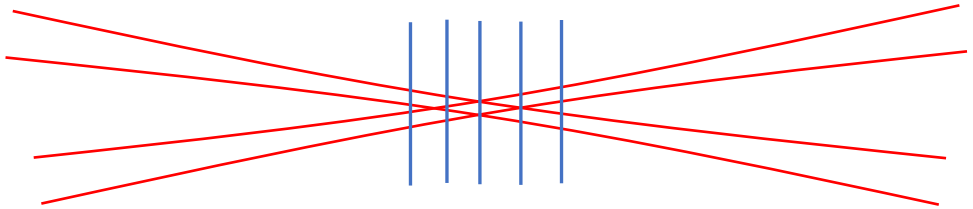
Off-axis FP schematic



Camera Image

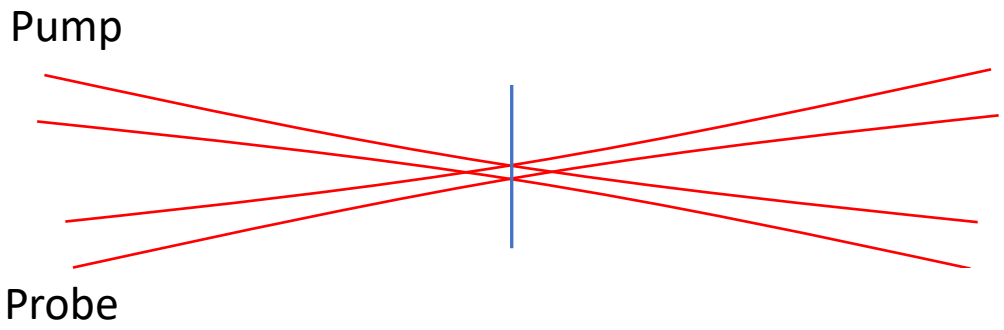


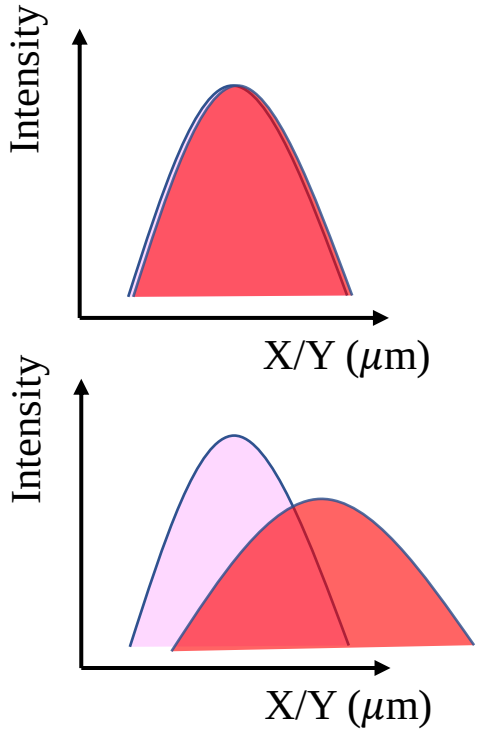
Pump

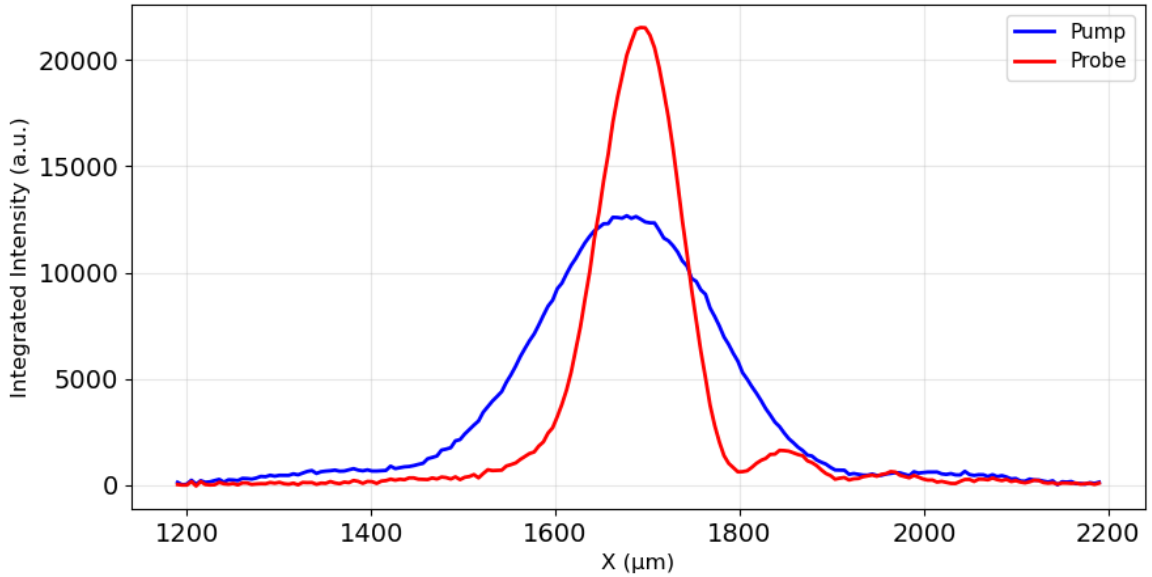


Probe

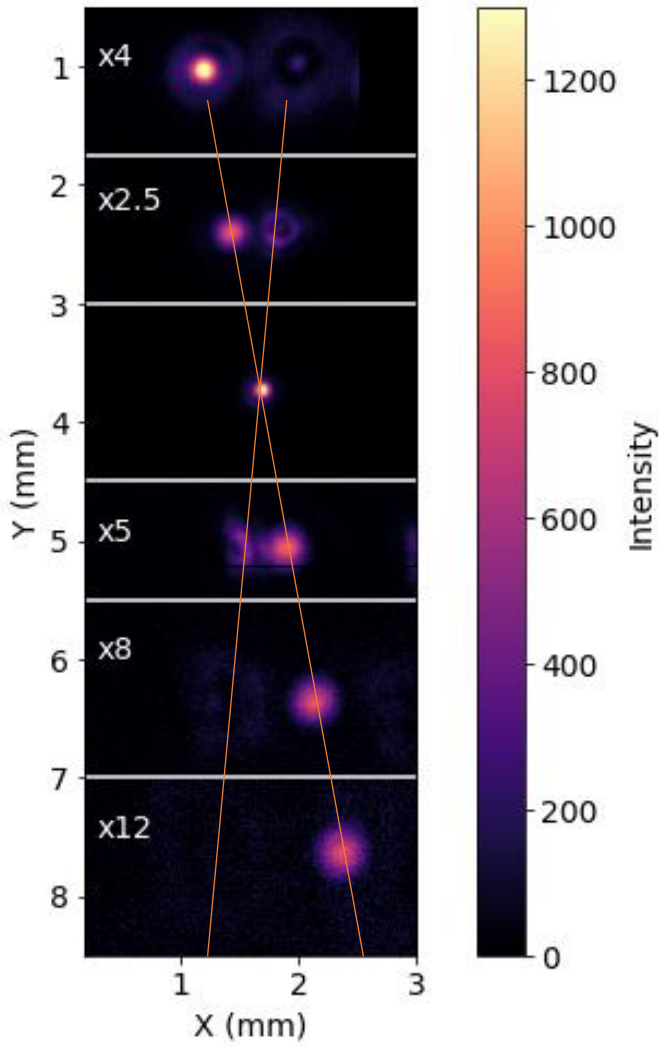
Two Beam XYZ Overlap Quantification

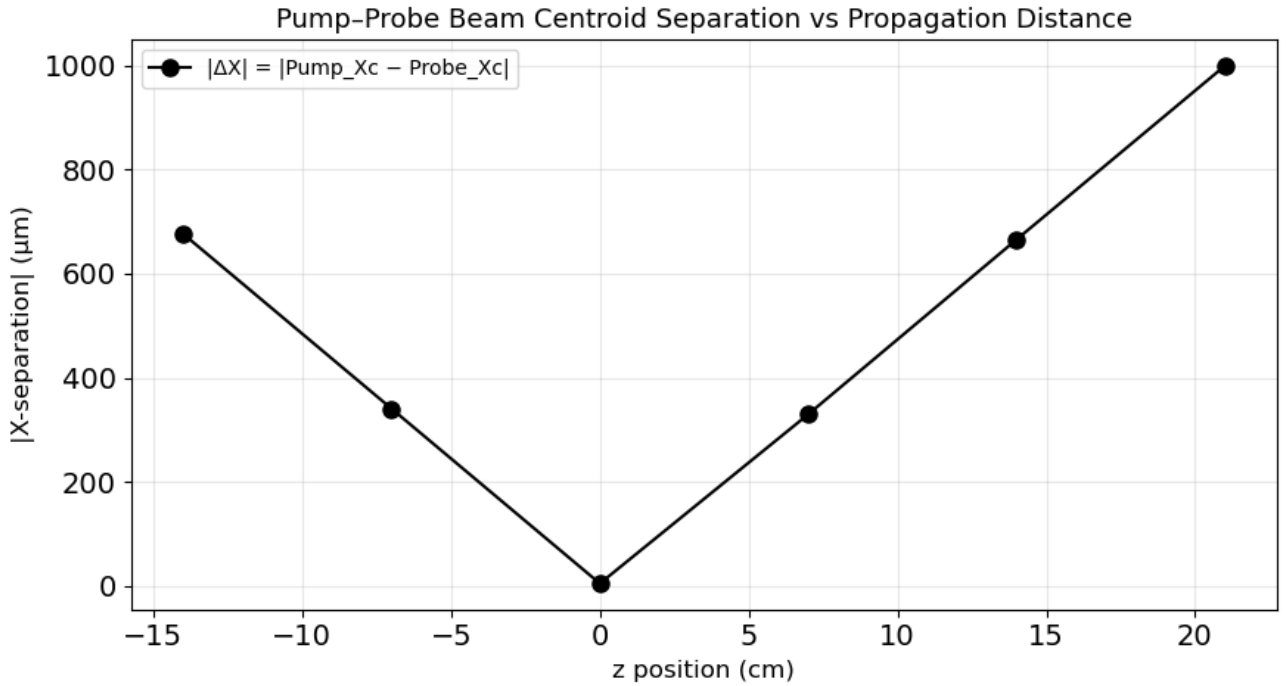






Beam Crossing characterization





Minimum distance of 5 μm for beam waist of 130 μm

Full angle crossing = 4.84 mrad

Summary of the Talk

- The Off-axis Fabry Perot allows single shot beam profile scanning.
  - Full characterization of a beam in single shot basis.

- For Pump probe study : Full characterization of beams overlaps.
  - XYZ Position of the laser Beam
  - Spatial overlap quantity to the Sample

- Perspective:
  - Full reconstruction spatial amplitude and phase
  - Reconstruction of temporal delay between the pulse.

Thank for your Attention