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SPARSE: a high performance scatterometer with imaging ability

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OBJECTIVES

- ▶ Measure maps of Bidirectional Scattering Distribution Functions (BSDF).
- ▶ Discriminate and quantify the light scattered by intrinsic roughness from that of defects and contaminants.

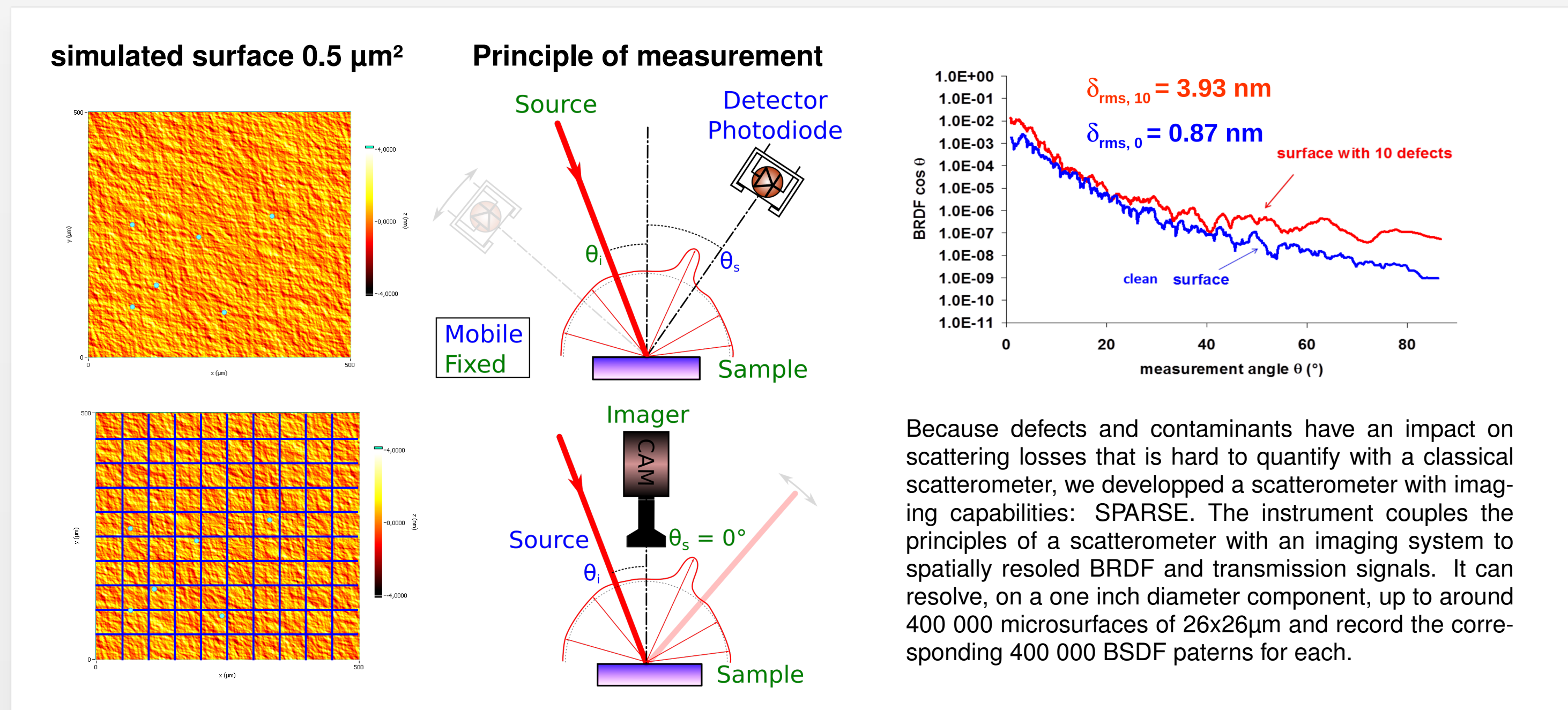
KEY PRINCIPLES OF SPARSE

- ▶ Reciprocity (scanning the illumination angle).
- ▶ Telecentric imager (bijection between CCD pixel and surface element).
- ▶ High Dynamic Range.

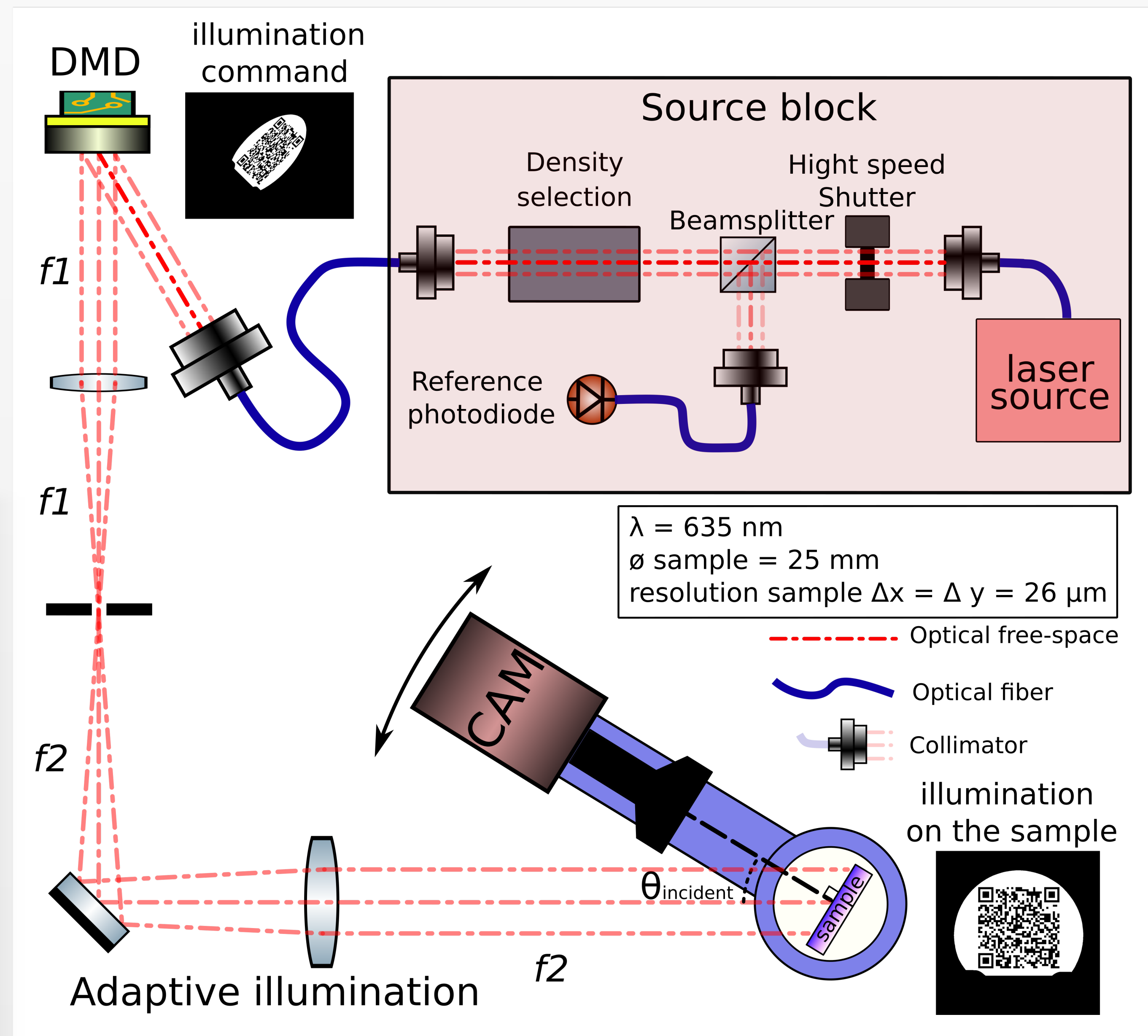
SPECIFICATIONS

- ▶ Performing, on 25 mm diameter sample, up to 400 000 BSDF patterns measurement simultaneously.
- ▶ Air diffraction limited: ARS at 10^{-8}sr^{-1}
- ▶ Having an agile selection of the area to be analyzed.

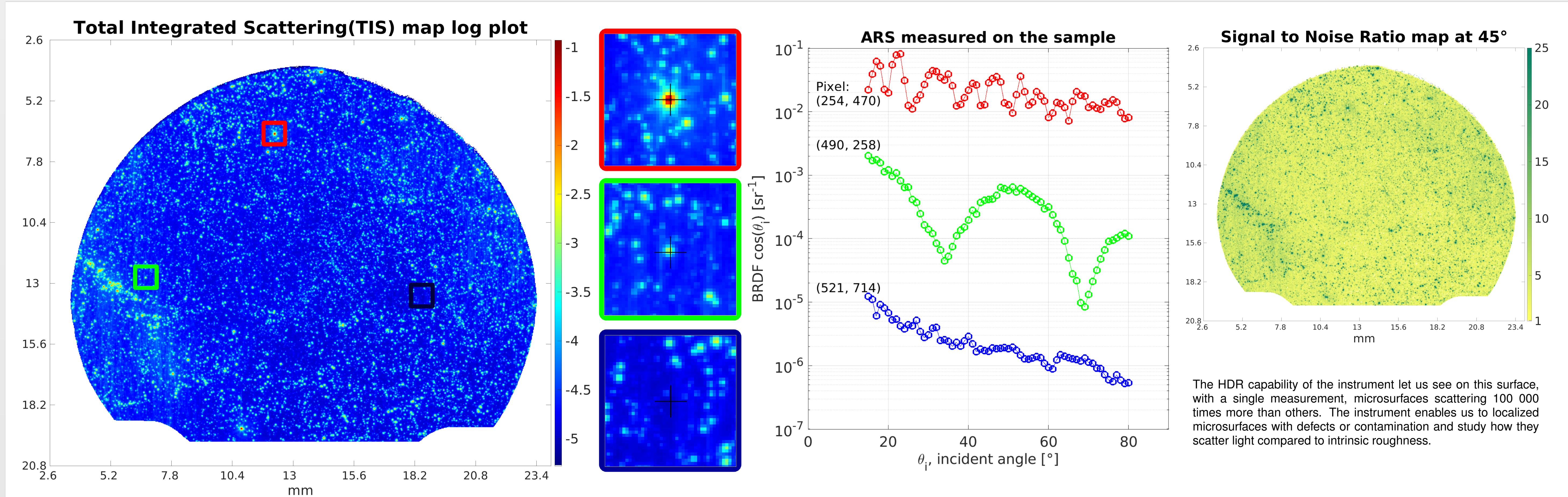
PROBLEMATIC



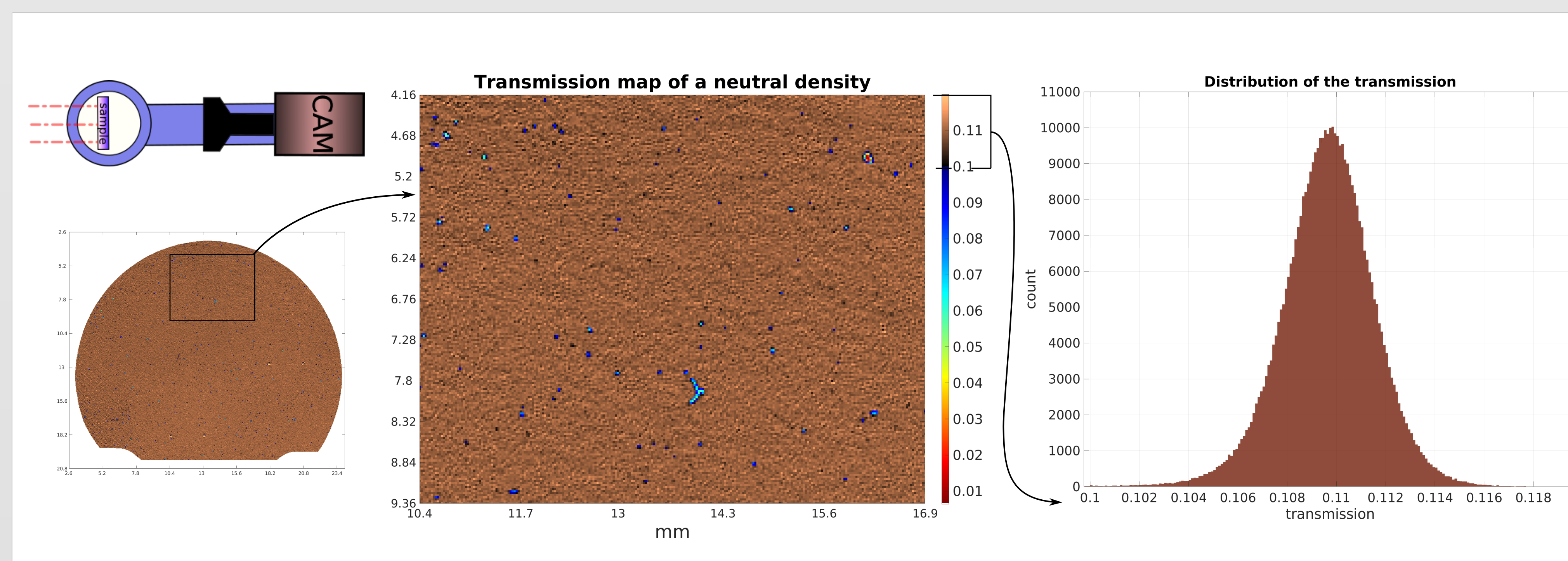
SPARSE INSTRUMENT SPATIALLY AND ANGULARLY RESOLVED SCATTEROMETRY EQUIPMENT



BRDF MEASUREMENT OF A SILVER COATED MIRROR



MAPPING OF THE LOCAL TRANSMISSION - APPLICATION TO A NEUTRAL DENSITY



NEXT MILESTONES

- ▶ Transfert SPARSE in a clean room to work under a controlled environment.
- ▶ Extend the metrology of scattered light to BTDF.
- ▶ Measurement at multiple wavelengths.
- ▶ Develop AI classification software coupled with electromagnetic models to extract structural information on defects and contamination

References

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