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Recent advances of Bragg ptychography and perspectives at 4th generation synchrotron

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Bragg ptychography is a phase retrieval method combining crystalline sensitivity and the possibility to image extended 3D samples [God2011, Mas2017]. Recent progresses in Bragg ptychography formalism, namely, the introduction of the back projection operator [Hru2017] and the advent of 4th generation synchrotron sources have enabled the use of 3D Bragg ptychography with unprecedented accuracy, sensitivity and spatial resolution. Specifically, the probe retrieval [Li2021] and the beam-position refinement [Li2022] are now made possible and provide improved image quality.

In this talk, I will first detail recent advance of Bragg ptychography. Using a series of preliminary results, I will further highlight the perspectives offered by 4th generation synchrotron sources, in terms of temporal resolution and strain analysis. I will finally present a project of integration of Bragg ptychography at synchrotron beamlines, performed with collaborators from ESRF, MAXIV and Diamond. It aims at enabling the use of this 3D crystalline microscopy approach to a larger x-ray community.

[God2011] P. Godard et al., Nature Commun. 2, (2011) 568

[Mas2017] F. Mastropietro et al., Nat. Materials 16, (2017)

[Hru2017] S. Hruszkewycz et al., Nat. Materials 16 (2017)

[Li2021] P. Li et al., Nat. Commun 12 (2021), 7059

[Li2022] P. Li et al., Light : Science & Applications 11 (2022), 73

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