

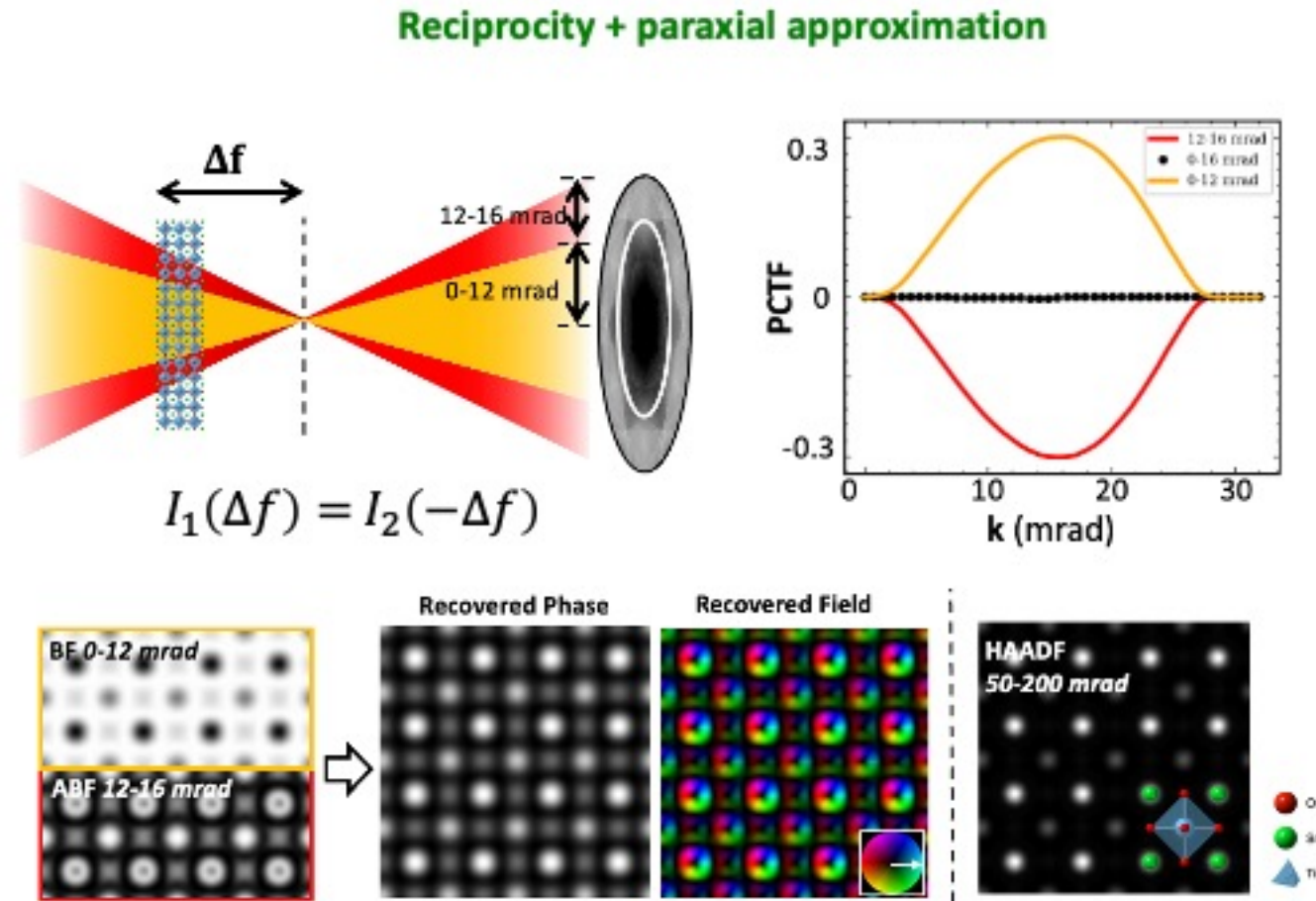
BKM to BBD method

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BBD method



Under paraxial and weak phase approximation, the BF and ABF image's PCTF is inversely symmetry. See Appendix in attached manuscript.

Acquire BF and ABF images*

- Consider your spatial resolution with accelerate voltage and half convergence angles
 - For example, you need >10 mrad for atomic resolution imaging; ~ 200 urad for nanoscale imaging at 300 kV
- Once you decided the convergence angle, check the Fig. 1 what is the critical defocus in your experiment

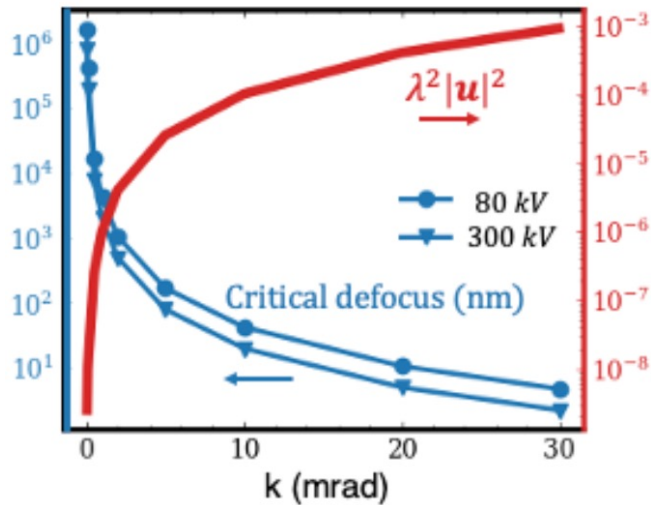


Fig.1. Critical defocus at different k and accelerate voltage (note the k is ~ ¼ of the convergence angle).

- Load your sample, find ROI and focus there on STEM mode
- Checking both BF, ABF, ADF images if possible and make BF detector cover > ½ the transmitted disk while the ABF is < 1/2, which can provide you the optimized PCTF (See Fig.2)
- Under focus you probe and acquire the BF/ABF image at same time if you are using segmented detector; although the pixel array direct electron detector is preferred for better performance (you need post-process you image to get virtual BF/ABF images)

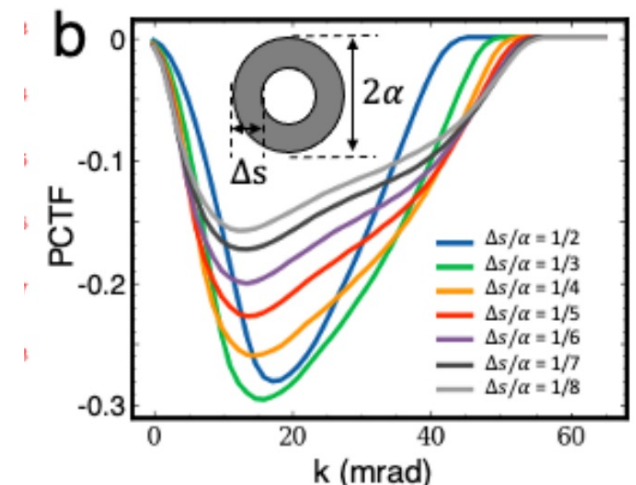
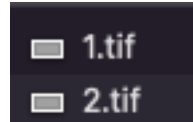
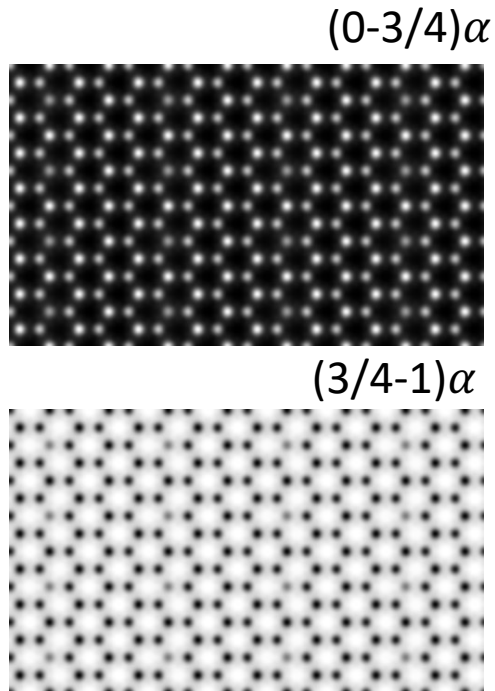


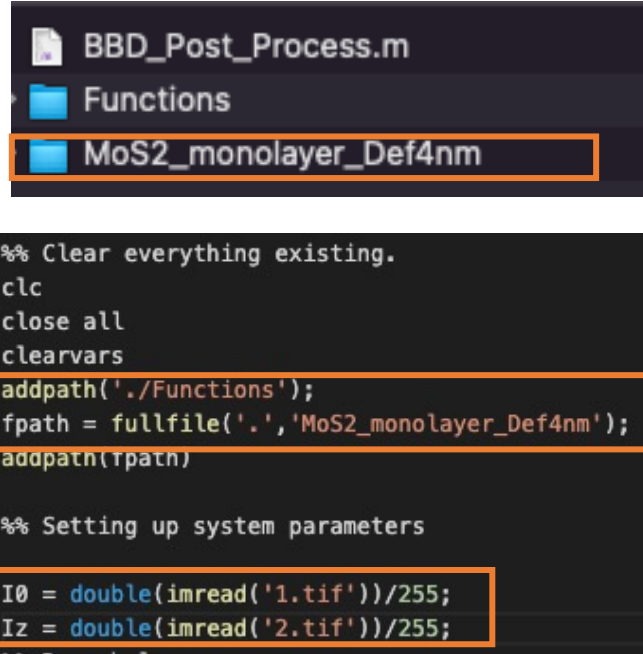
Fig.2. PCTF v.s. BF/ABF detector ratio

* This could either be done by segmented detectors or pixel area detectors

Data process



1
2



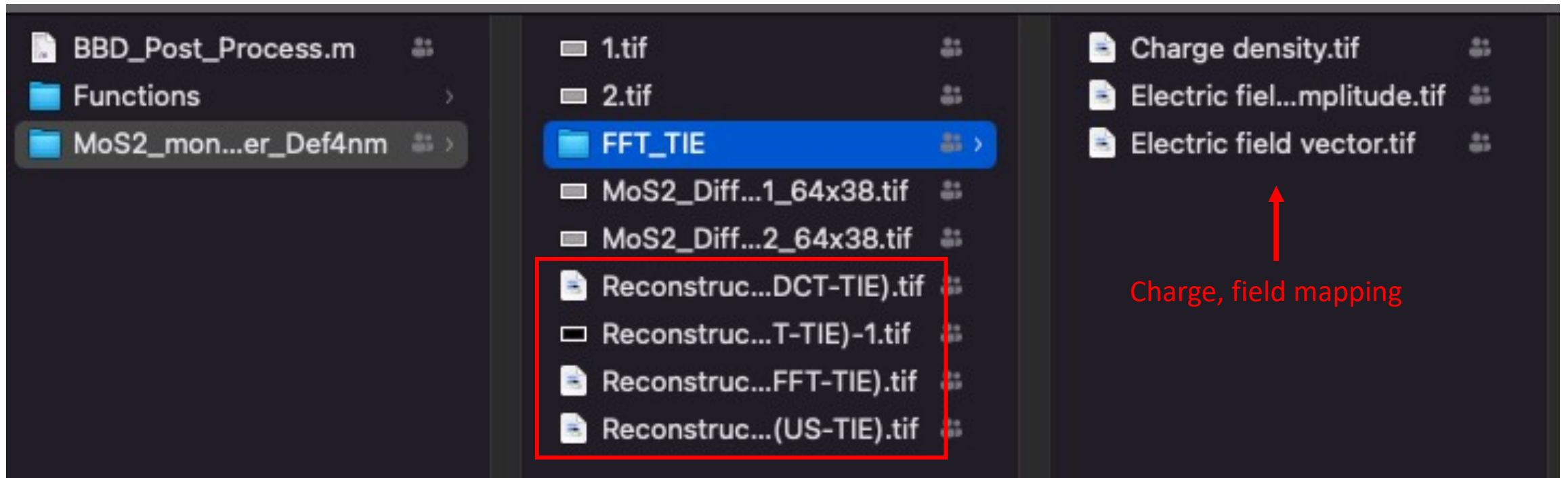
Prepare:

Data: MoS₂, focus -4 nm.

1. Open folder in Demo
2. Create a folder and put two images acquired following last slide
3. Open the script BBD_Post_Process.m
4. Set up the file path and run the script (answering question pop up)

Data output

If the script run success, you can see output below:



Charge, field mapping

Reconstructed phase in different method