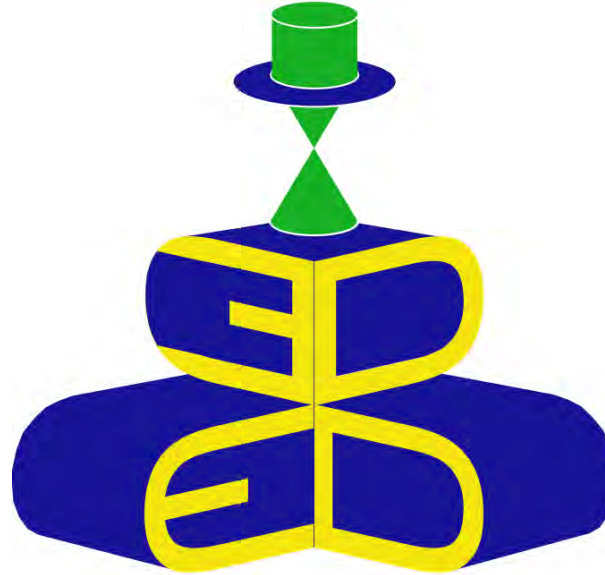




H2020-MSCA ITN
Grant n. 956099



Nan ED



JOHANNES GUTENBERG
UNIVERSITÄT MAINZ

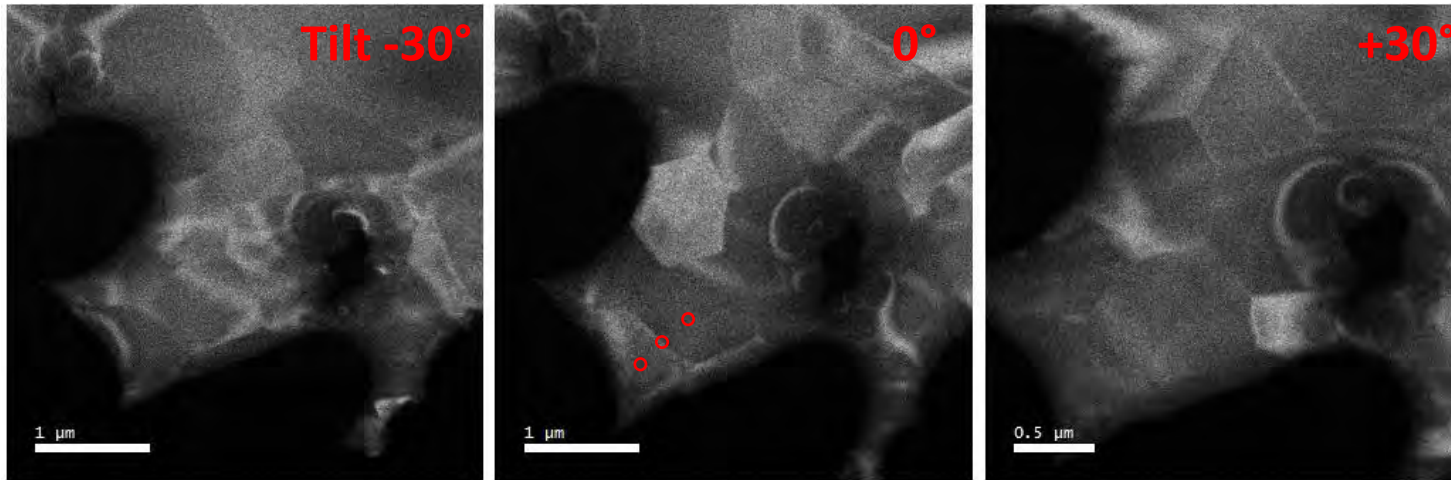
ESR #9 Electron crystallographic applications for defect structures of nano crystals

Santucci Marco – JGU@Mainz

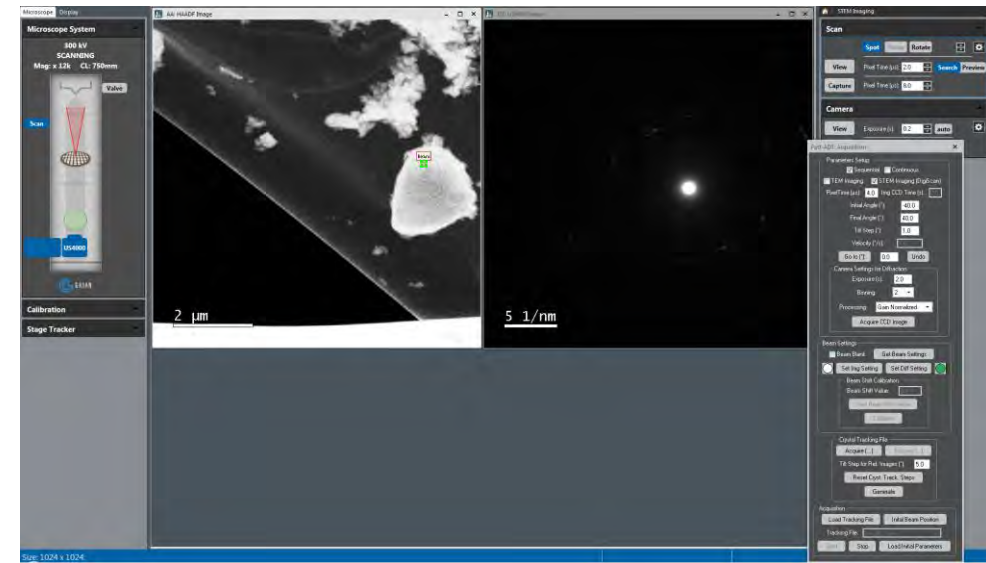
EC applications for defect structures of nano crystals

Aim: Structure solution protocols\strategy for defects of different dimensionality

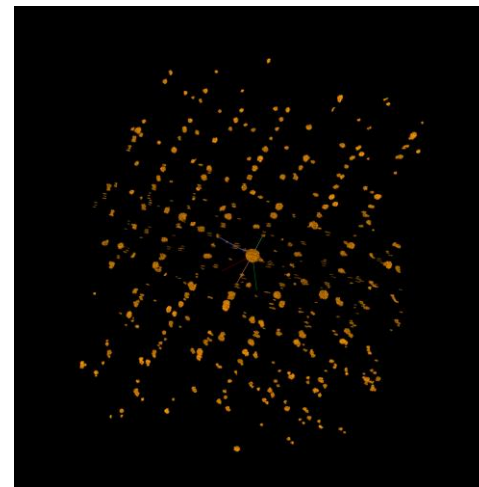
SrTiO₃ Thin film



Fast-ADT

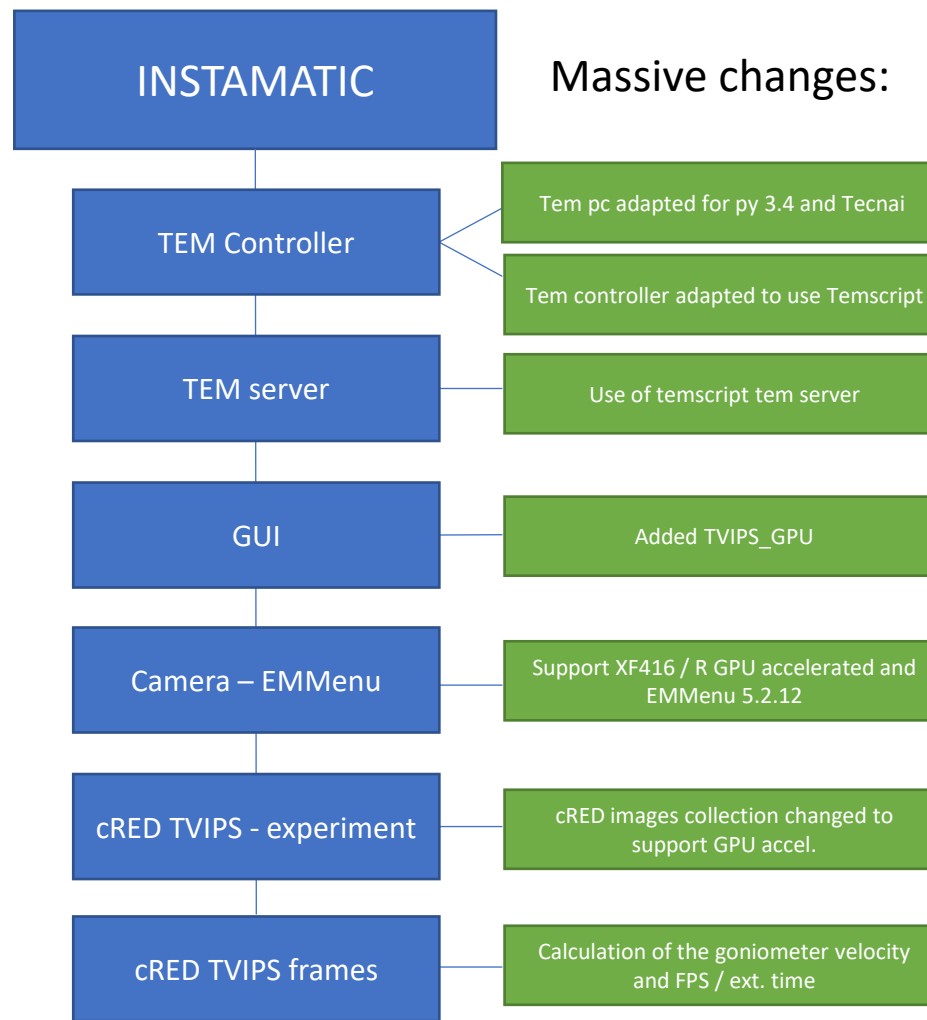
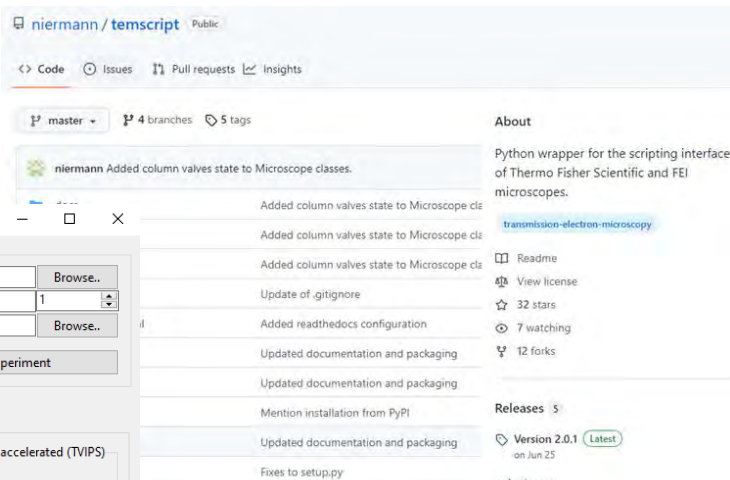
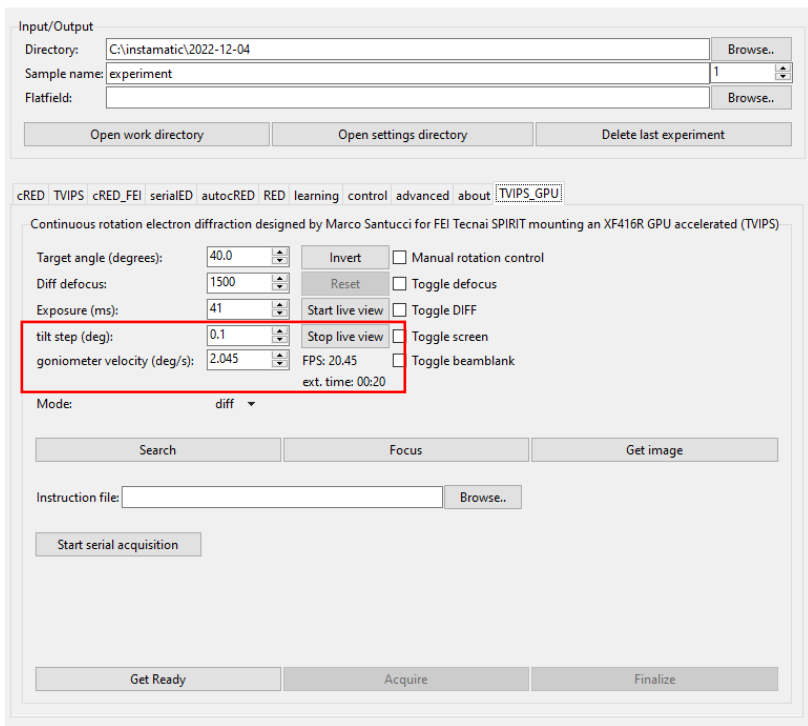


3D Reciprocal space Reconstruction



cRED implementation

Instamatic + temscript (COM interface for FEI py3.4)



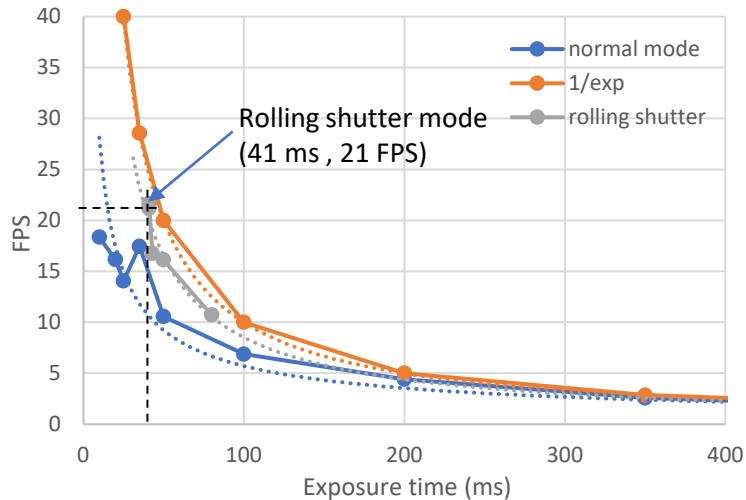
Acknowledgement:

- Instamatic v1.7 – Stef Smeets et al. DOI [10.5281/zenodo.1090388](https://doi.org/10.5281/zenodo.1090388)
- Instamatic v1.0 – Robert Buecker <https://github.com/robertbuecker/instamatic>
- Temscript v2.1 – Tore Niermann <https://github.com/niermann/temscript>
- TVIPS py module – Marco Oster, TVIPS GmbH



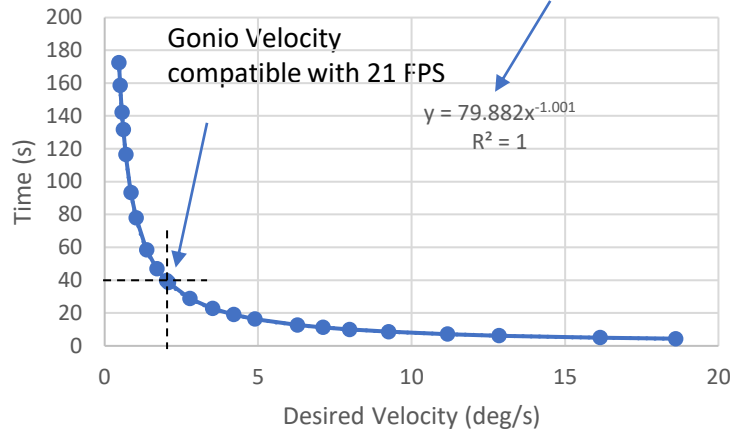
cRED implementation, TVIPS XF416R and Tecnai SPIRIT Goniometer Calibration

FPS(mode) vs 1/exposure

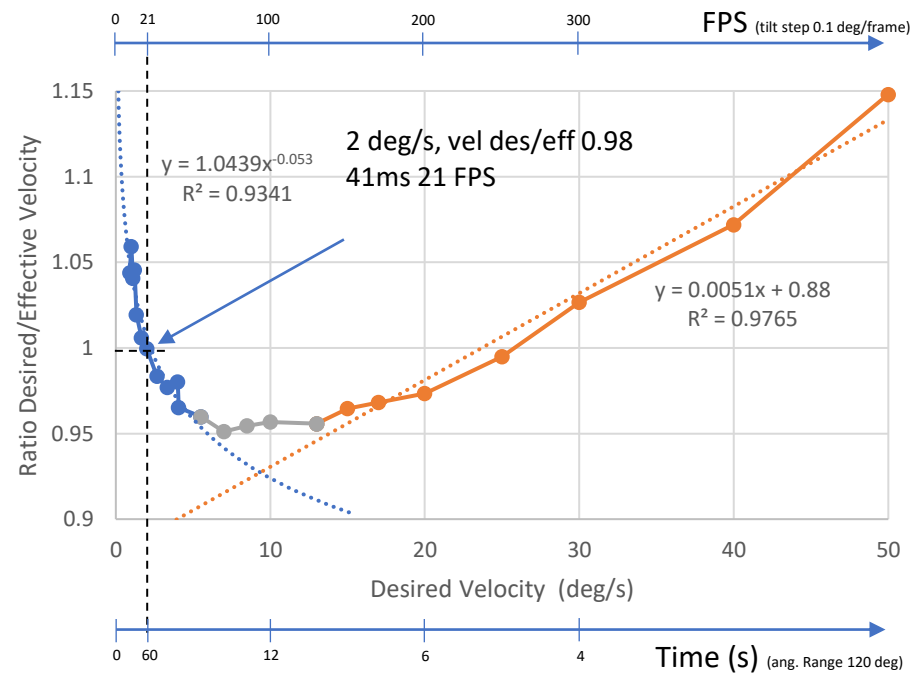


Trivial but necessary: calibrated from -40 to +40 deg

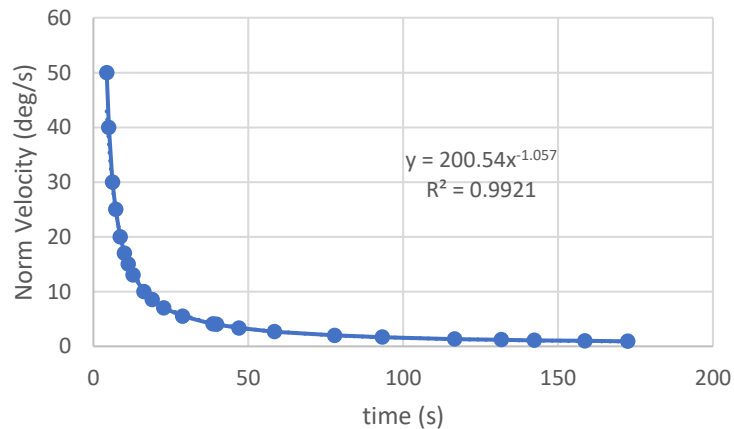
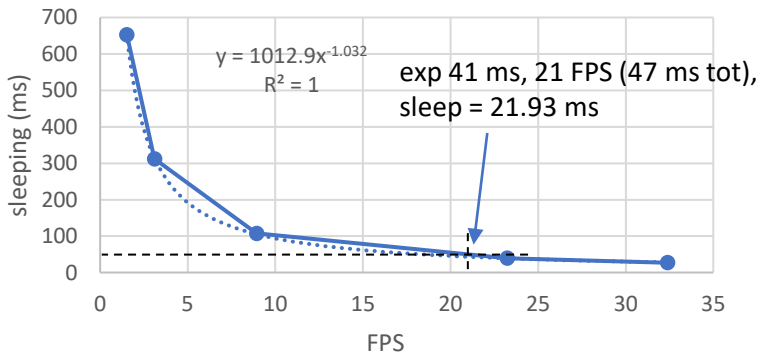
$$velocity = \text{ang. range} \frac{1}{time}$$



Spirit Goniometer behavior



Desired FPS vs optimum sleeping

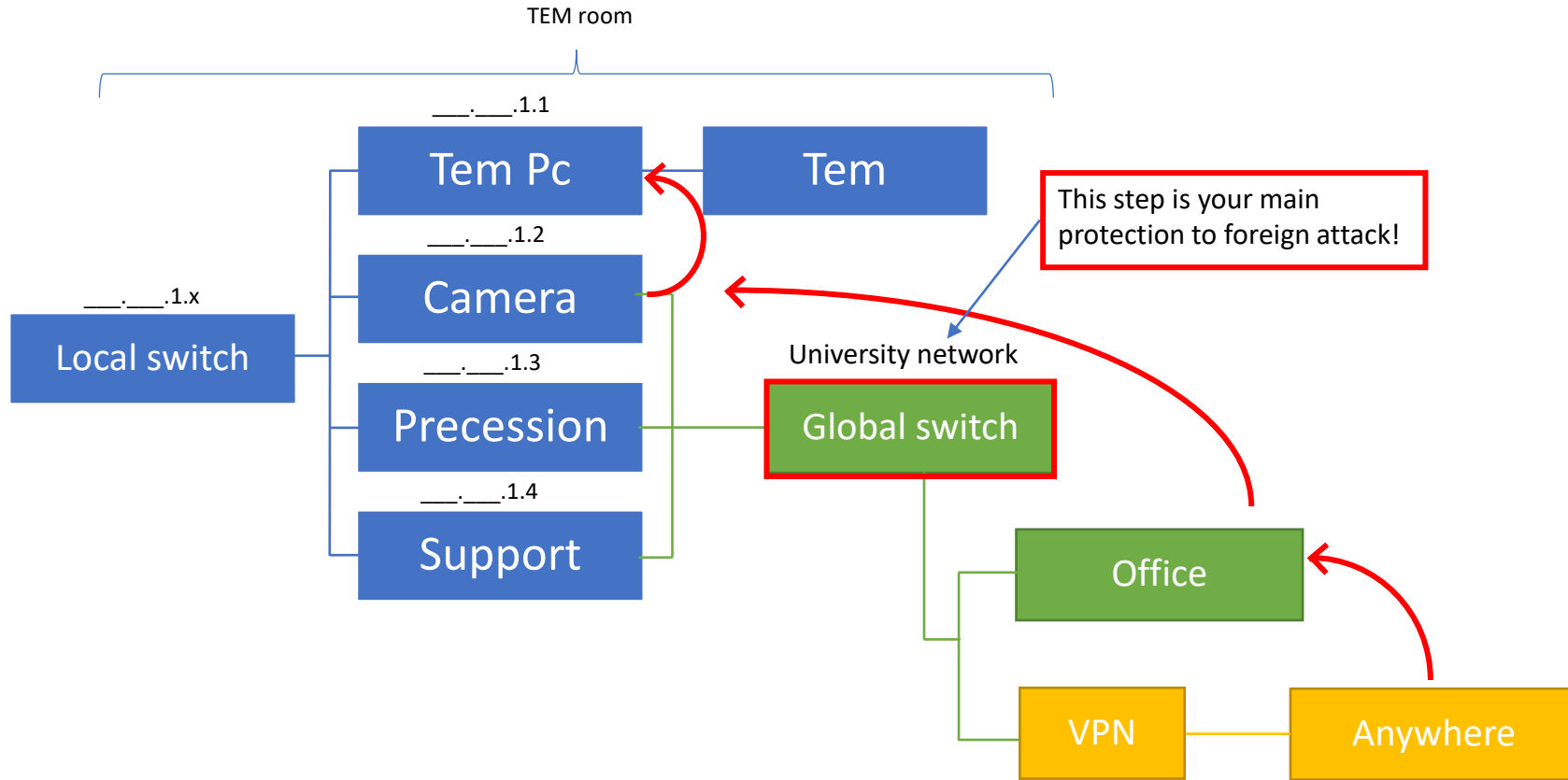


$$goniom. speed \left(\frac{deg}{s} \right) = FPS \left(\frac{frames}{s} \right) * tilt step \left(\frac{deg}{frame} \right)$$



cRED implementation TEM network setup

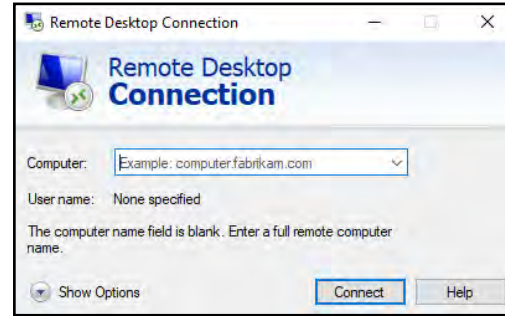
Working from the office is not impossible is relatively easy!



cRED implementation TEM network setup

My office pc → SPIRIT camera pc → SPIRIT Tem pc

Remote desktop, TeamViewer



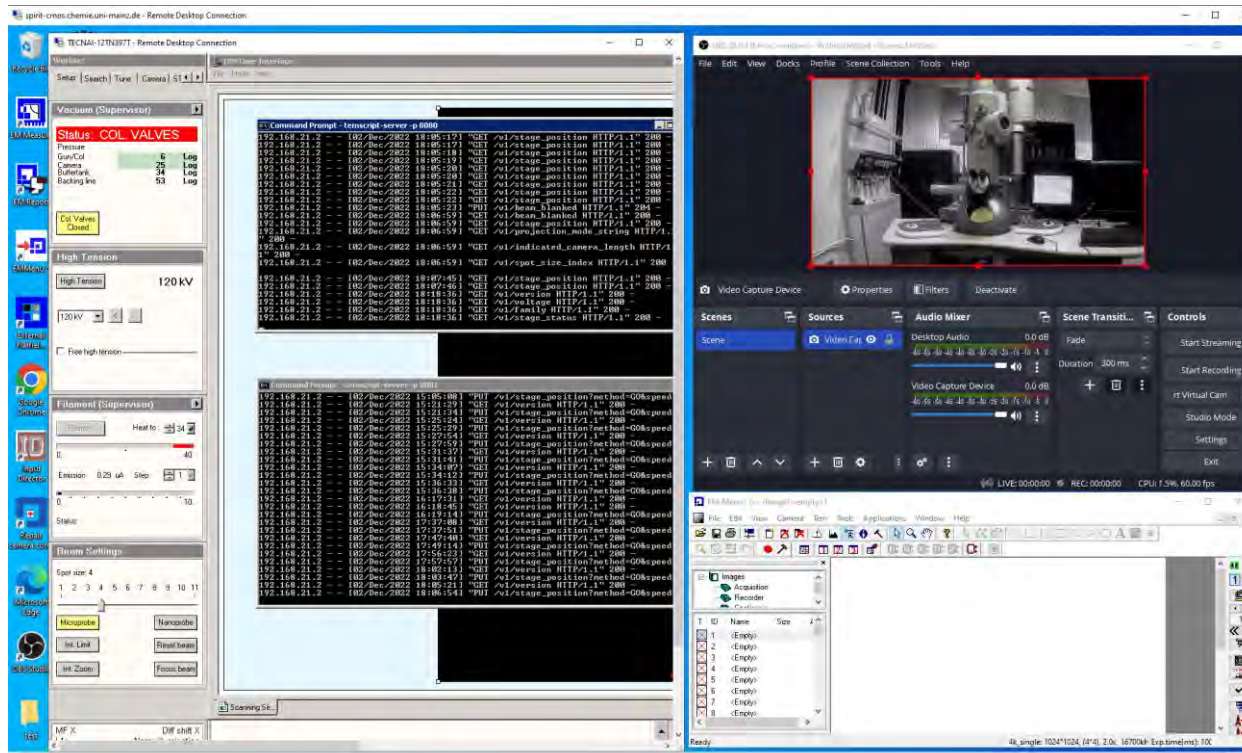
ADVANTAGES:

Technology not different wrt remote service (es: RAPID FEI)

Amazing for script development

With few implementations you can easily control a TEM for remote data acquisition

such as MF knob, stage, user shift, screen lifting ecc...



DISADVANTAGES:

You need to refill the N2 every 3h

alignment is faster at the microscope

change the holder not reasonable

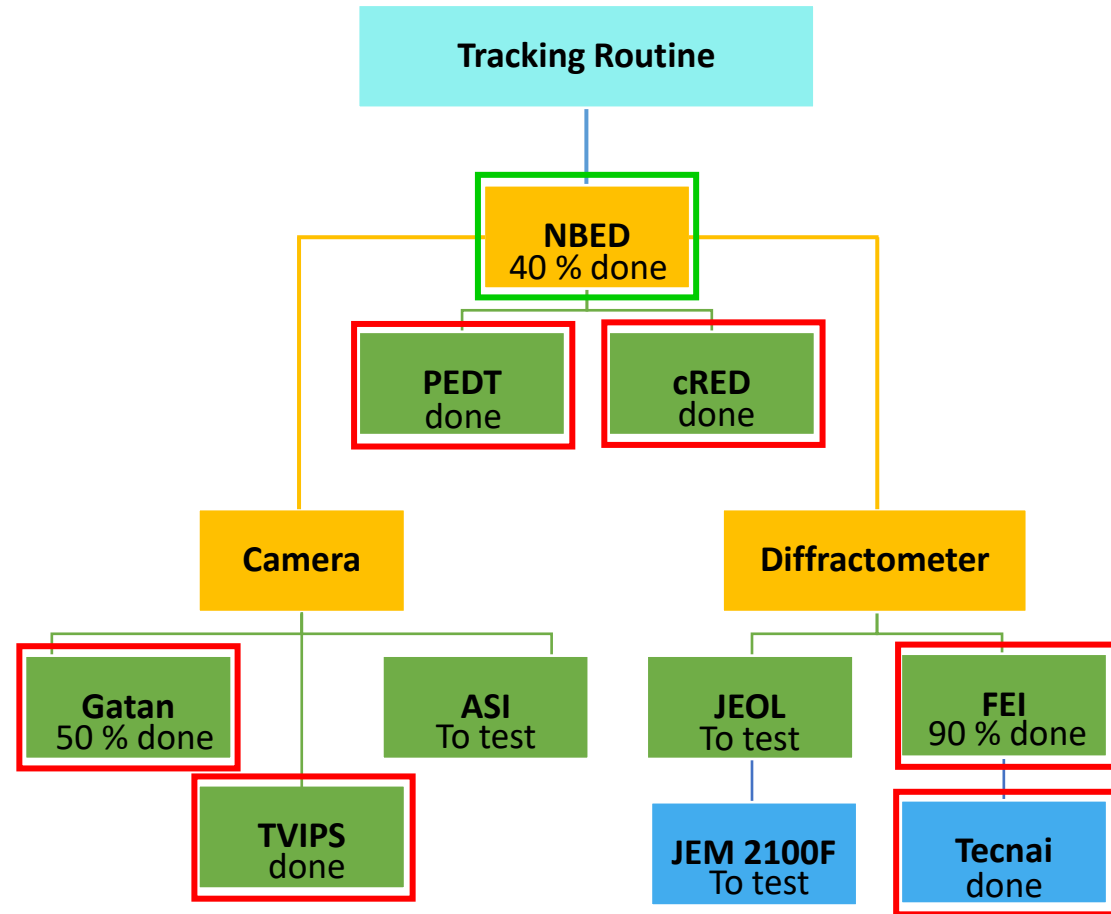


Tracking Routines for Automated 3DED Data Acquisition – Current State

JEOL JEM 2100F

FEI TECNAI F30

FEI TECNAI SPIRIT



Remarks:

- FEI COM implementation have an intrinsic issue with changing from Diffraction to Imaging that change the magnification/Camera length automatically
- FEI COM support intrinsically Tecnai, Titan, Talos up to now
- Gatan support is given directly thanks to Tecnai User Interface (Temscrip)
- JEOL support up to now is not tested but should be already implemented in Instamatic



Future perspective

Finalize cRED module

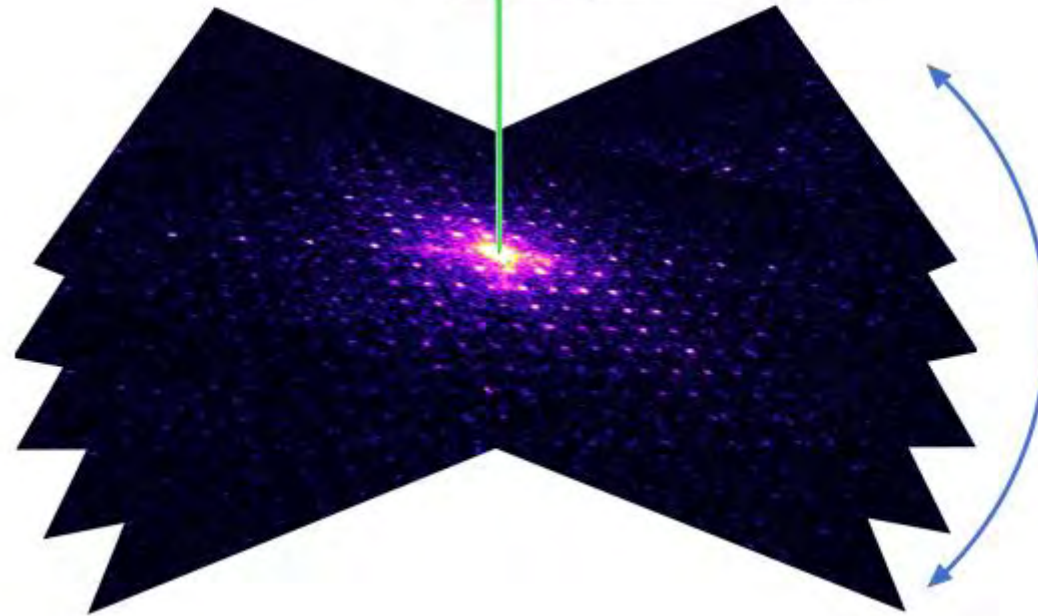
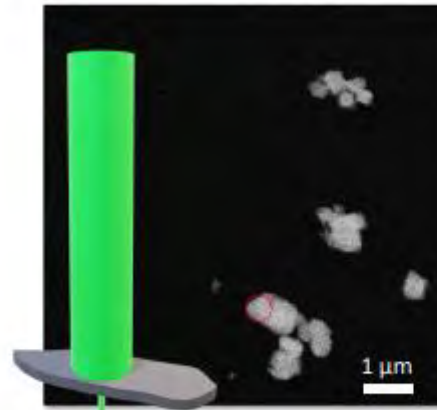
Finish translation Fast-ADT in python

Test :

TEM/STEM features

Camera supports (Gatan, TVIPS, ASI)

Start with tracking routine development



Thank you



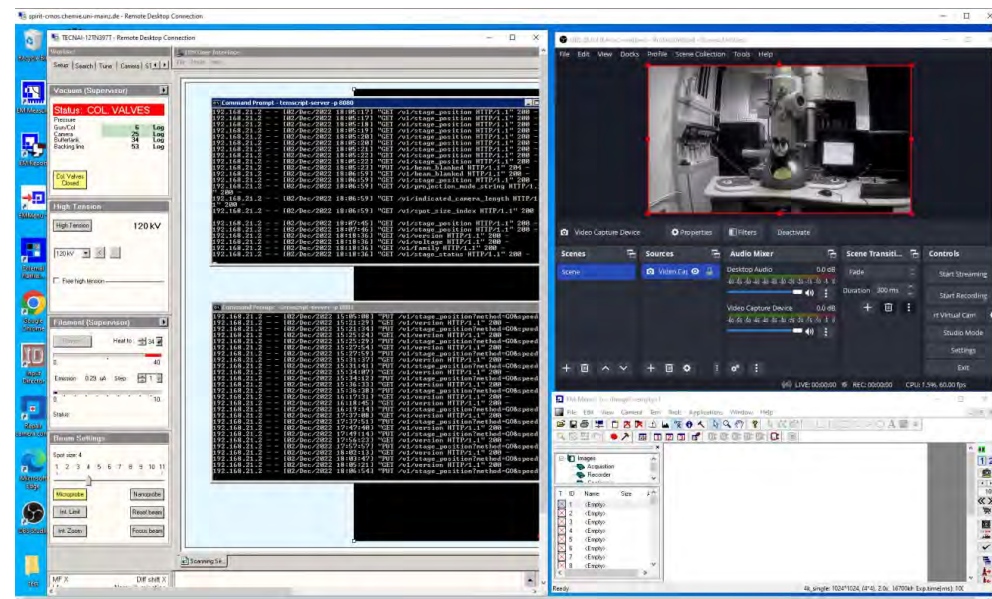
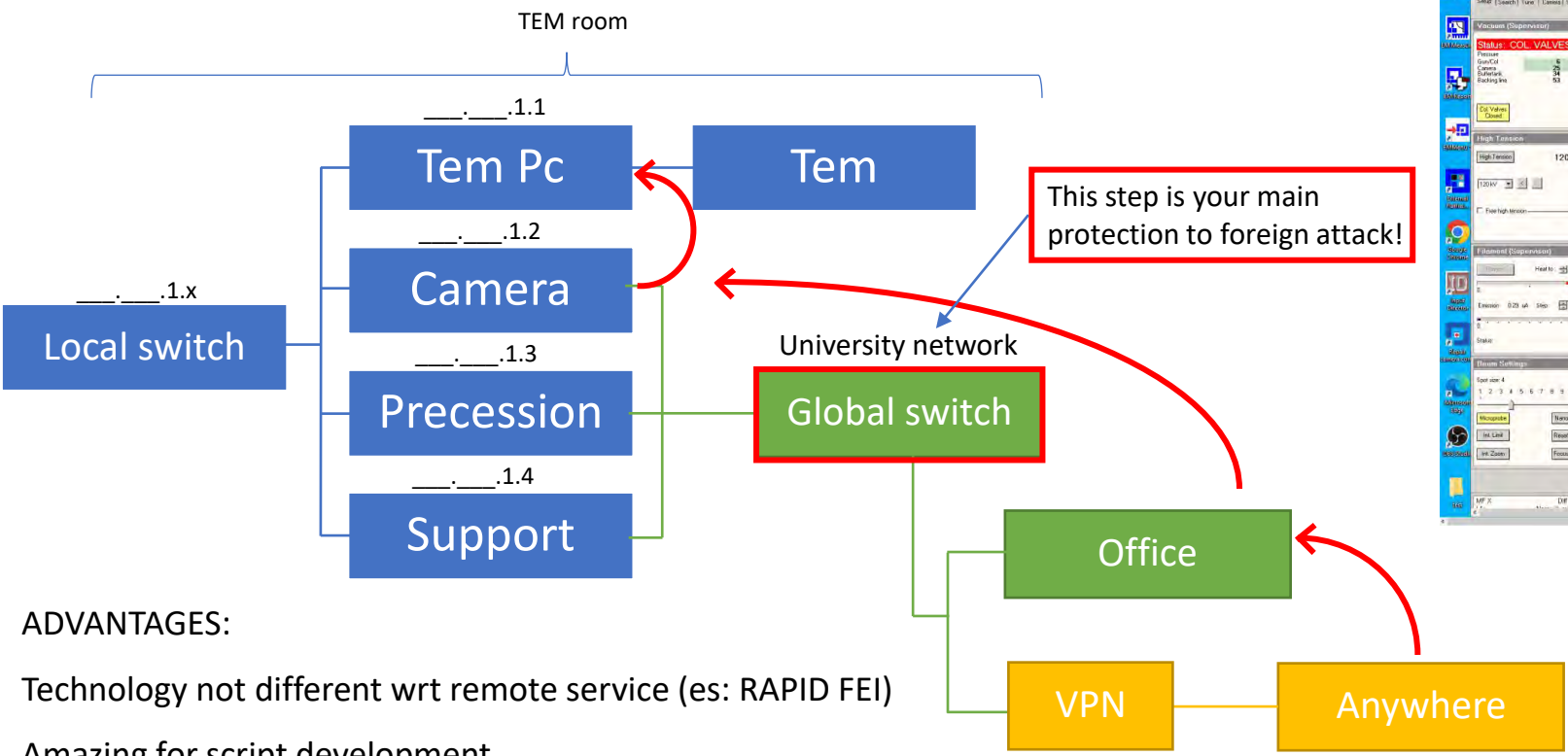
EMCM – JGU@Mainz



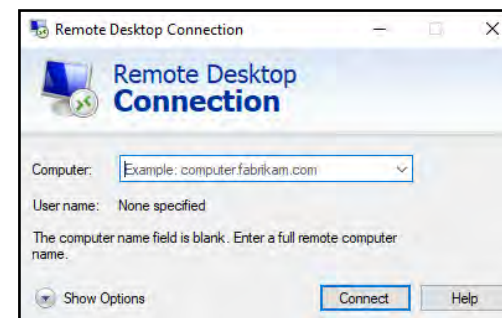
cRED implementation TEM network setup

Working from the office is not impossible ... is relatively easy!

My office pc → SPIRIT camera pc → SPIRIT Tem pc



Remote desktop, TeamViewer are some options



ADVANTAGES:

Technology not different wrt remote service (es: RAPID FEI)

Amazing for script development

With few implementations you can easily control a TEM for remote data acquisition:

MF knob, stage, user shift, screen lifting ecc...

DISADVANTAGES:

You need to refill the N₂ every 3h; alignment is faster at the microscope; change the holder not reasonable!

