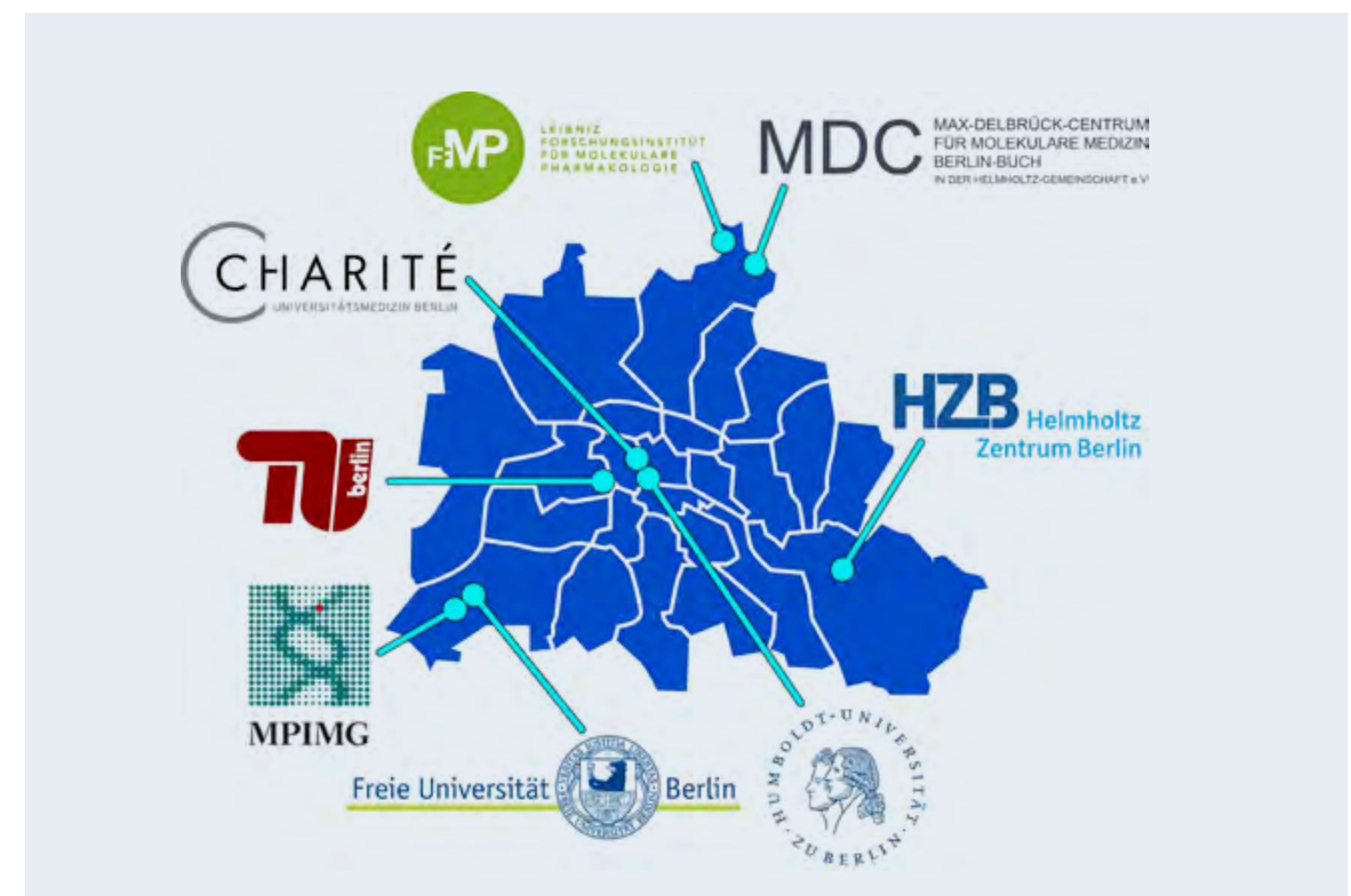


## Structural Biology

# Large-scale infrastructure for Structural Biology research

Summary: Structural Biology is a key discipline of modern Molecular and Medical Biology and a cornerstone of all major research consortia in the Berlin area. The Life Science Campus Berlin offers state-of-the-art, large research infrastructure for Structural Biology via the Joint Berlin MX-Laboratory (HZB, FUB, HUB, MDC, FMP, Charité), NMR centers (FMP, FUB), MS-based Structural Interactomics facilities (TUB, FMP, FUB) and the EM Ultra-Structure Network (Charité, FUB, MPI-MG). This infrastructure enables cutting-edge Structural Biology research through complementary approaches. To further reinforce long-term, close collaboration, we aim at integrating the existing collaborative networks into a newly formed Berlin Center for Integrative Structural Biology to serve as a platform for the operation, further development and usage of this unique collection of equipment for the Berlin Structural Biology community.



## Joint Berlin MX-Laboratory (HZB, FUB, HUB, MDC, FMP, Charité)

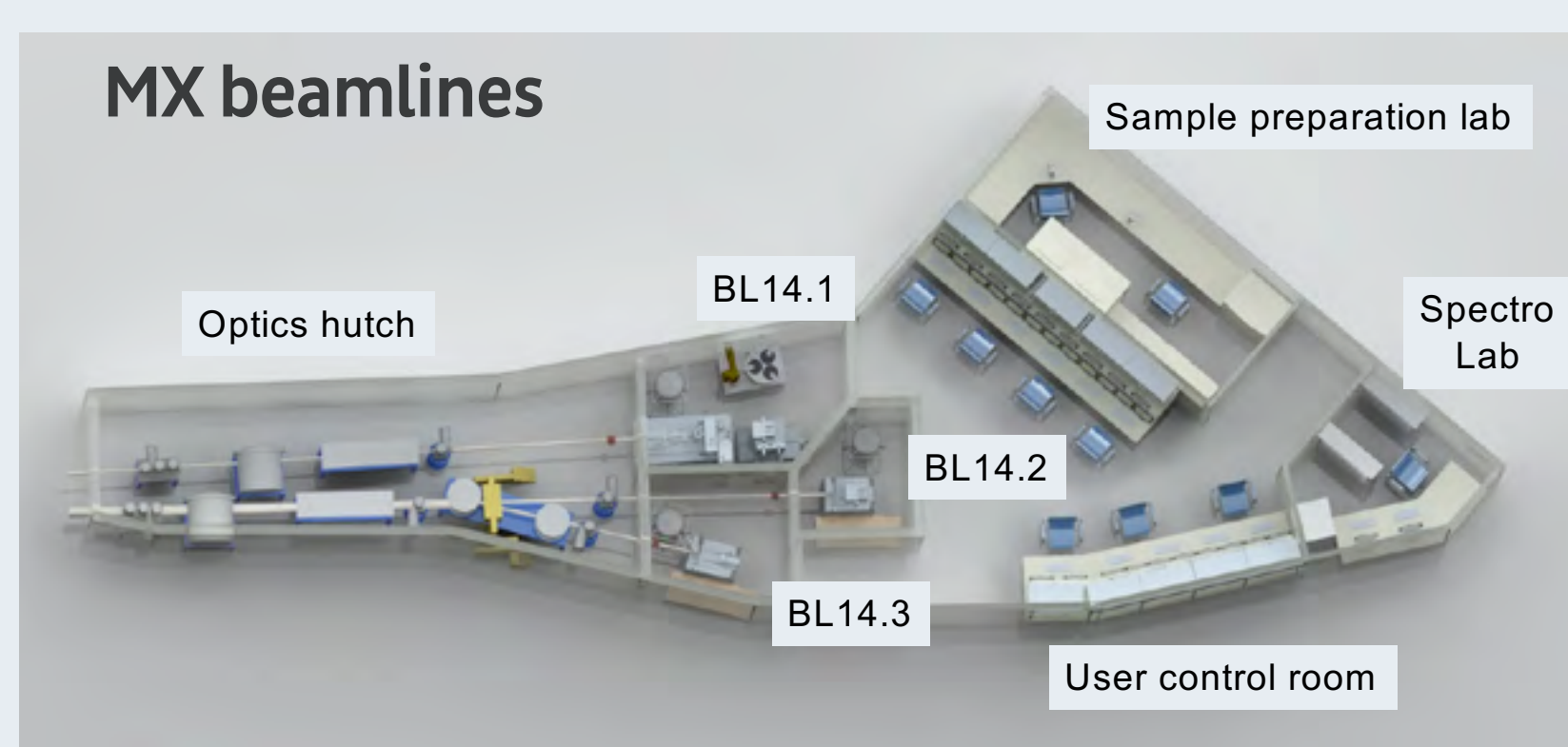


**Joint Berlin MX-Laboratory**

- Operation, usage and further development of BESSY II MX beamlines
- Founded 2009
- Phase III 2018-2020

### Joint Berlin MX-Day

- Annual meeting of the Berlin Structural Biology community



**Beamline 14.1**

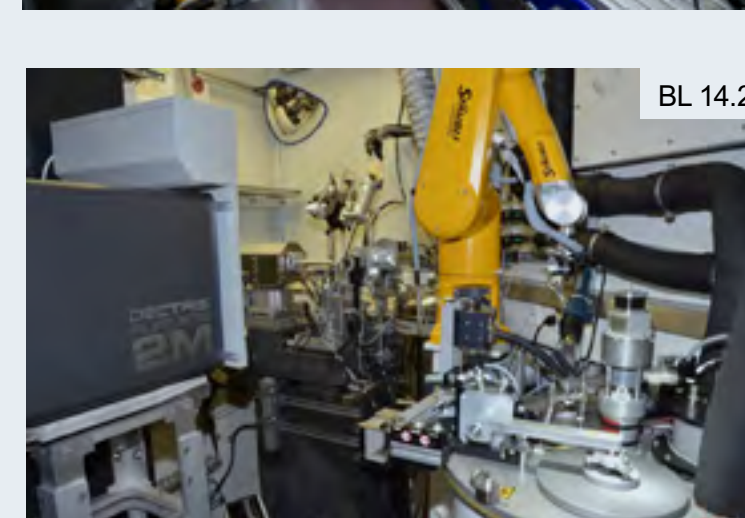
- Energy range 5.5 – 19.5 keV
- $5.0 \times 10^{11}$  photons/s
- High performance multi-axis goniometer MD2
- Automated sample mounting
- PILATUS 6M detector
- High performance *de novo* structure determination by MAD/SAD

**Beamline 14.2**

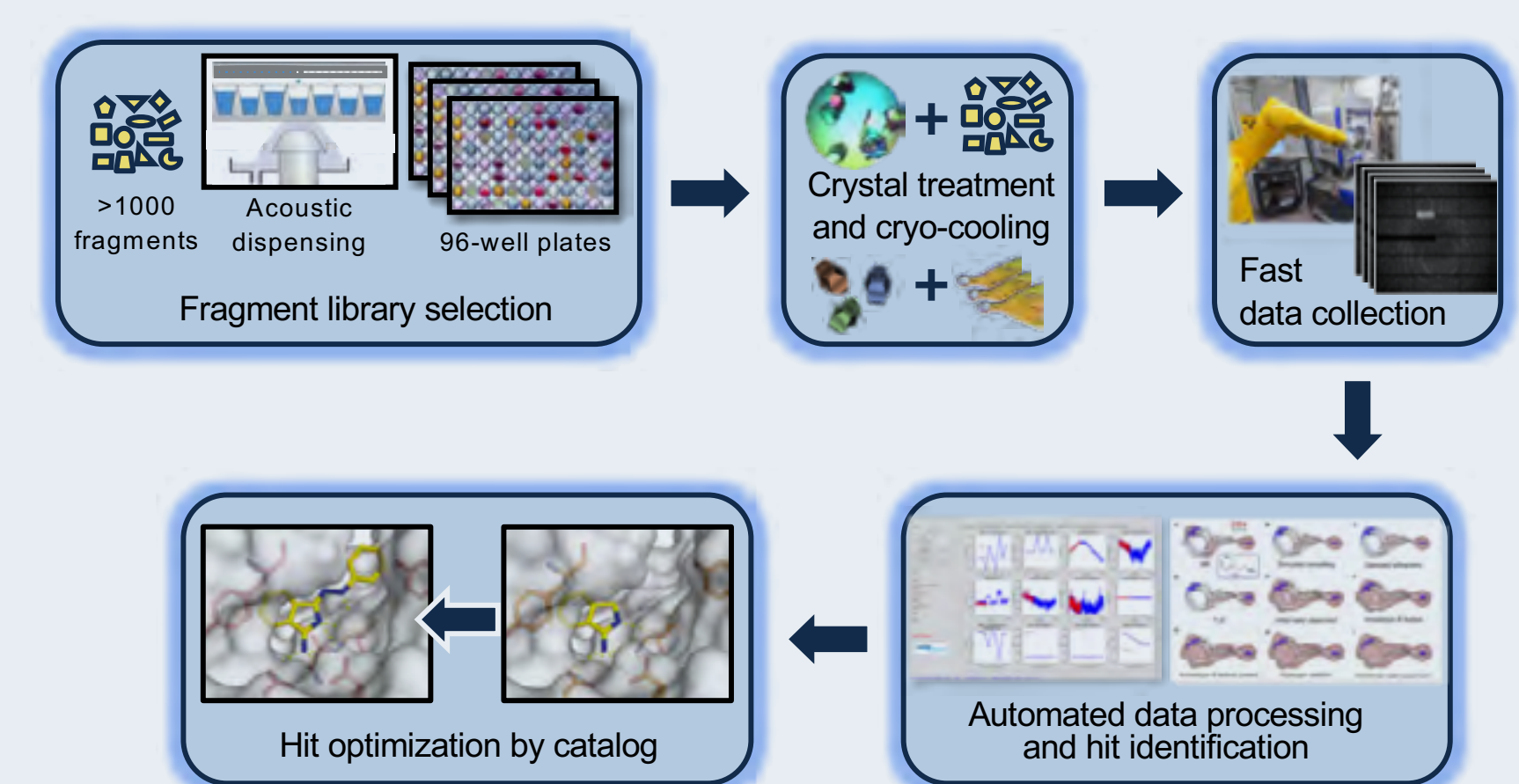
- Energy range 5.5 – 19.5 keV
- $4.6 \times 10^{11}$  photons/s
- Nanodiffractometer
- Automated sample mounting
- PILATUS 3M detector
- *De novo* structure determination by MAD/SAD, long-wavelength S-SAD

**Beamline 14.3**

- Energy 13.8 keV
- $6.8 \times 10^{11}$  photons/s
- High performance multi-axis goniometer MD2-S
- Rayonix MX225 CCD-detector
- In situ crystal screening
- Crystal dehydration experiments



## Crystallographic fragment screening



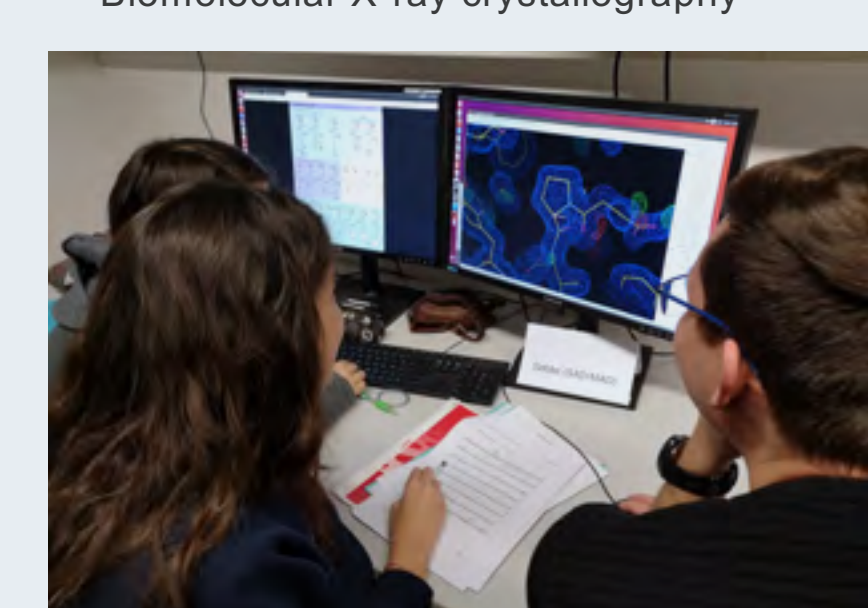
### Crystallography under inert atmosphere

- Oxygen-sensitive metal centers



### Joint methods course at FUB, HZB, MDC

- Biomolecular X-ray crystallography



## Nuclear magnetic resonance centers (FMP, FUB)

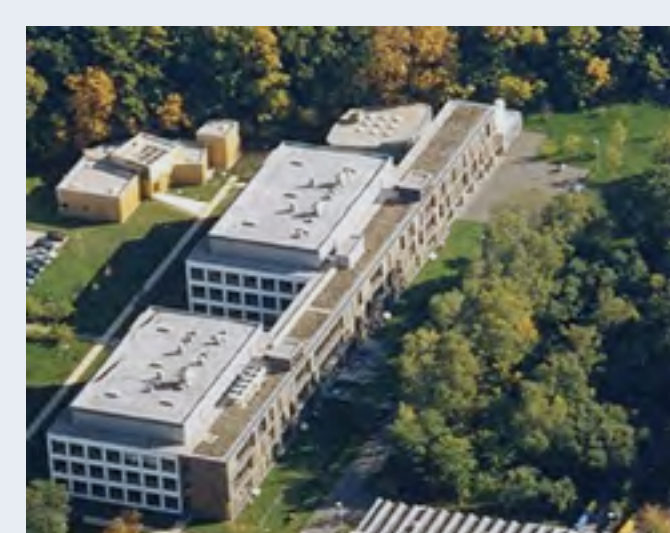
### Dynamic nuclear polarisation

- DNP increases S/N by two orders of magnitude

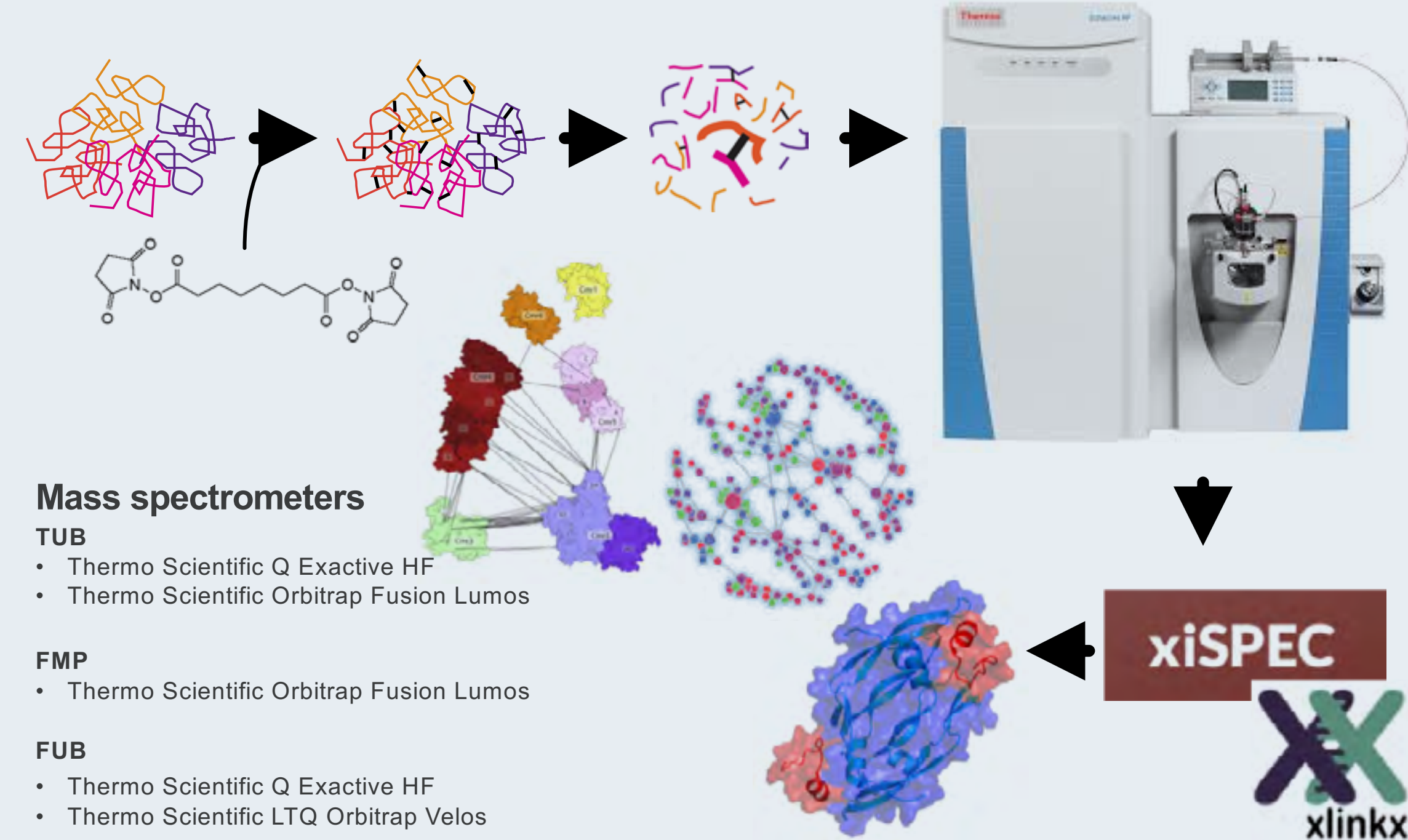
### NMR spectrometers

- FMP**
- Bruker AV 400 (MRI imaging)
  - Bruker AV 300, 3x600 and 750 (solution)
  - Bruker AV 900 (solution and solid-state)
  - Bruker AV 600 and 700 (solid-state)
  - Bruker AV 400 and 900 (solid-state with DNP functionality)
  - Bruker 1.2 GHz NMR (to be installed)

- FUB**
- Bruker AVANCE III 700 (solution)
  - JEOL 600 (solution, solid state)



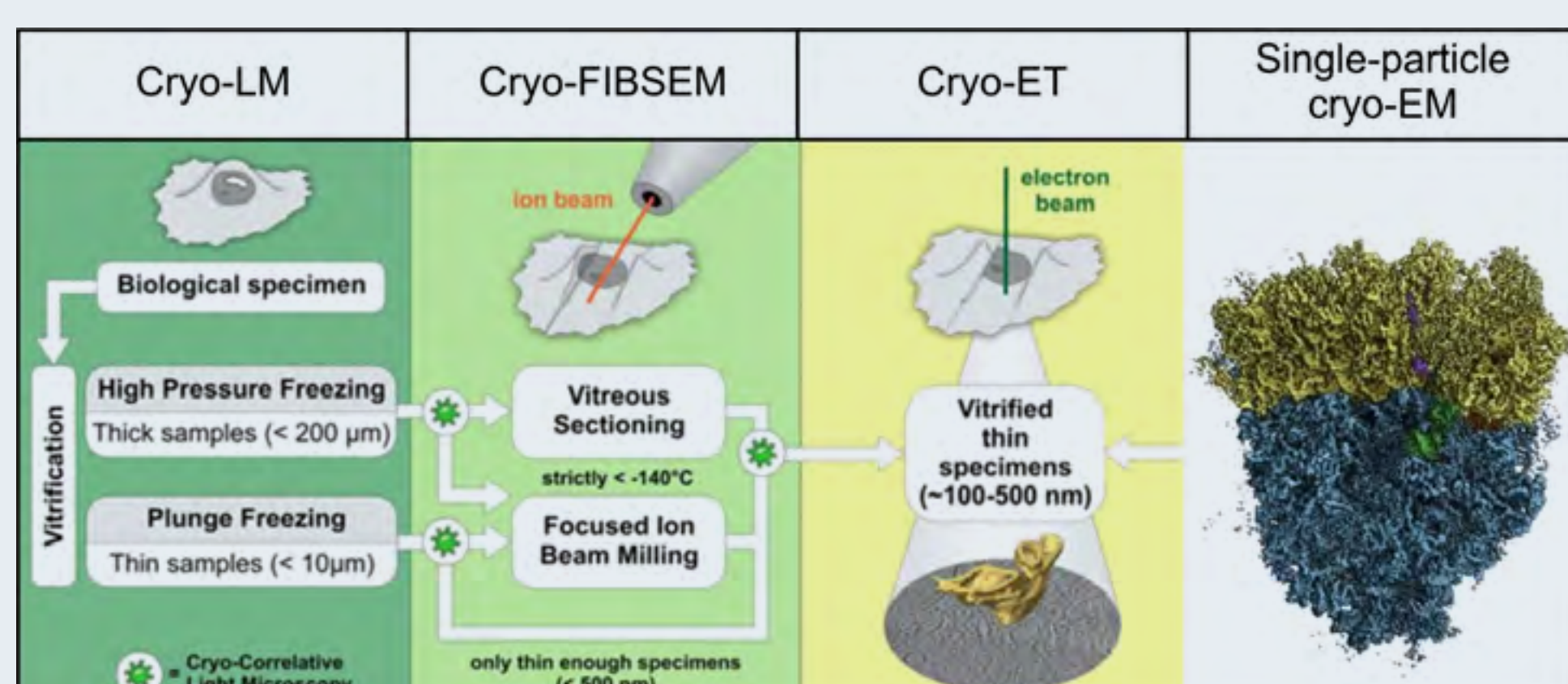
## Structural interactomics (TUB, FMP, FUB)



### Mass spectrometers

- TUB**
- Thermo Scientific Q Exactive HF
  - Thermo Scientific Orbitrap Fusion Lumos
- FMP**
- Thermo Scientific Orbitrap Fusion Lumos
- FUB**
- Thermo Scientific Q Exactive HF
  - Thermo Scientific LTQ Orbitrap Velos

## Ultra-Structure Network – Transmission cryo-electron microscopy (FUB, Charité, MDC, FMP, MPI-MG)



Experimental workflow using the instrumentation to be set up in 2019 (adopted with modifications from Lukić *et al.* (2013) *J Cell Biol* **202**, 407-419)

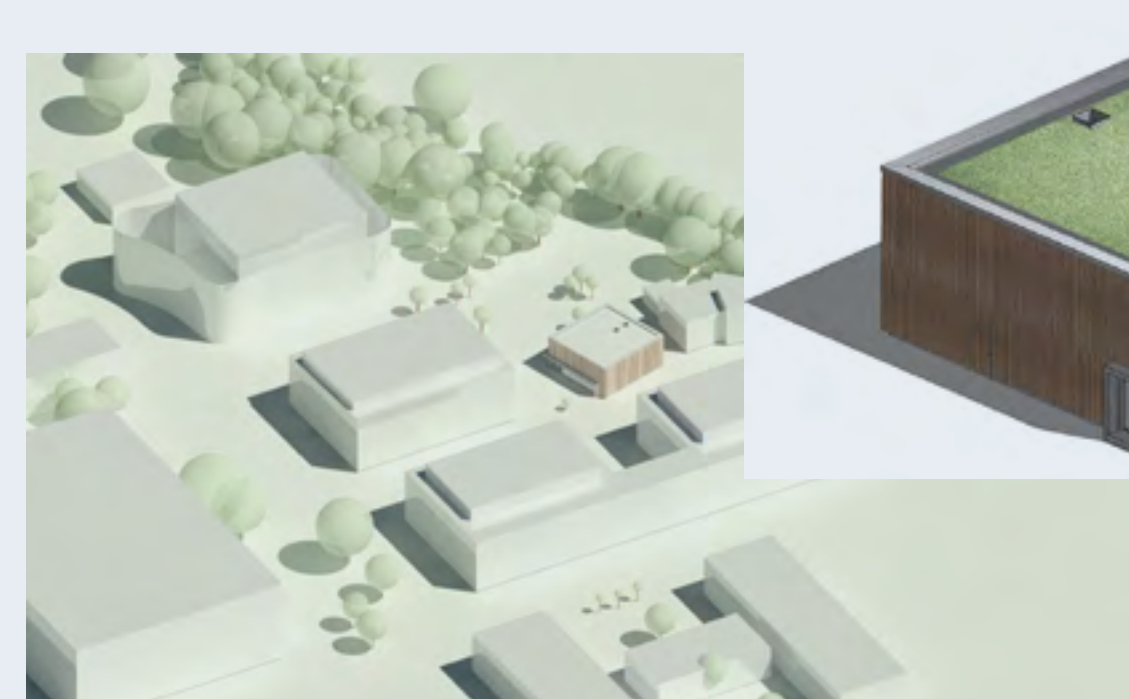


### Research building SupraFAB

- In operation end of 2020 (FUB Campus Dahlem)
- Large research infrastructure (including cryo-TEM, solid state NMR)
- Architects: Nickl & Partner AG

### Cryo-EM building

- In operation mid 2019 (Charité Campus Buch)
- Large cryo-TEM infrastructure
- Architects: Heinle, Wischer & Partner



### IT infrastructure

- Data acquisition and data evaluation
- Core-Facilities BioSupraMol (FUB), AMBIO (Charité), Zuse Institute Berlin (Campus Dahlem)