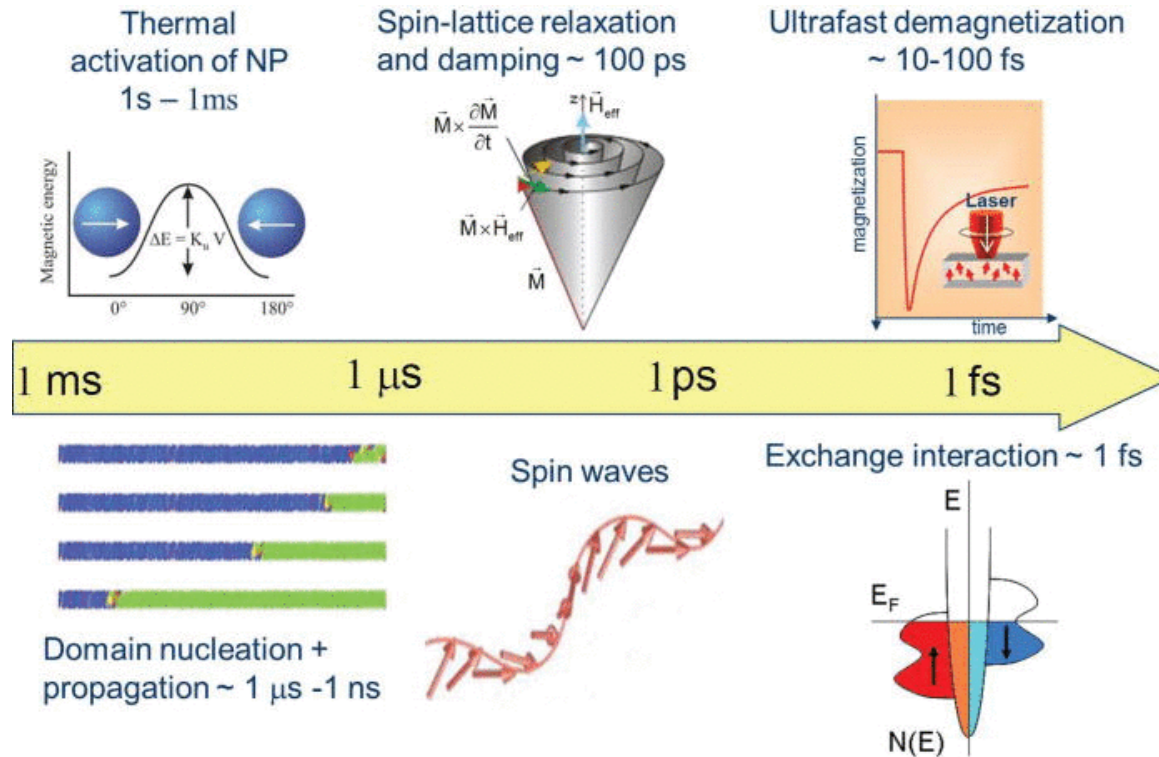
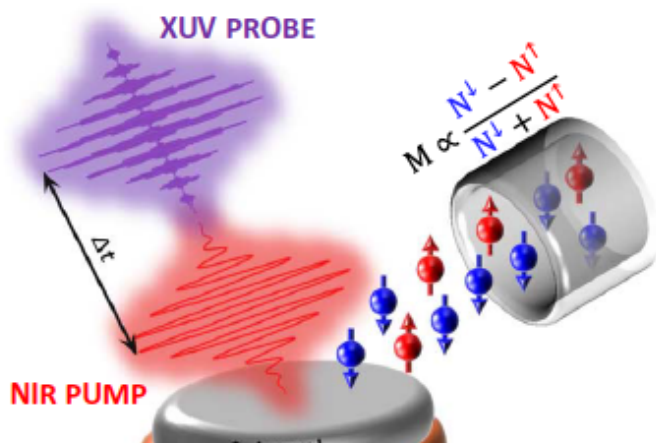


Time-, spin- and angle- resolved photoemission

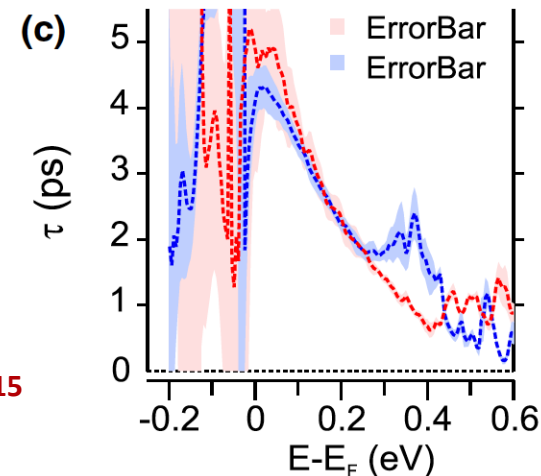


Zabel JAP 2014

Time-, spin- and angle- resolved photoemission

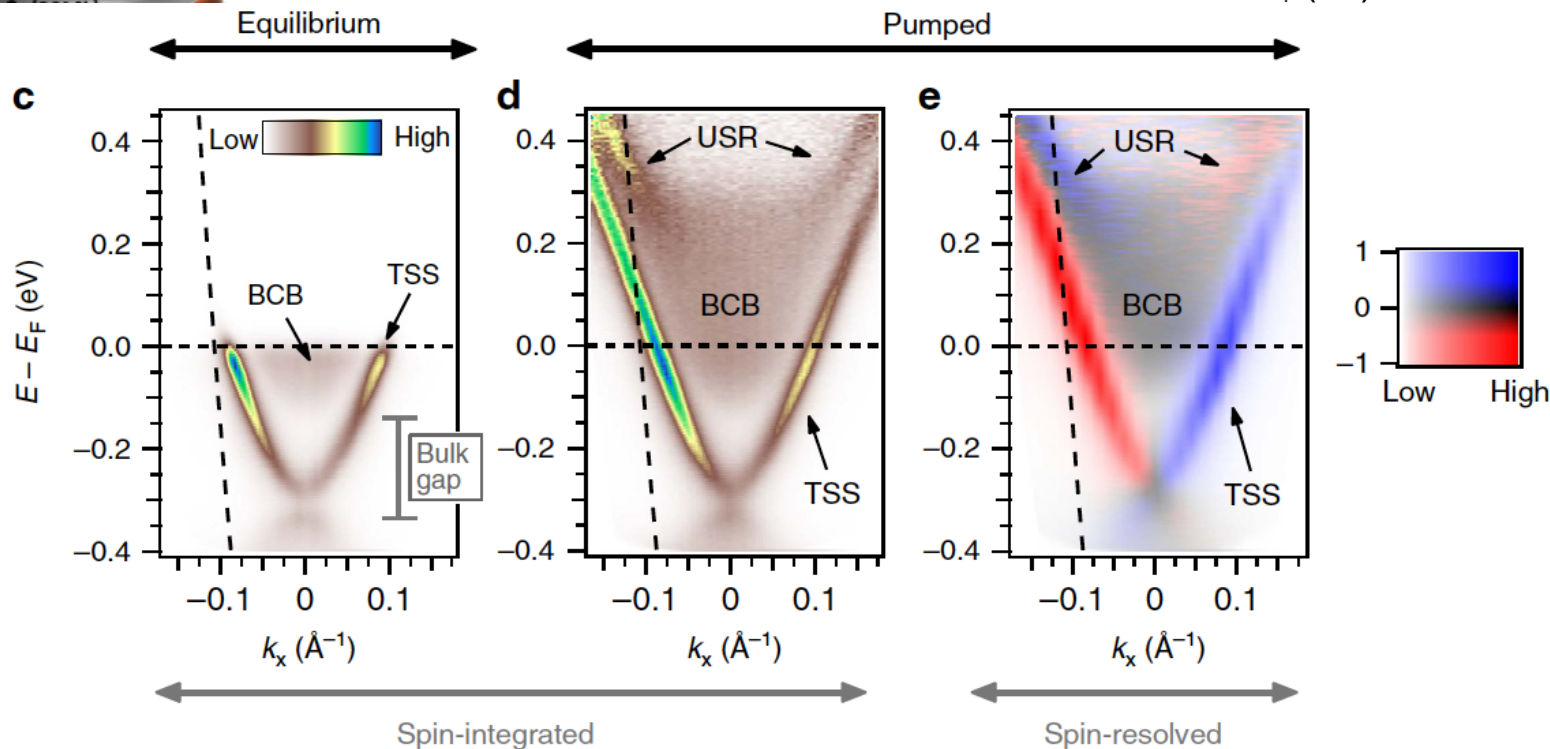


Cacho PRL 2015



Eich SciAdv 2017

Bi_2Se_3

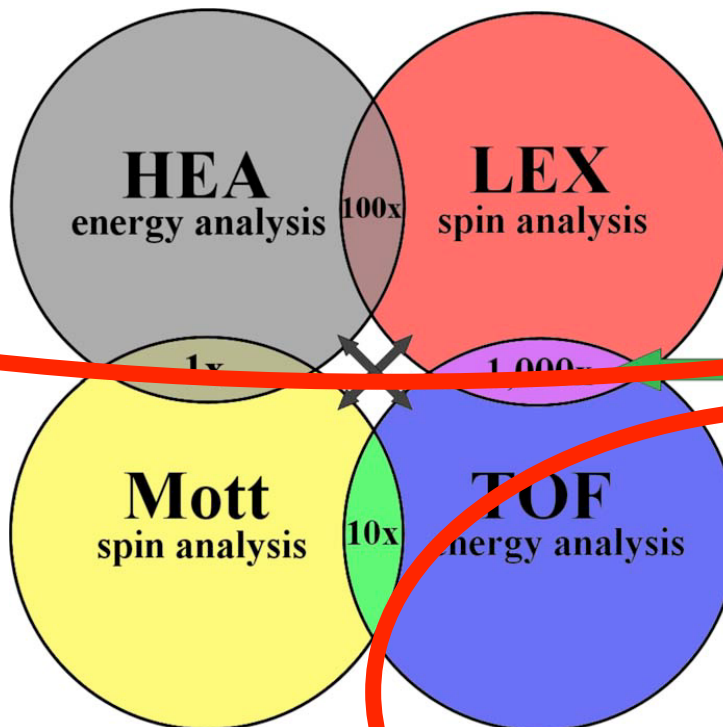
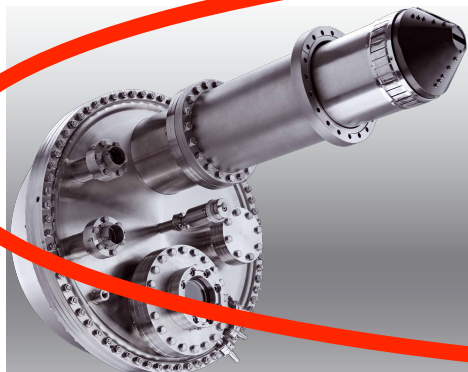


Jozwiak NatCom 2016

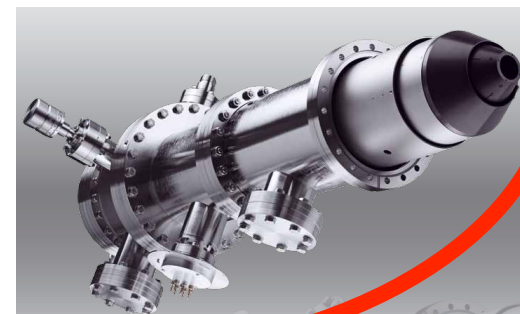
Time-, spin- and angle- resolved photoemission

hemispherical electron analyser

low energy exchange scattering



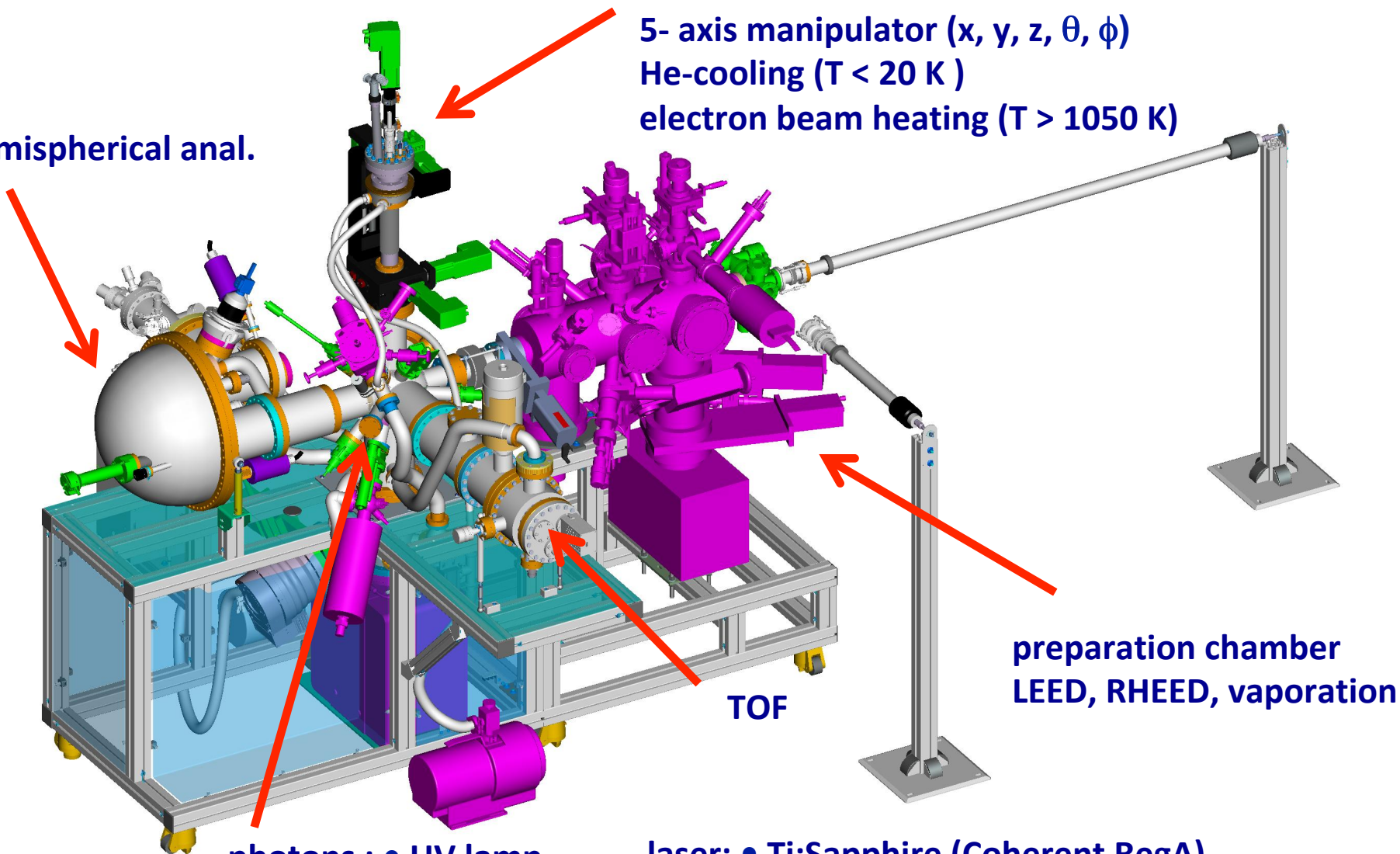
time of flight analyser



Time-, spin- and angle- resolved photoemission

5- axis manipulator (x, y, z, θ, ϕ)
 He-cooling ($T < 20\text{ K}$)
 electron beam heating ($T > 1050\text{ K}$)

hemispherical anal.



preparation chamber
 LEED, RHEED, vaporation

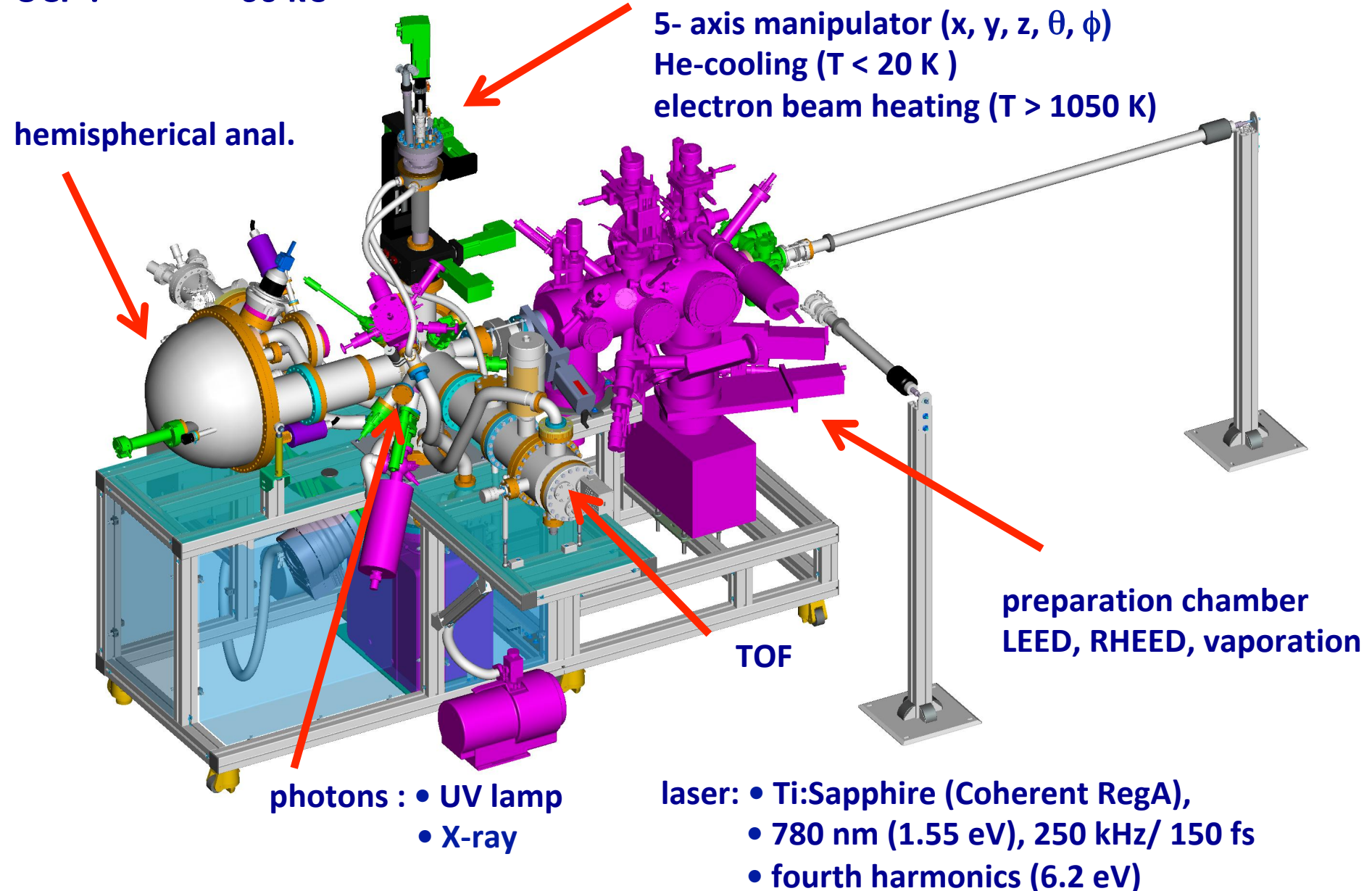
TOF

photons : • UV lamp
 • X-ray

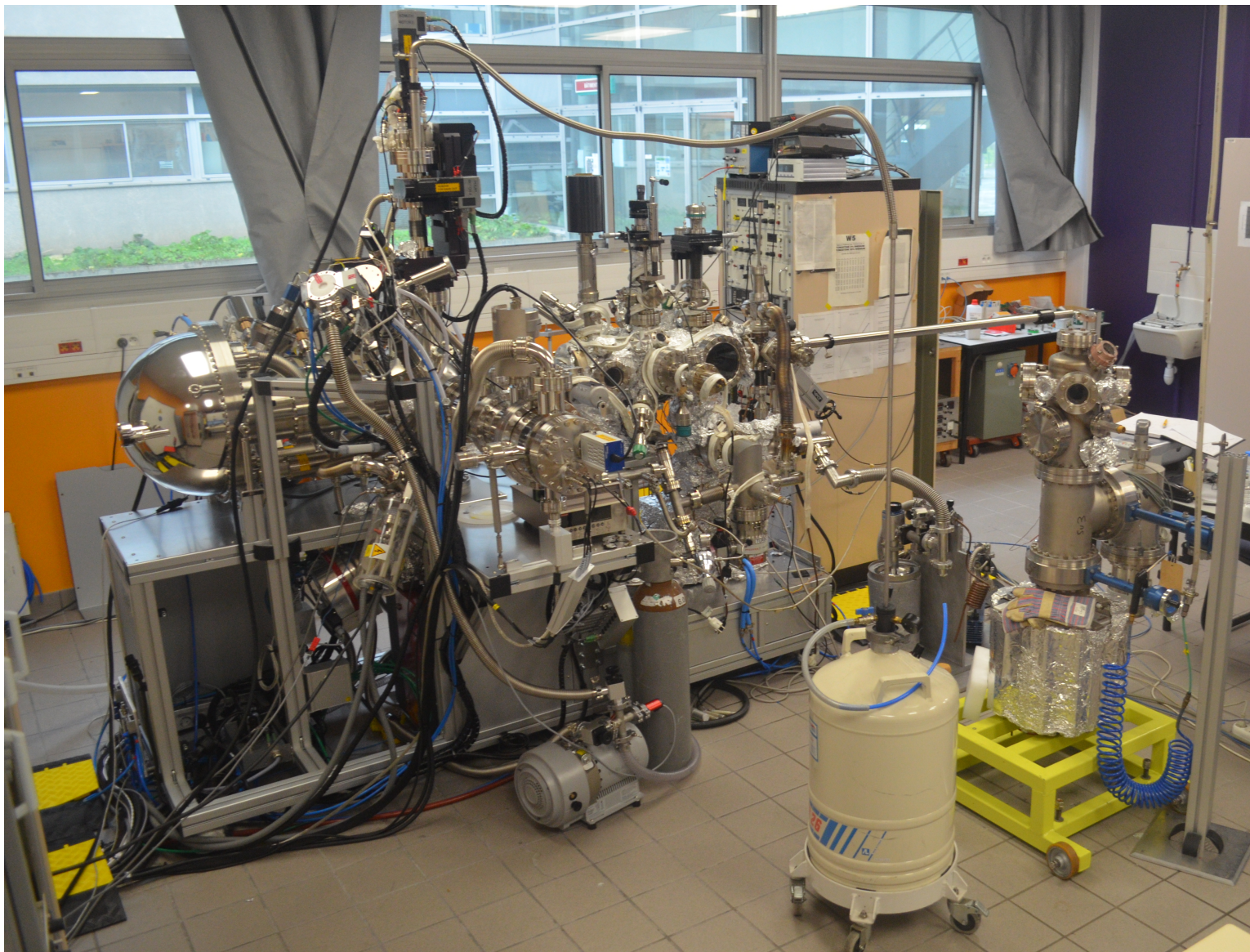
laser: • Ti:Sapphire (Coherent RegA),
 • 780 nm (1.55 eV), 250 kHz/ 150 fs
 • fourth harmonics (6.2 eV)

ATTOLAB : 220 k€
PATRIMEX : 290 k€
UCP : 60 k€

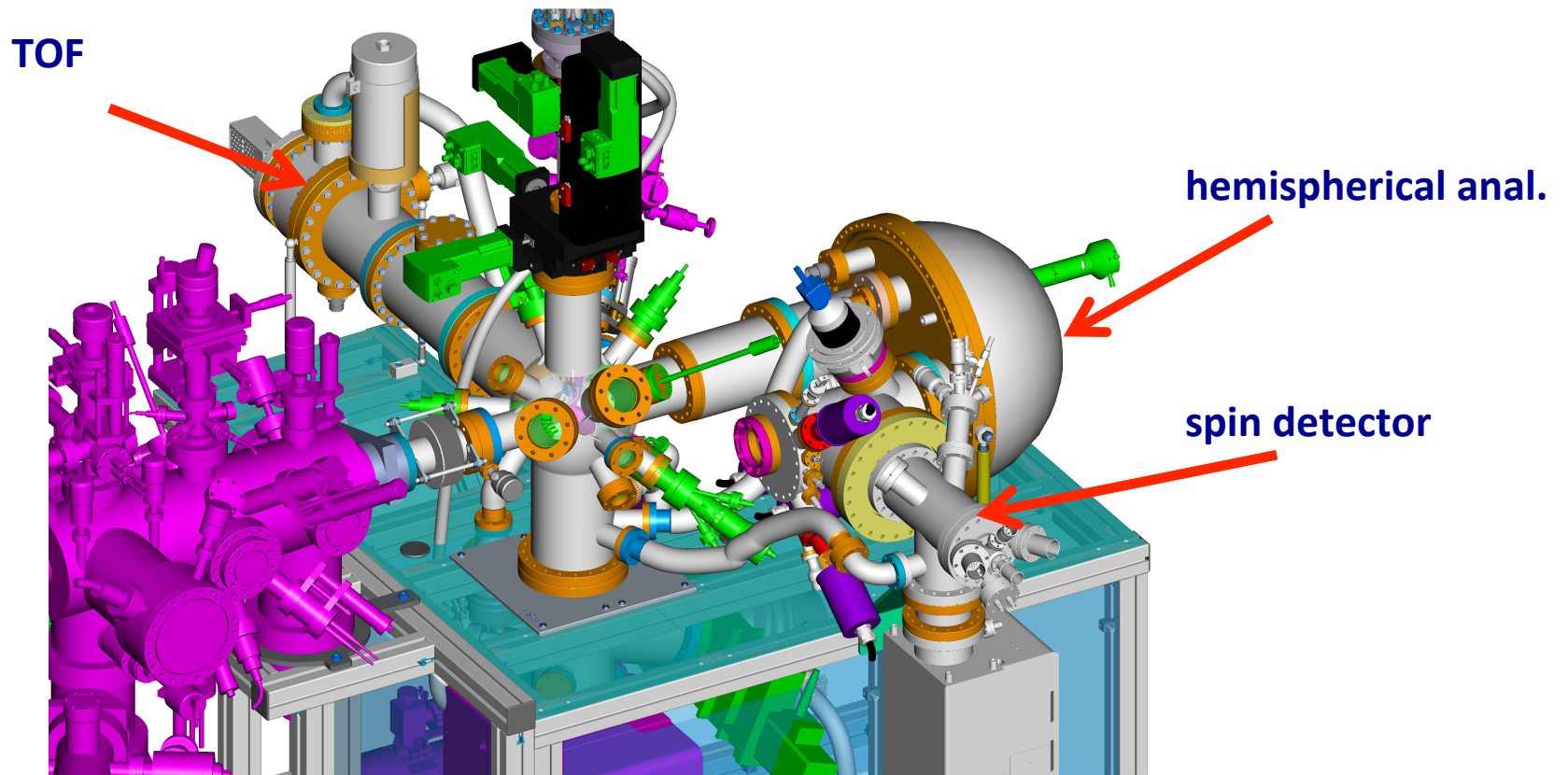
PATRIMEX : 200 k€ Ti-sapphire laser
PATRIMEX : 100 k€ MesoXscope



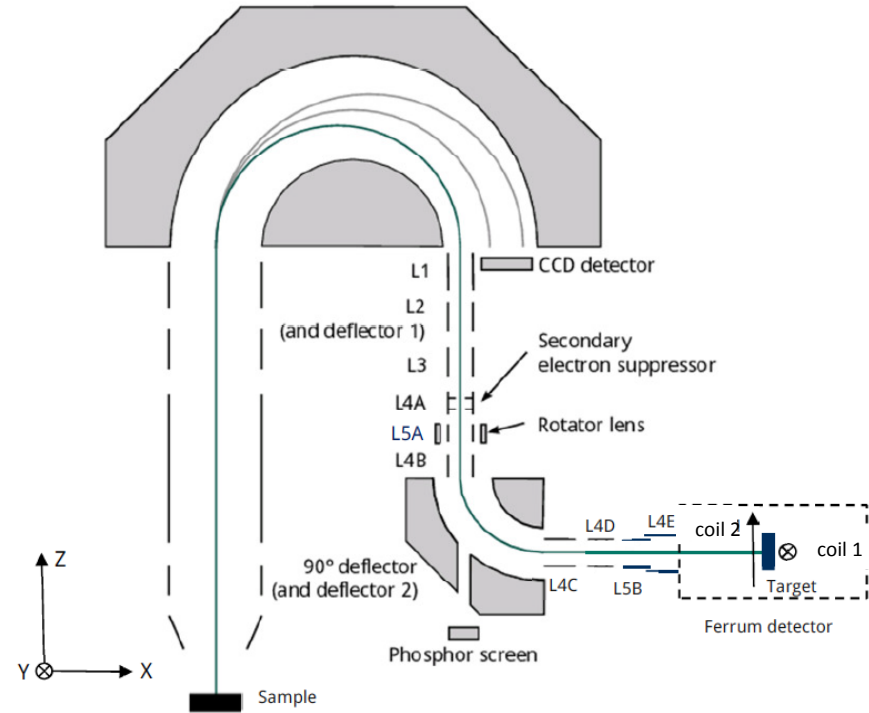
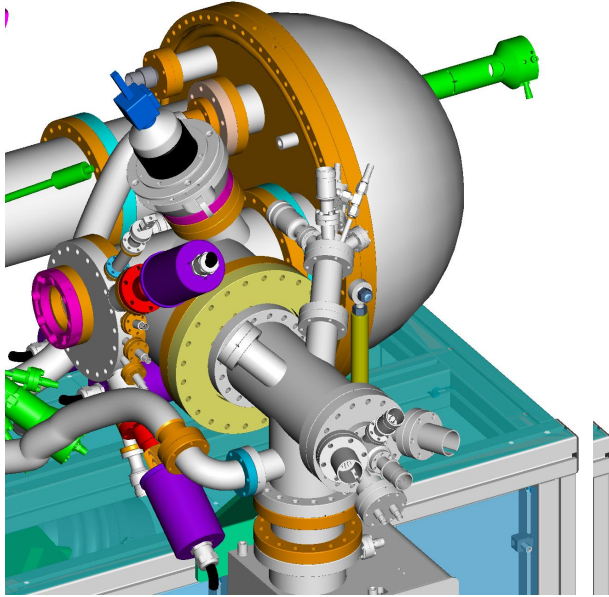
TOF-SPIN configuration at LPMS



TOF-SPIN configuration

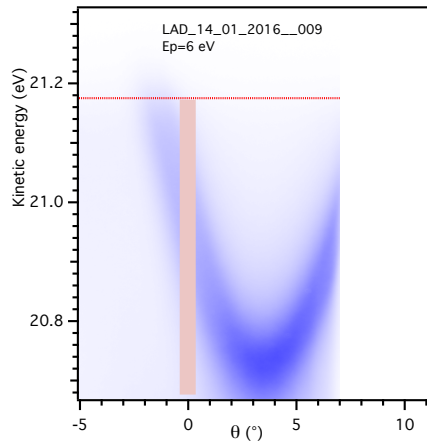
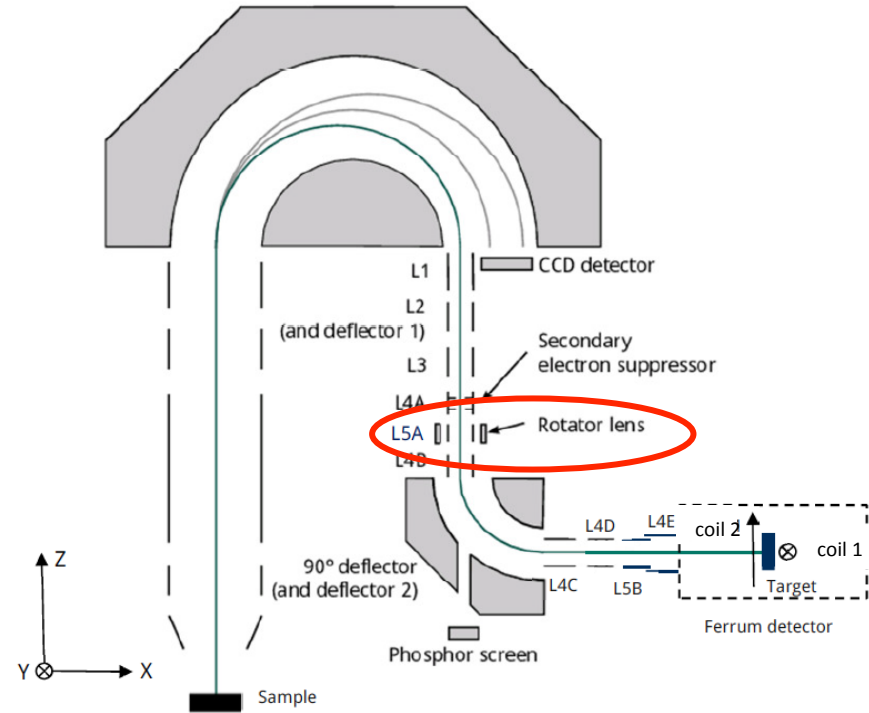
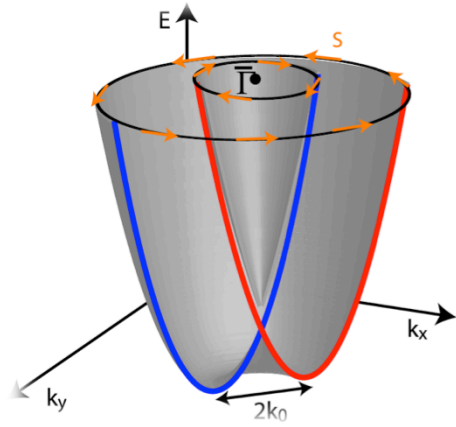


specifications



specifications

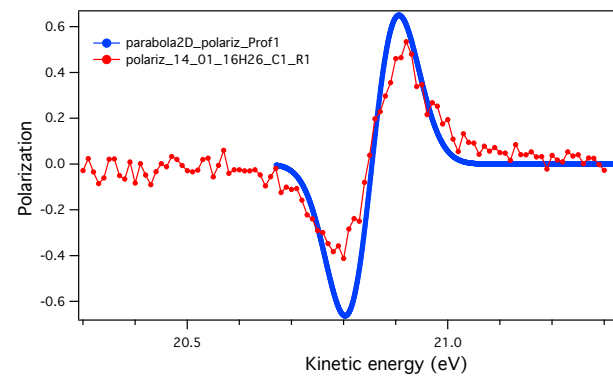
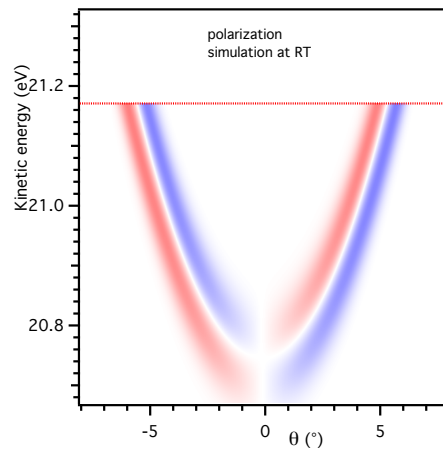
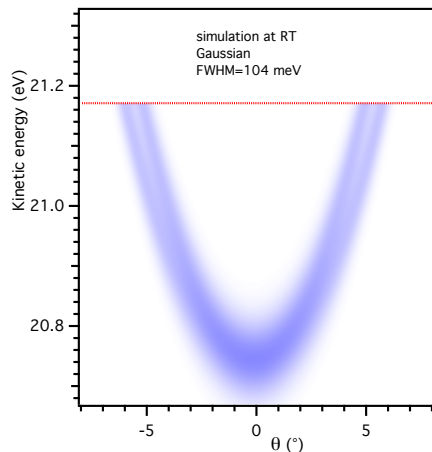
Au(111)



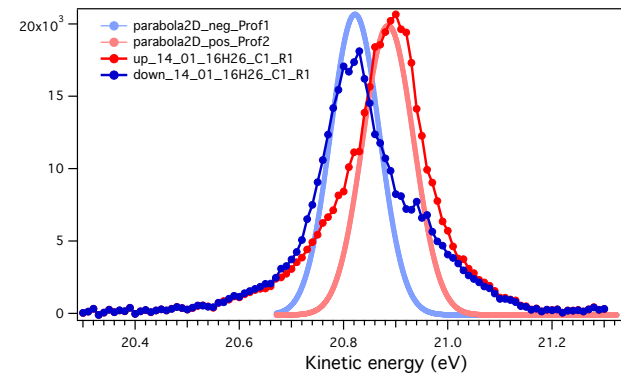
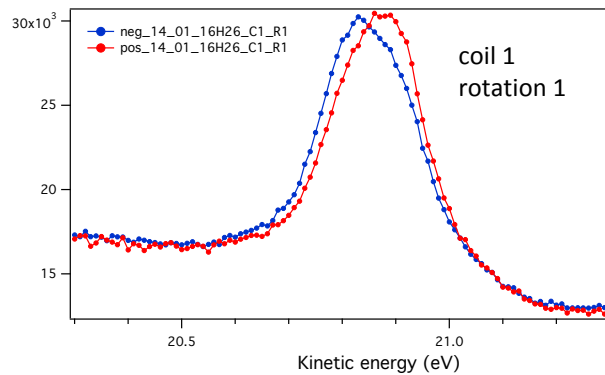
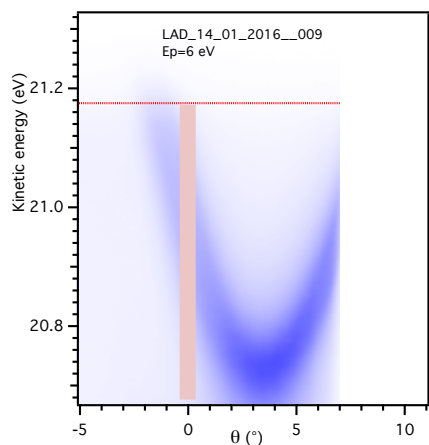
specifications

Au(111)

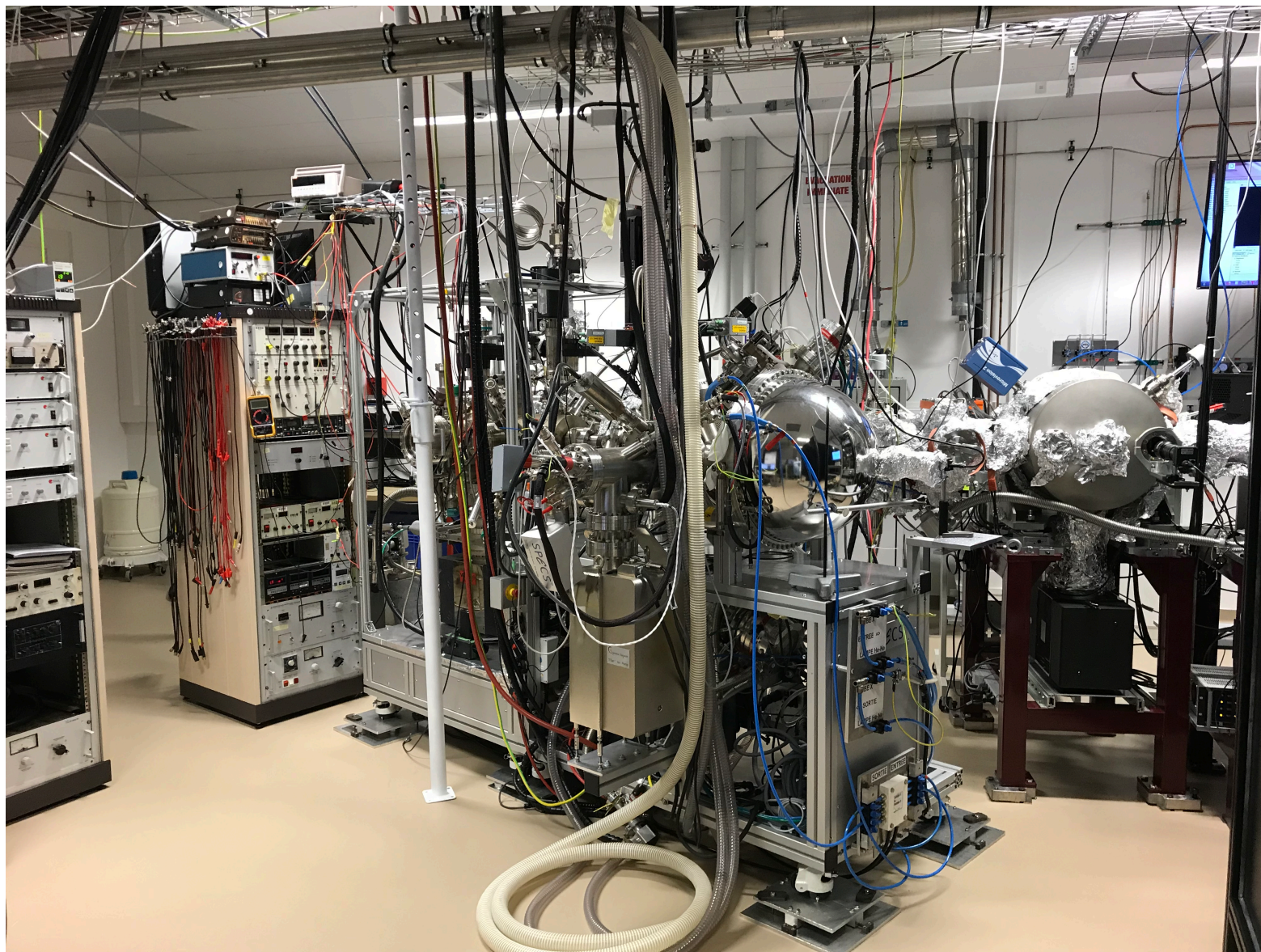
simulation at RT



raw spectra (room temperature)
8 sec/point



TOF-SPIN configuration at ATTOLab



beamline characterisation

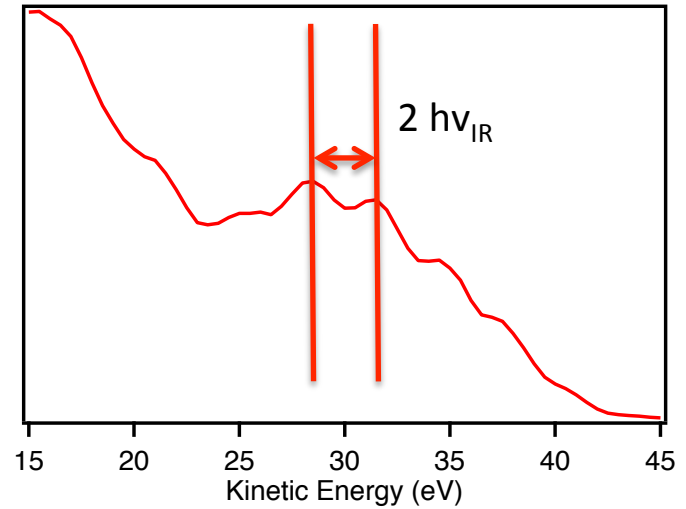
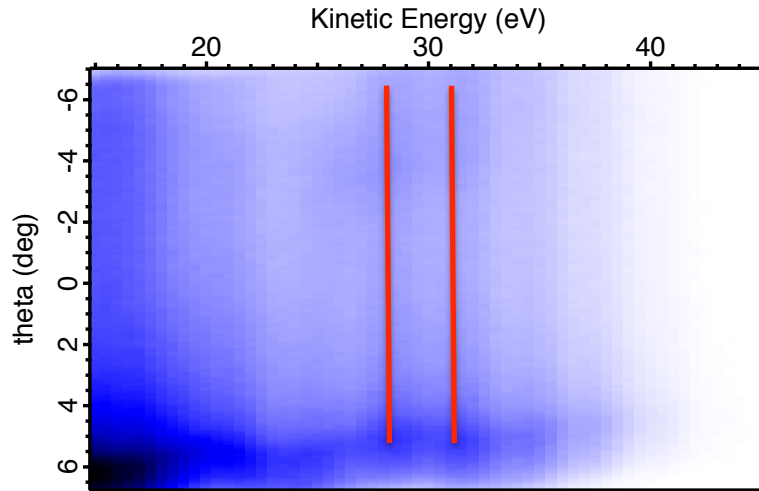
with Au (111)

9 Novembre: HHG photons

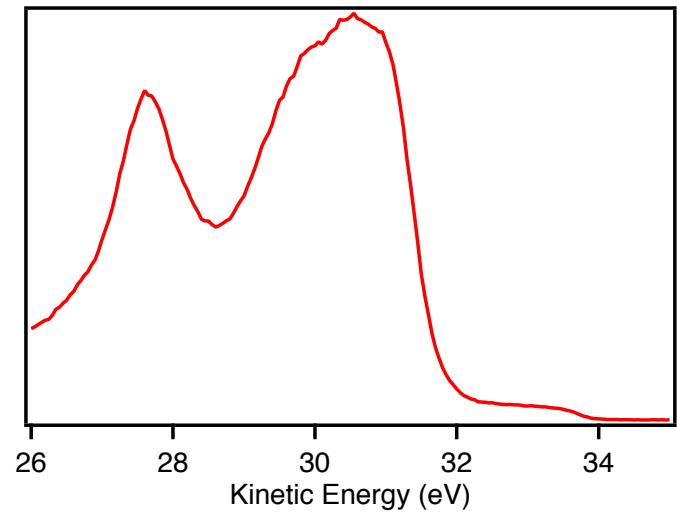
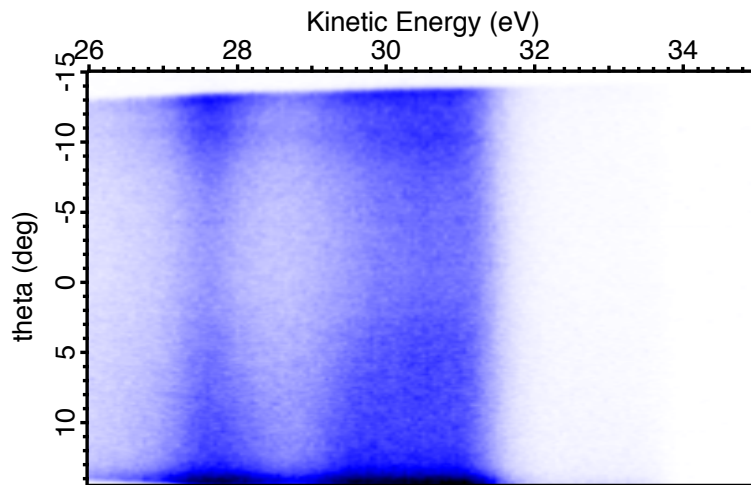


9 Novembre: HHG photons

without grating

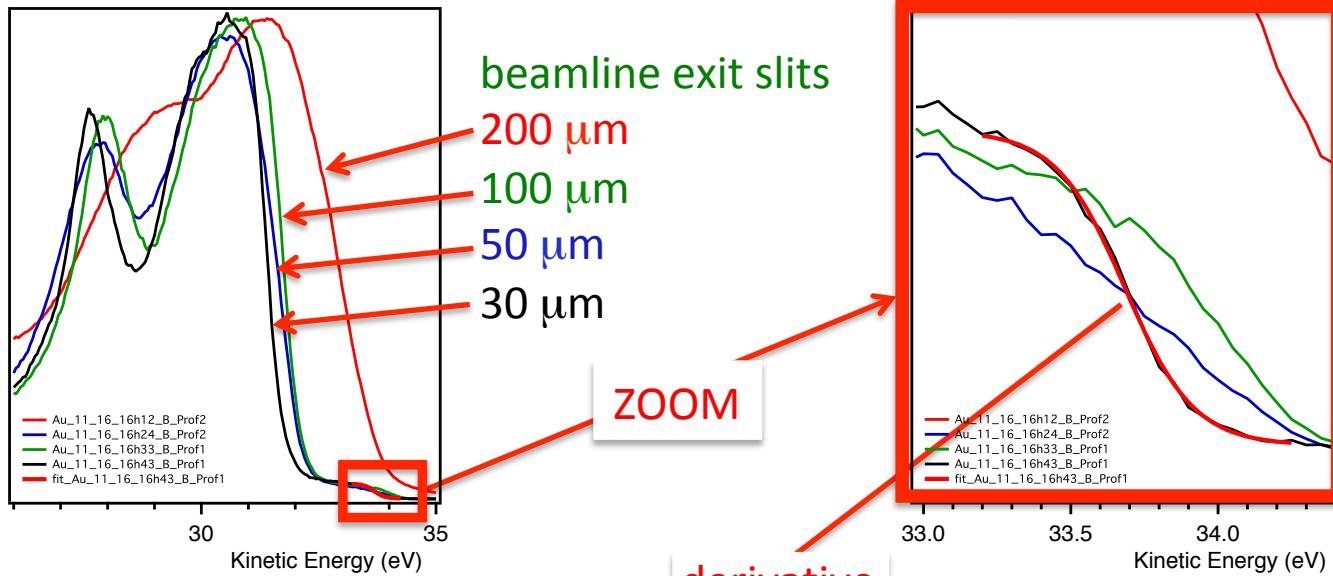


with grating

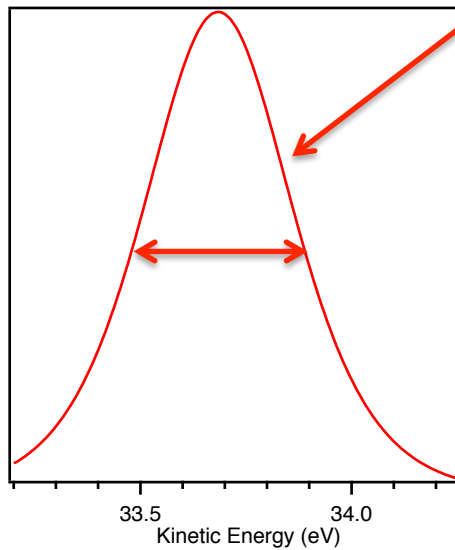


beamline characterisation

space charge



derivative



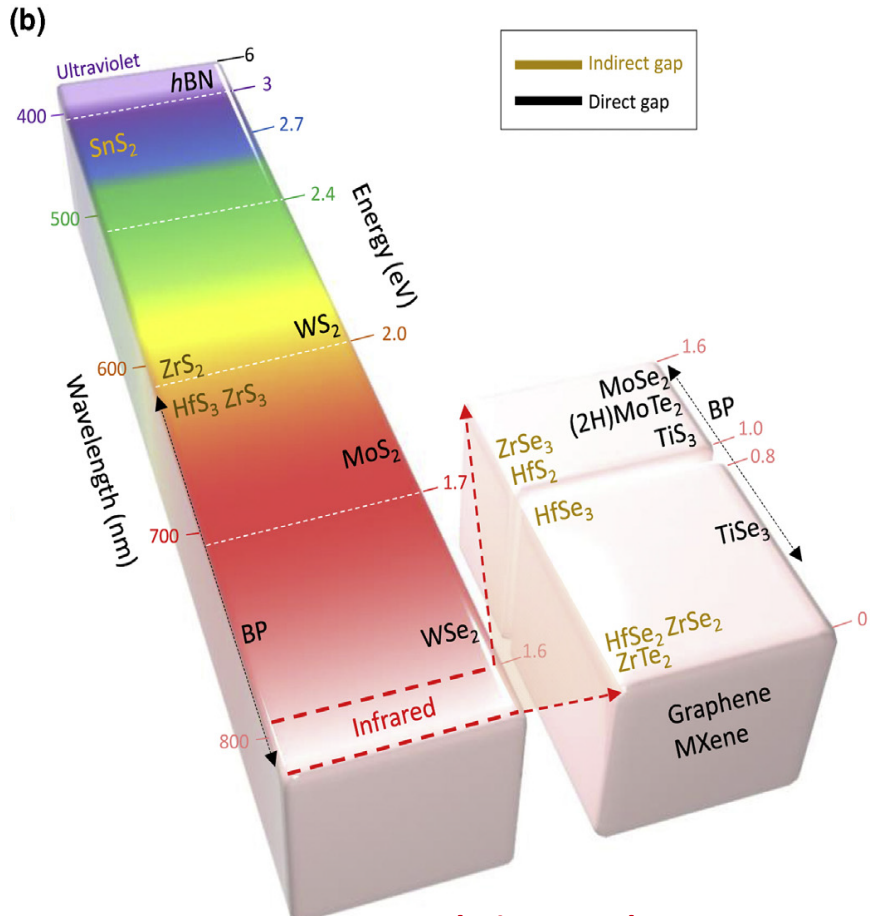
width = 400 meV
→ 270 meV
(reduction of Ar pressure)

analysis:
 $E_p = 5\text{eV}$, slit 2

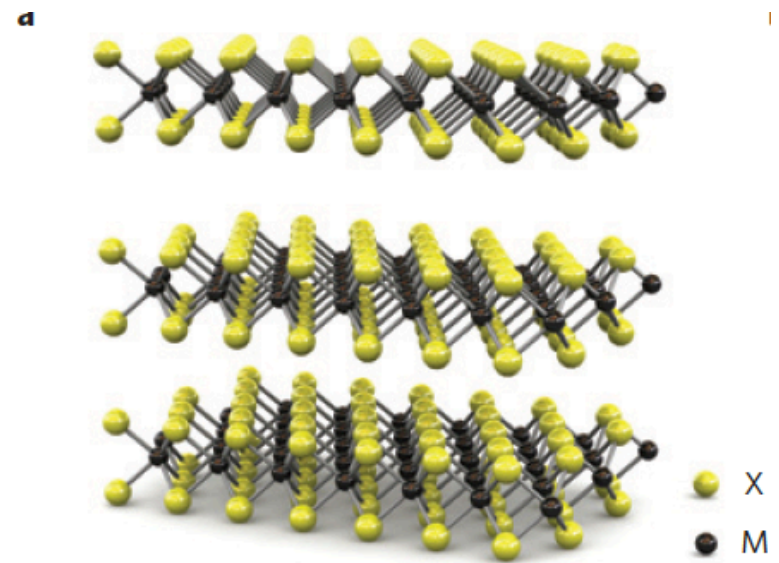
TMDC under study (Transition Metal DiChalcogenites)

General formula MX_2

$MoS_2, WSe_2, WTe_2, HfTe_2$



Choi MatToday 2017



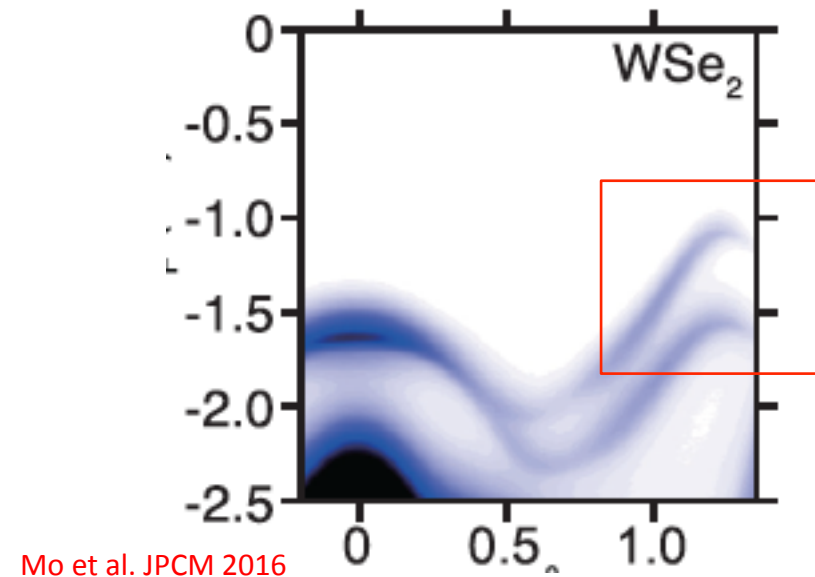
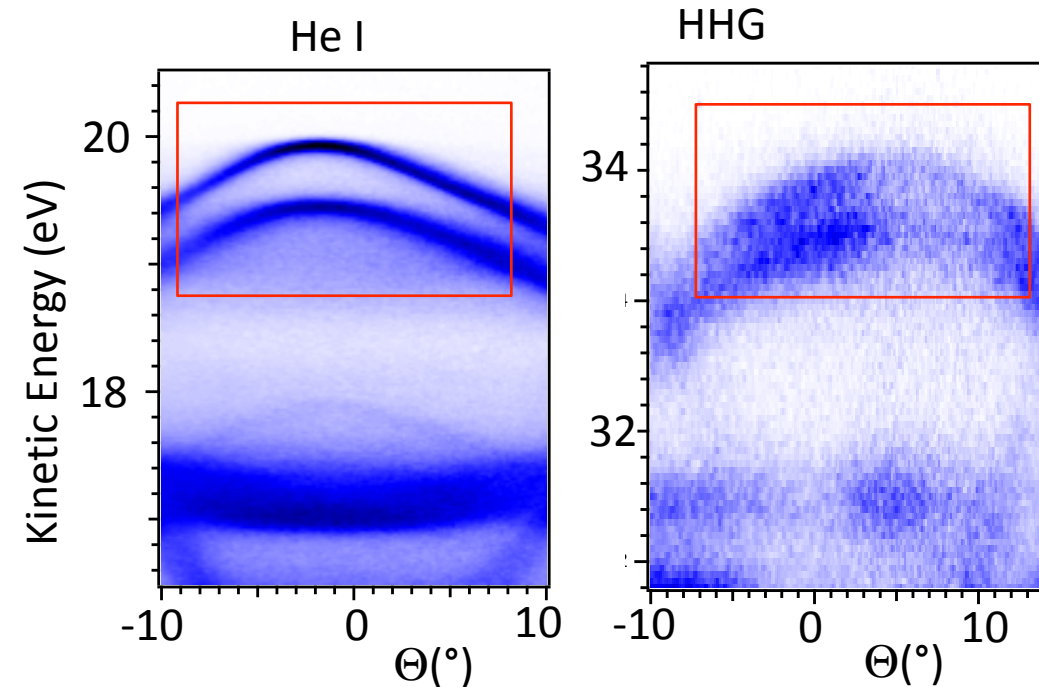
Wong ProgCrystGrCarMater 2016

TMDC under study

First ARPES tests on the FAB 10 beamline

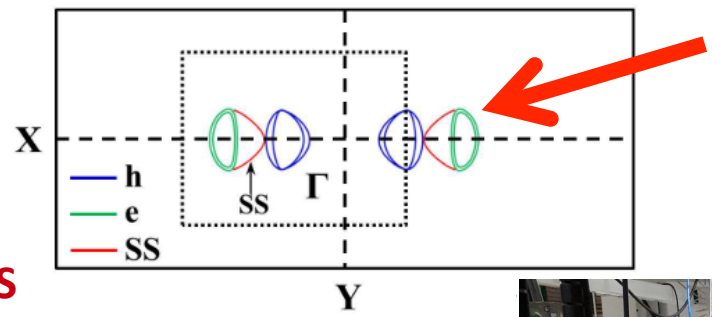
monochromator narrow band

WSe₂ crystal, cleaved under vacuum

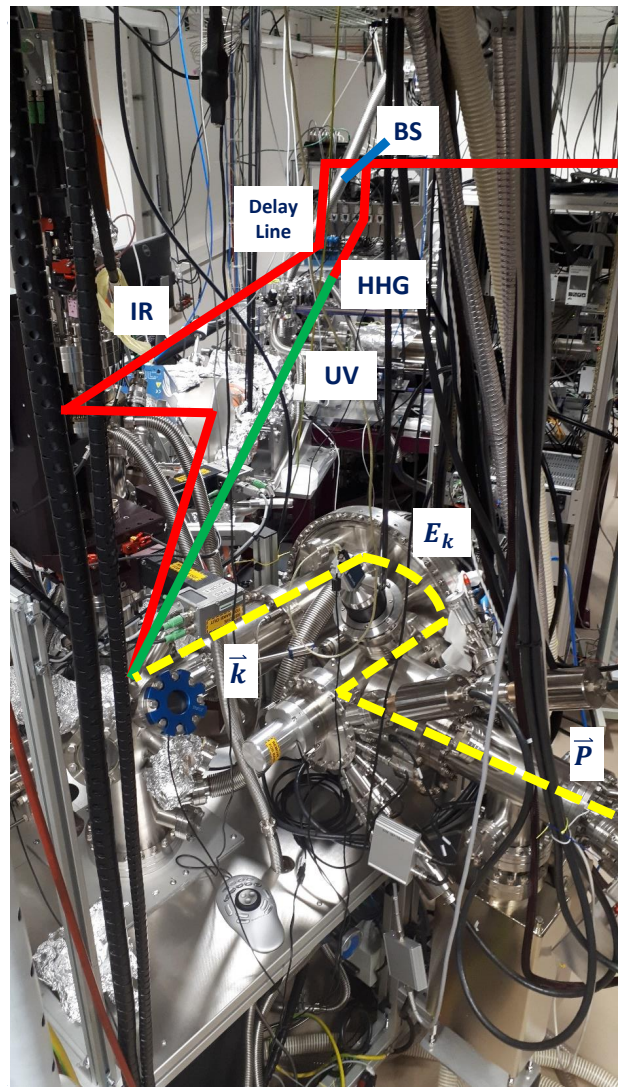
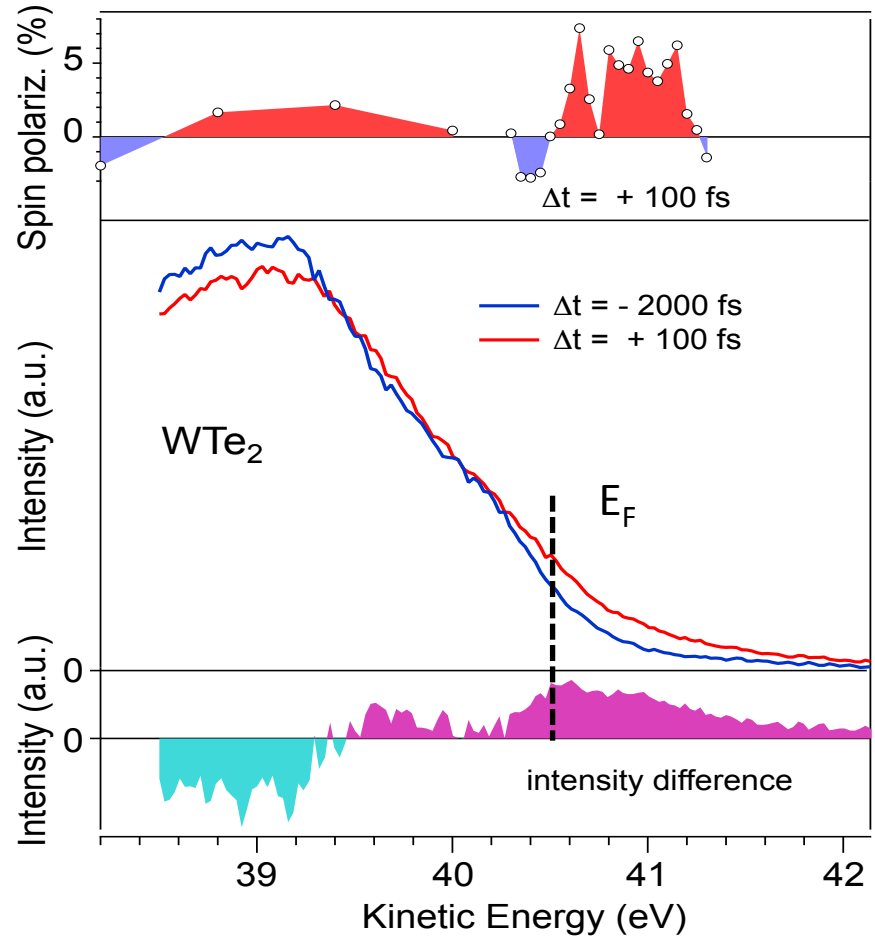


TMDC under study

ATTOLab FAB 10
time- and spin-resolved ARPES



WTe₂ crystal, cleaved



10 kHz
800 nm

the team

