

# New Instruments for Condensed Matter Physics

Presenter	Title
H. Nojiri Tohoku Univ.	XFEL and high magnetic fields -application for field induced electronic state transition and progress in spectroscopy-
A. Ikeda Univ. Tokyo	XRD study of ultrahigh field induced crystals using 100 T pulse magnet and XFEL: Status of development and prospect
H. Wadati Univ. Hyogo	Studying spin dynamics in SACLA
Y. Kubota SACLA	Instrument updates for condensed matter physics at SACLA

## Sample Environment

Magnetic Field  
Temperature  
Pressure  
Electric Field  
Photo Excitation  
Gas Absorption

X

## Materials

Magnetic compounds  
Superconductors  
Molecules  
Semiconductors  
Metals

X

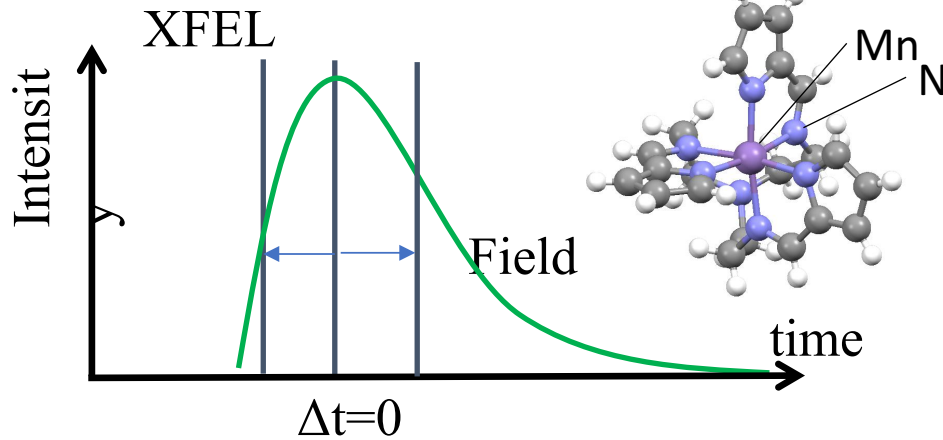
## SACLA

Beam focus  
Coherence  
Energy dispersion  
Time resolution  
Stability  
Stuffs  
Software

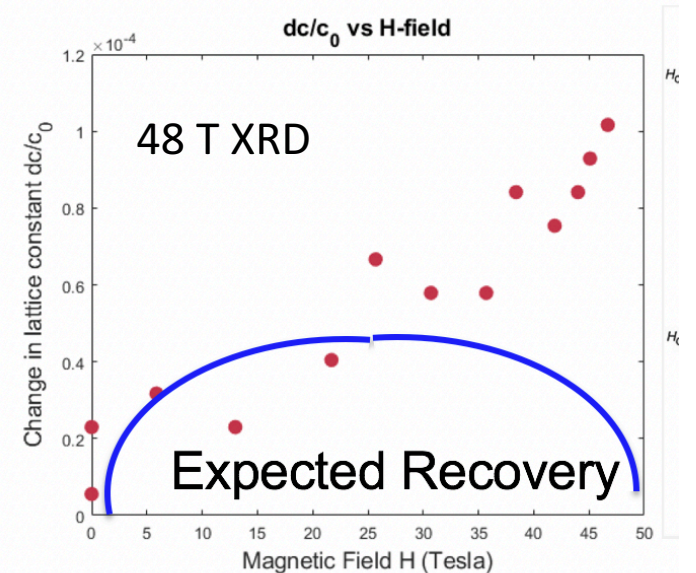
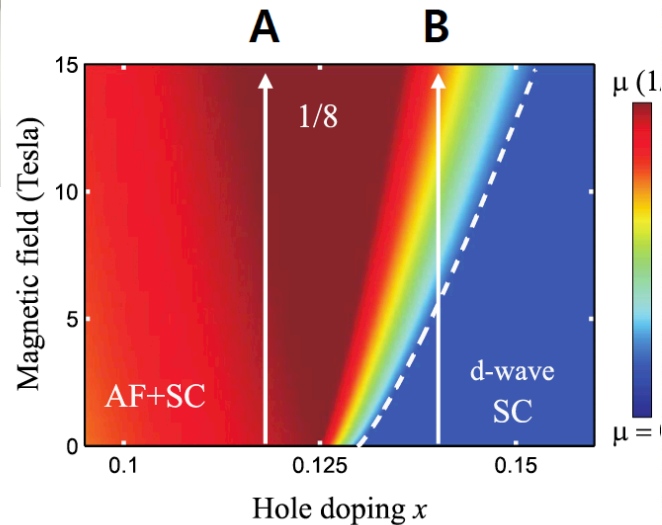
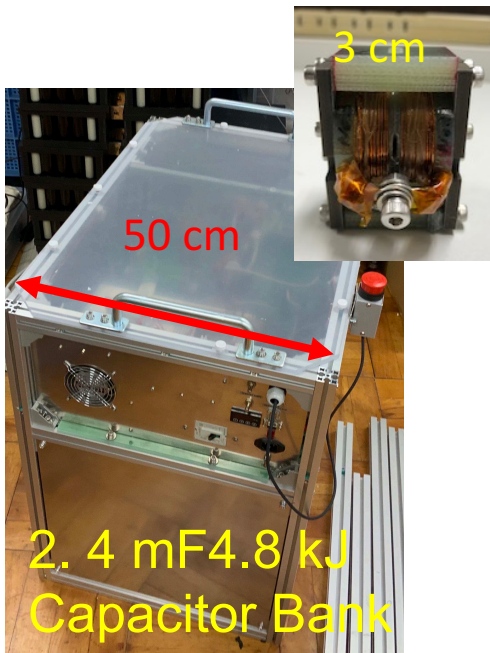
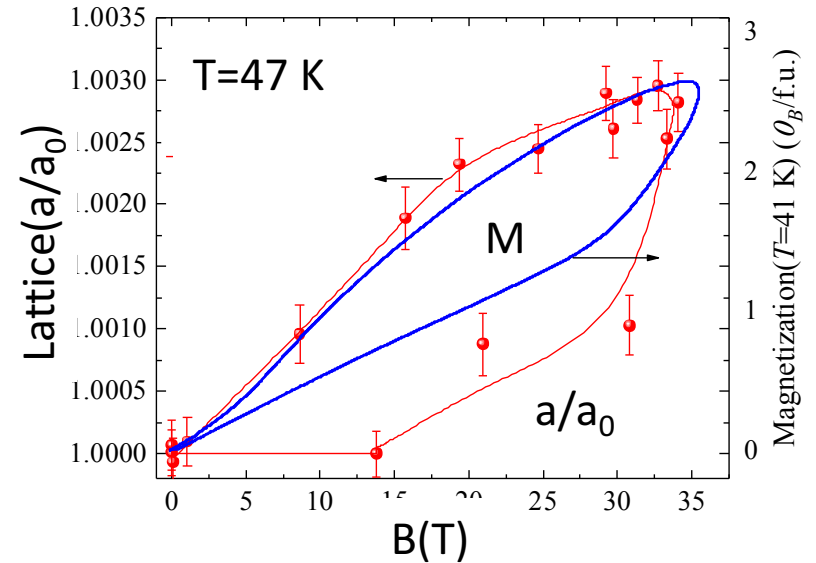
# XRD and XES in Pulsed Fields

H. Nojiri, Tohoku

Snap Shot XRD in Field Induced Spin Crossover Transition

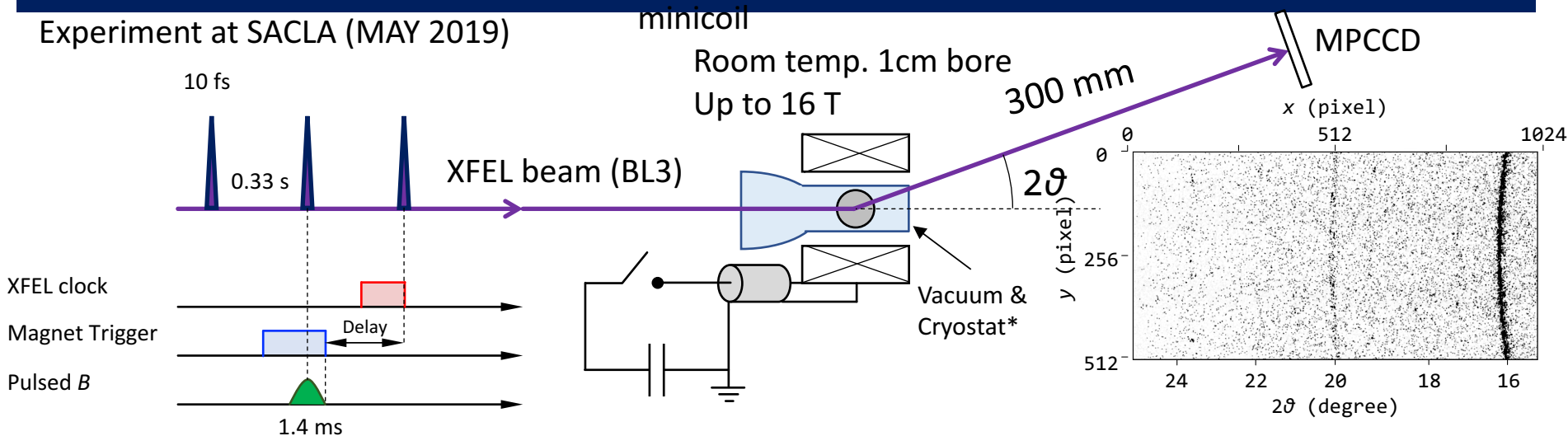


Field-Dependence

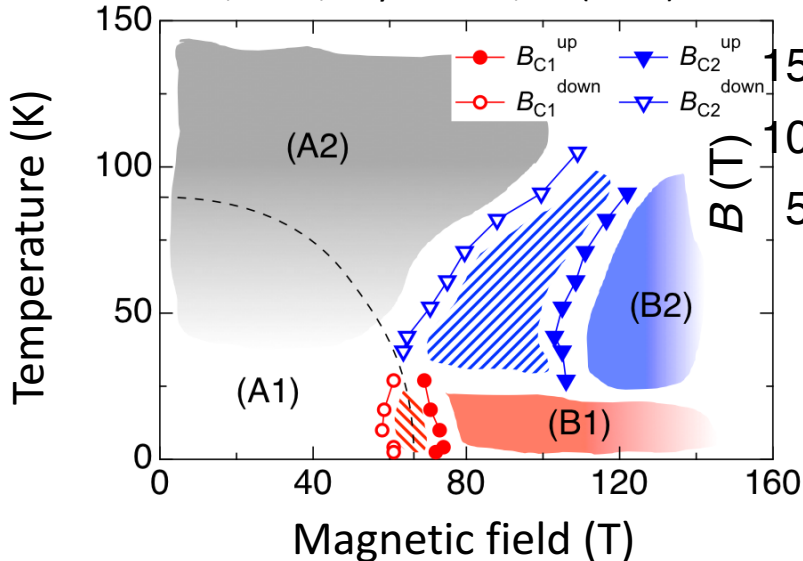


# 100 T XRD for Magnetic field induced phase transition

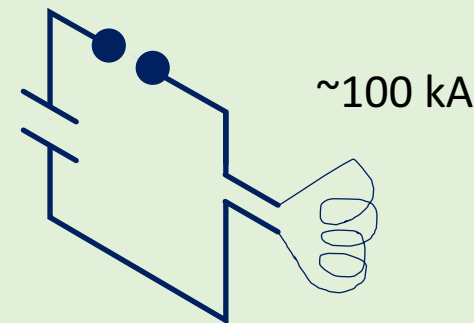
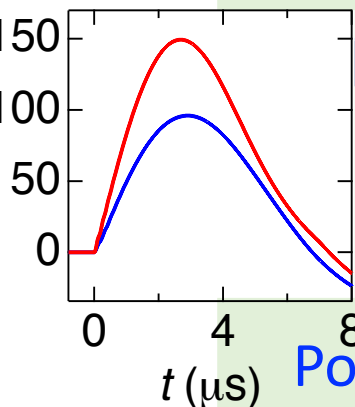
Experiment at SACLA (MAY 2019)



A. Ikeda, et al., Phys. Rev. B, **93** (2016) 220401(R).



A capacitor bank 5 kJ at 30 kV  
+ a gap switch



Portable single turn system  
~1tons (under design)

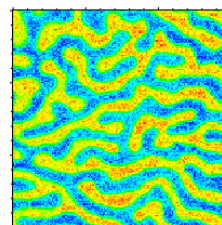
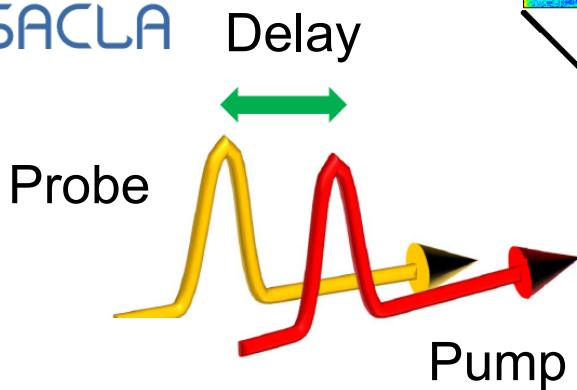
A. Ikeda, ISSP

# Studying spin dynamics in SACLA

H. Wadati, Hyogo

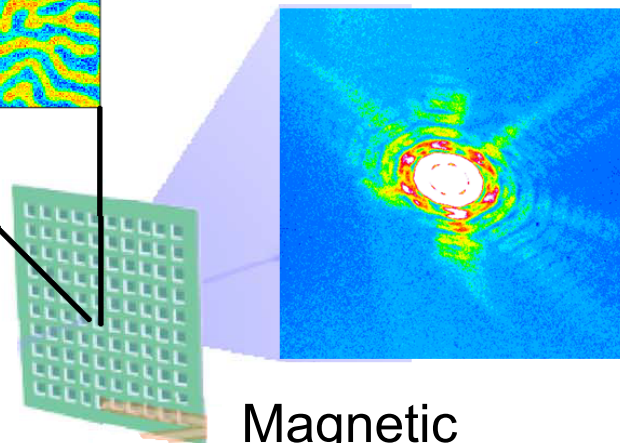
Coherent diffraction imaging (CDI):

- Probe:  
SACLA, SPring-8,  
Laboratory laser
- Pump:  
1 - 2 eV, (THz...)



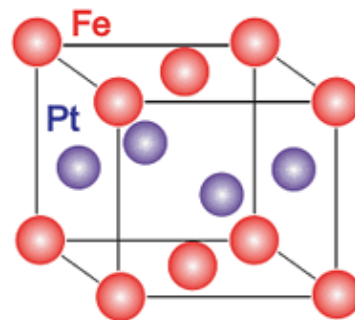
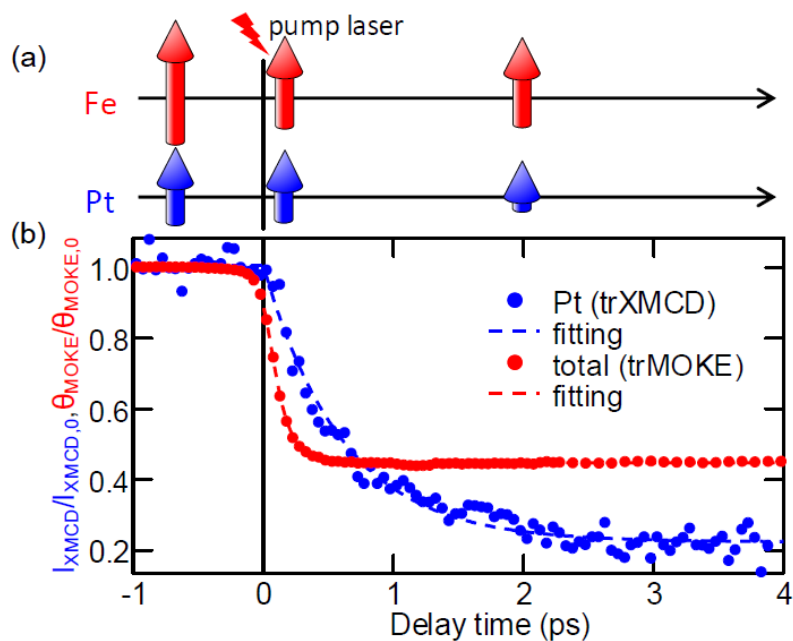
Magnetic domains

Diffraction pattern



Magnetic thin films

## Time-resolved XMCD



# Beam Line Updates

## BL1

- Experimental station for soft-XFEL opto-spintronics (SACLA Basic Development Program) **presented by Y. Hirata**
- **Under development of a nano-focus system for spintronics study with Prof. I. Matsuda G and Prof. Mimura G (tr-MOKE measurements have been already operated.)**

## BL3

- THz pump laser system
  - **The basic system has been already constructed. We will continue improving.**
  - **We would like to get your feedback about the development, goal and science.**
- Cooling system for ultrafast (optical laser pump-XFEL probe) measurement
  - **The first prototype will be completed soon. (commissioning is scheduled in early 2020.)**
  - **We would like to get your feedback about the goal and science.**

Y. Kubota, SACLA

