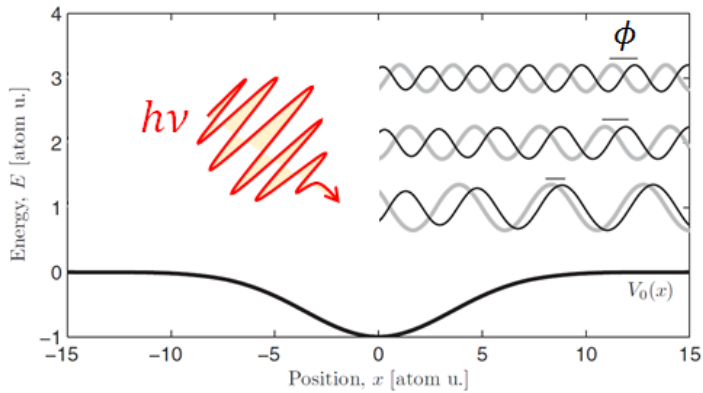


Programmes matière condensée

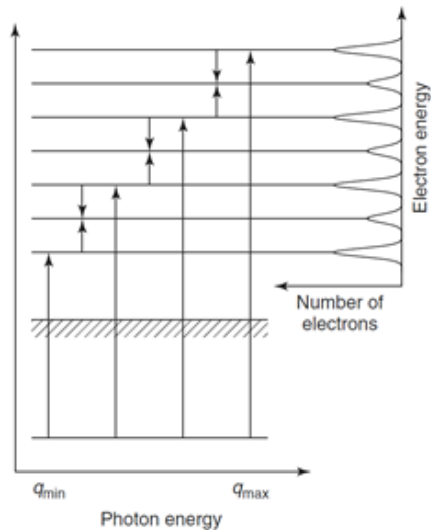
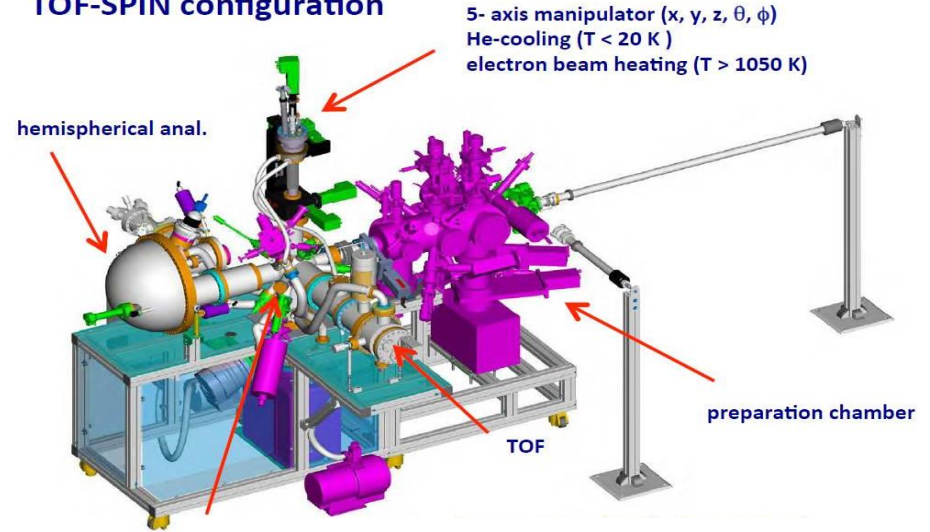
- K. Hricovini, C. Richter, O. Heckmann, ... (LPMS, U.Cergy)**
- M. Marsi, E. Papalazarou, ... (LPS, CNRS/U. Paris-Sud)**
- S. Guizard ... (LSI, X/CEA/CNRS)**
- N. Barrett, C. Mathieu, C. Lubin ... (SPEC, CEA/CNRS)**





Modified from J. M. Dahlström et al. - *J. Phys. B: At. Mol. Opt. Phys.* 45, 183001 (2012)

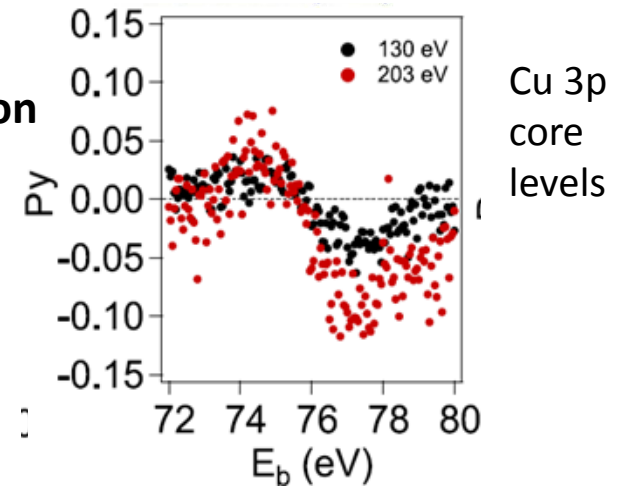
TOF-SPIN configuration



Combining spin polarization and attosecond time delay in photoemission (M. Fanciulli)

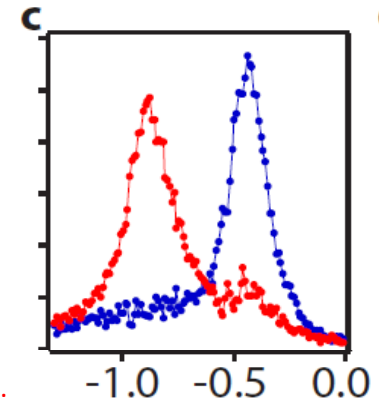
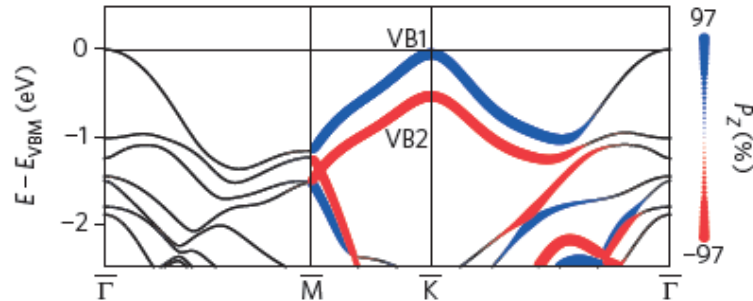
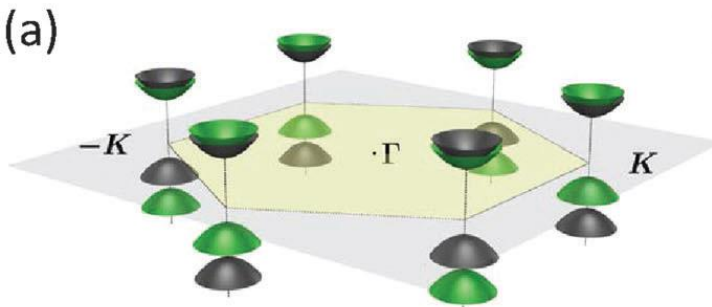
RABBITT

➡
Add spin resolution



TMDCs (WSe_2 , WTe_2 , HfTe_2) are very interesting candidates to explore their different degrees of freedom (valley pseudospin, layer pseudospin and spin).

- strong spin-orbit coupling (spin-polarization at the K point)

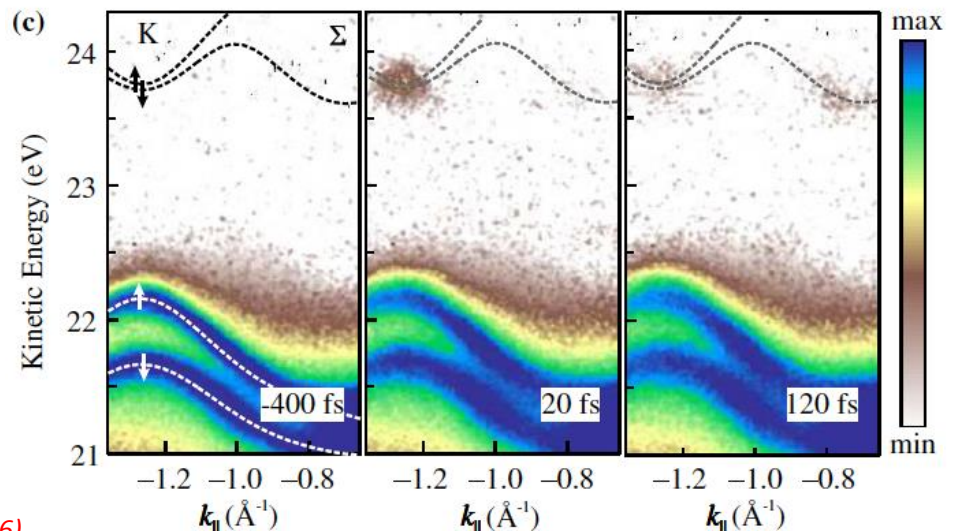


J. M. Riley et al., *Nat. Phys.*, vol. 10, no. 11, pp. 835–839, 2014.

WSe₂

- valley structure of the conduction band makes the electron dynamics particularly interesting

pump-probe experiment



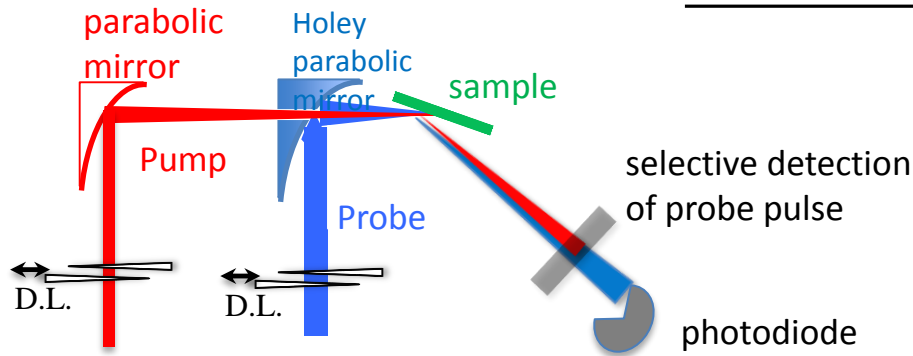
R. Bertoni et al. *PRL* 117, 277201 (2016)



TOCYDYS - *Toward Optical CYcle DYnamics in Solids*

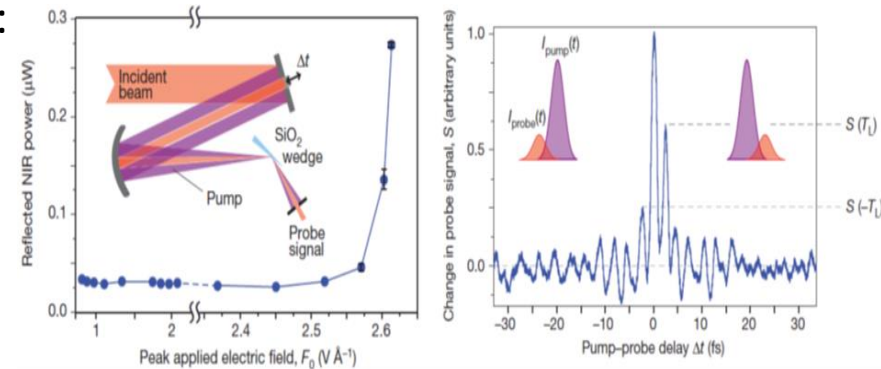
S. Guizard, LSI,

- dans le visible:



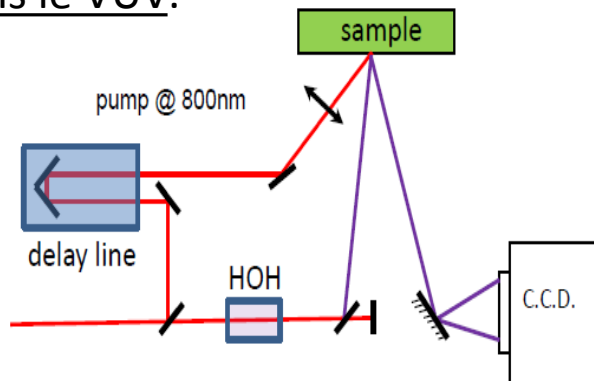
Objectif: sonder la dynamique électronique dans les solides
Méthode expérimentale: mesure pompe-sonde optique, absorption ou réflectivité dans le visible et/ou le VUV

- dans le visible:



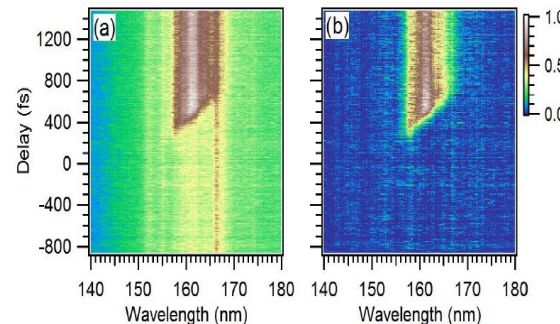
Référence: Controlling dielectrics with the electric field of light,
 M. Schultze et al, Nature 493, p.75, 2013.

- dans le VUV:



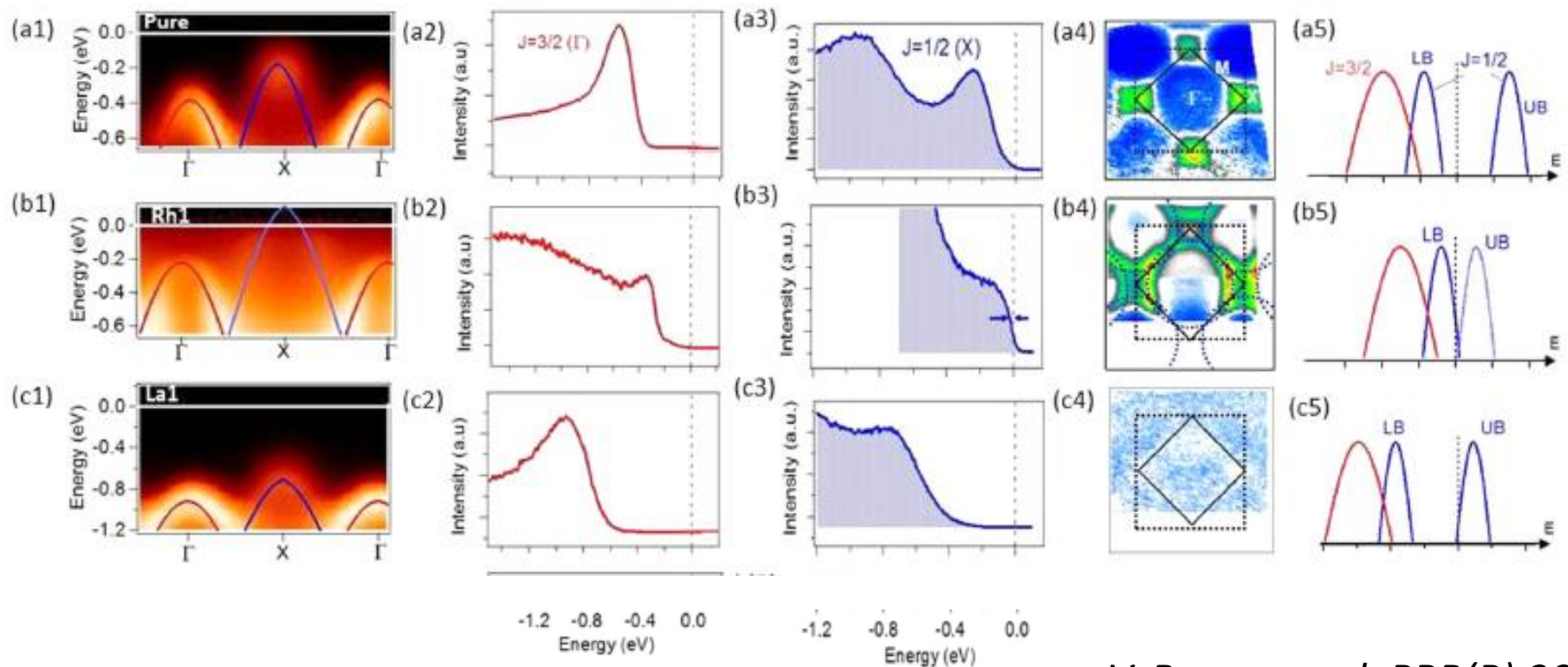
- dans le VUV:

réflectivité H5 sur SiO₂: obs; directe du « chirp »

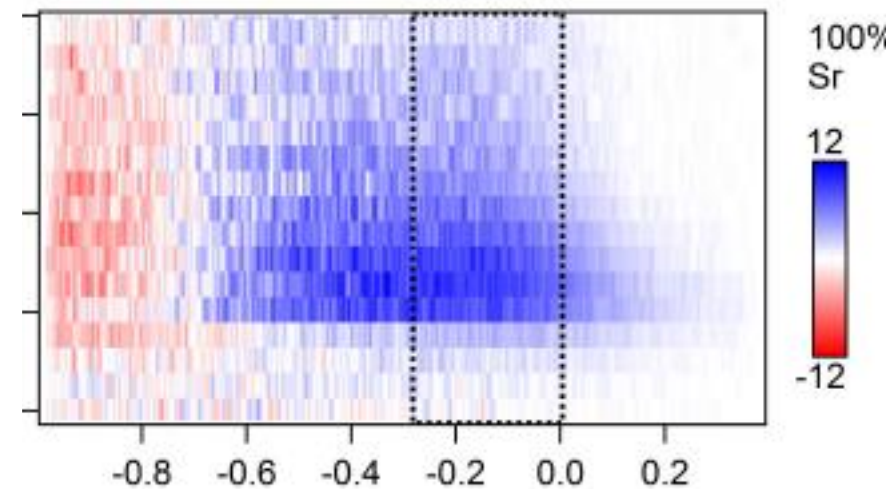
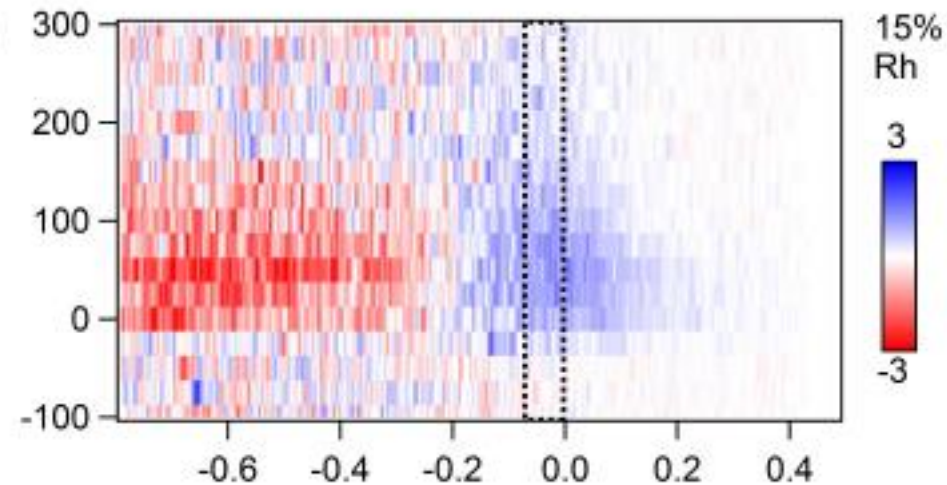


Itakura et al
 Optics Express 2017

ARPES on (La,Rh) Sr_2IrO_4 *Spin-orbit coupled Mott material*
 Hole doping (Rh), and electron doping (La)
 5d bands give different behaviour at Γ and at X



TrARPES (6 eV), *C. Piovera, L. Perfetti et al. (PRB 93, 241114(R))*



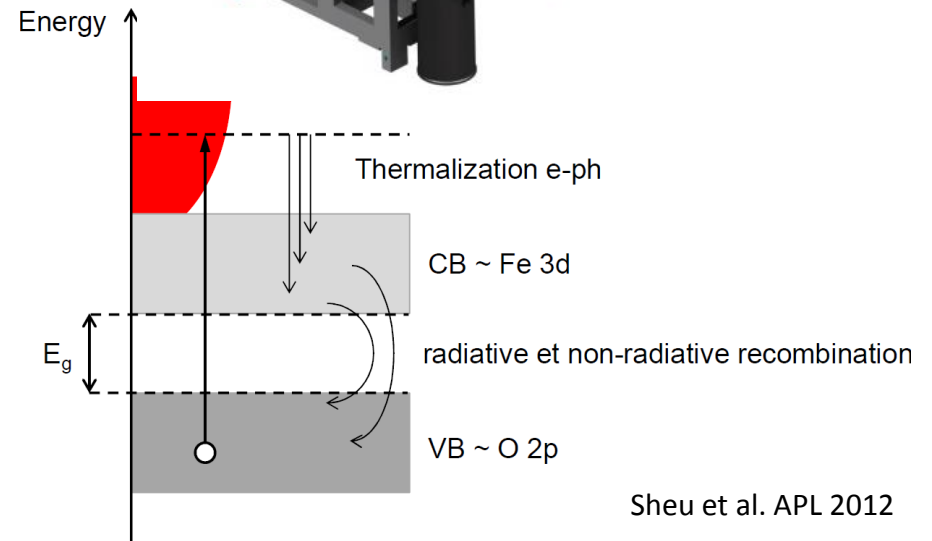
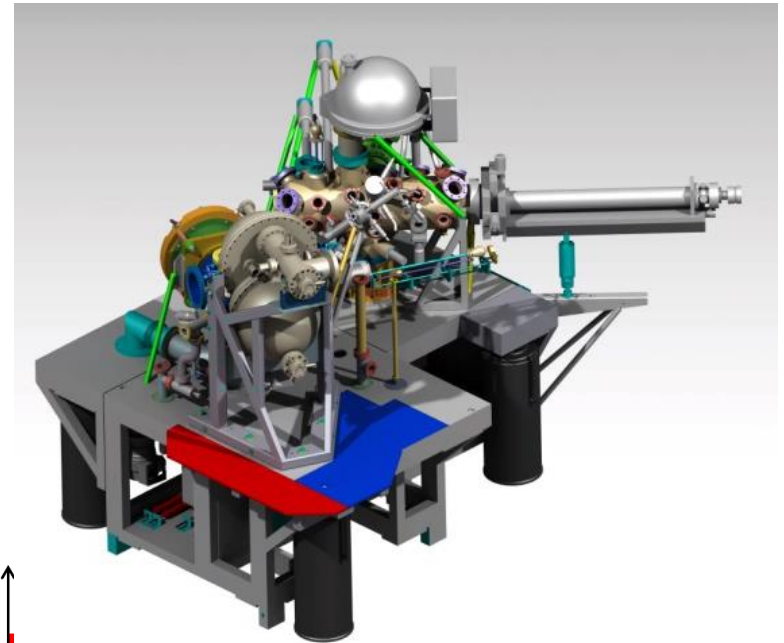
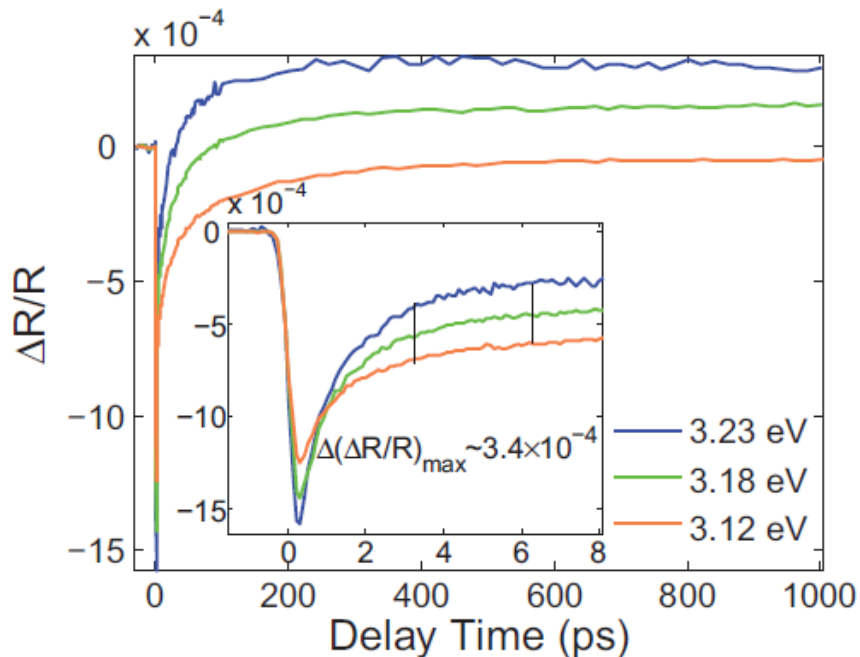
- No accumulation in upper HB (unlike for inst. UO_2)
- Similar to « small » gap systems (ex: VO_2)
- Dynamics only at Gamma

Pump-probe ARPES on (doped) Sr_2IrO_4

X-PEEM MesoXscope (N. Barrett et al.)

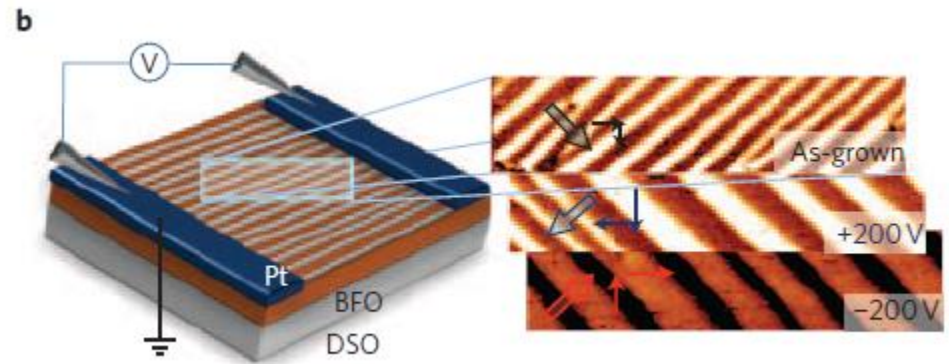
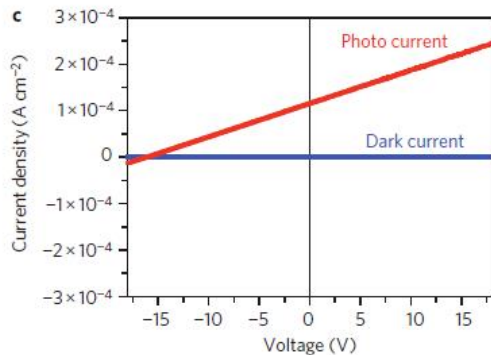
Dynamique des états excités dans BiFeO_3

Spectroscopie optique pompe-sonde



Photoferroelectricity in BiFeO_3

Domain wall ordering gives rise to above band gap OC voltages \gg Si : photovoltaic applications



Photocurrent

Pump: UV pulse (IR frequency doubled)

Probe: PEEM using HHG laser

Informations:

Separation e-h pairs at domain walls

Band bending

Switching

Pump: voltage pulse

Probe: PEEM using HHG laser

Informations:

Dynamic map of the polarization switch

