ATTOLAB : plateforme pour la dynamique ultra-rapide

lasers FAB1-FAB10

lasers Salle Noire 2.0/3.0 - FABP

- Phase gazeuse

- Phase condensée

- Plasmas

- Optiques XUV

salle blanche – CeMOX

45 permanents ~ 20 ETP

20 non perm ~ 15 ETP

Salle laser FAB1 – FAB10

SLIC : O. Tcherbakoff, J.-F. Hergott, F. Lepetit, P. d'Oliveira - A. Golinelli, X. Chen, B. Bussières

Nov 2015

Nov 2016

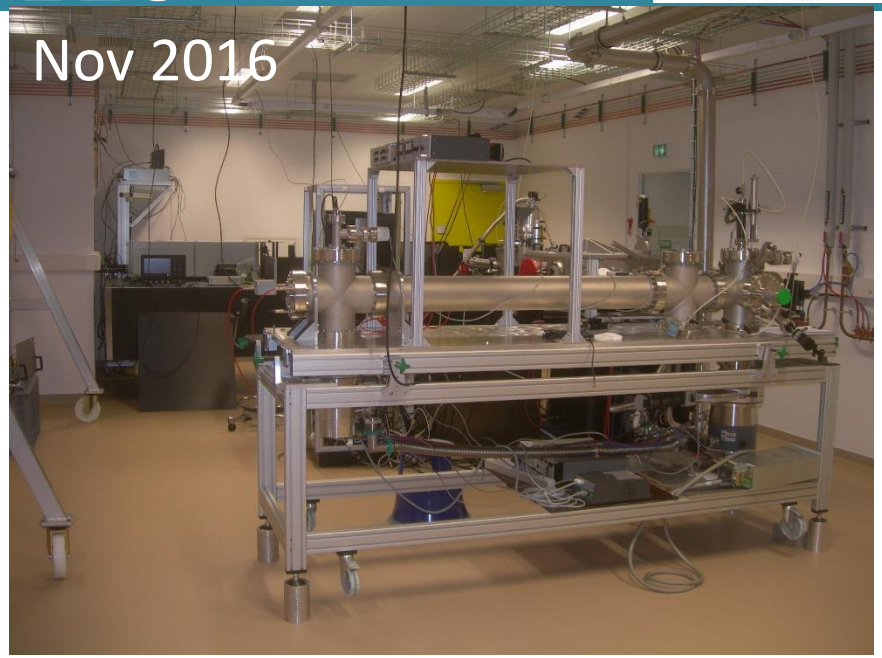
- FAB1 : 800 nm, 15 mJ, 24 fs, 1 kHz, CEP : 370 mrad tir à tir
- FAB10 : 800 nm, 2 mJ, 23 fs, 10 kHz, CEP : 260 mrad tir à tir (optimisation en cours)

SE1 – SE10

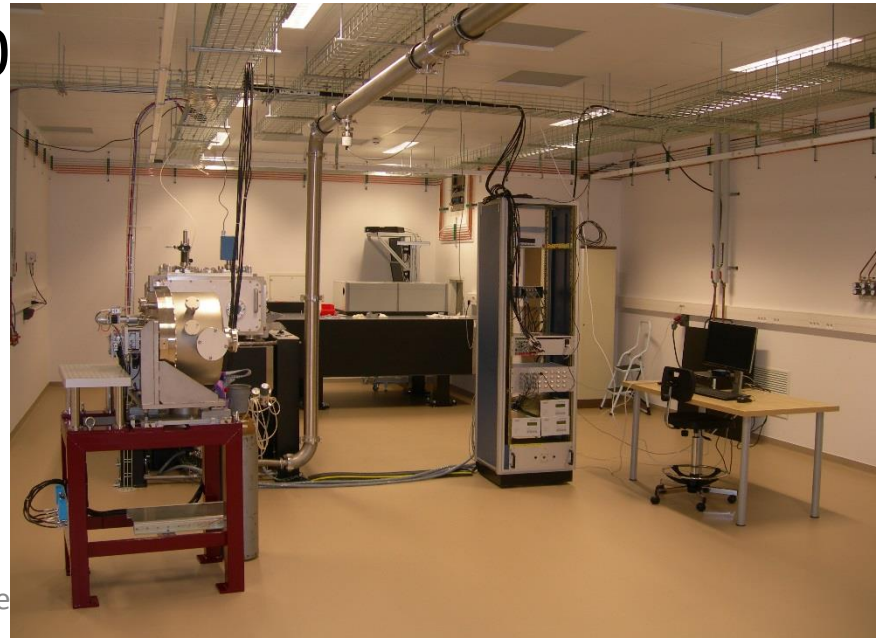
Nov 2015

SE1

Nov 2016

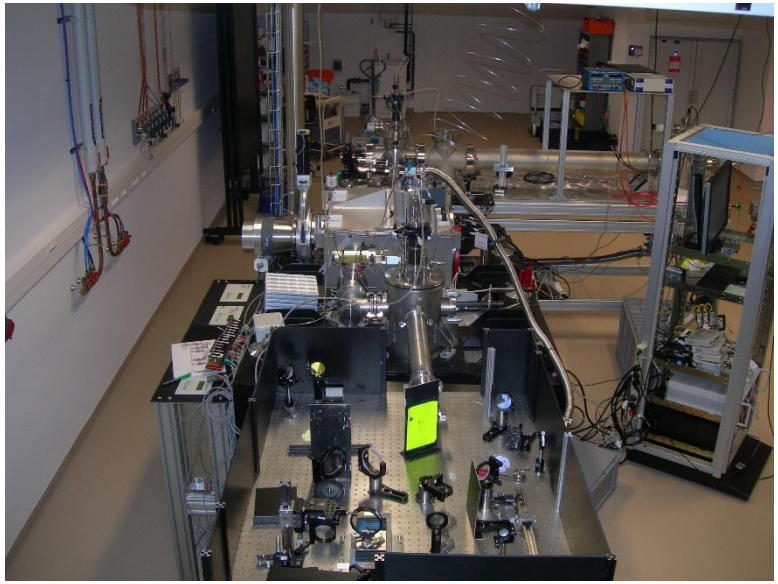


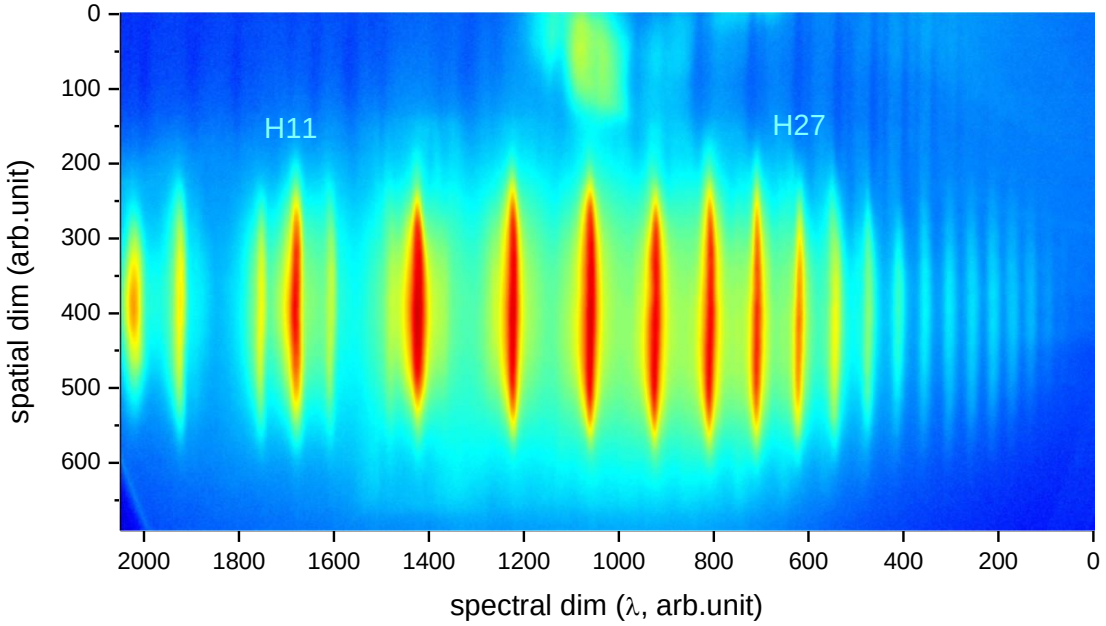
SE10

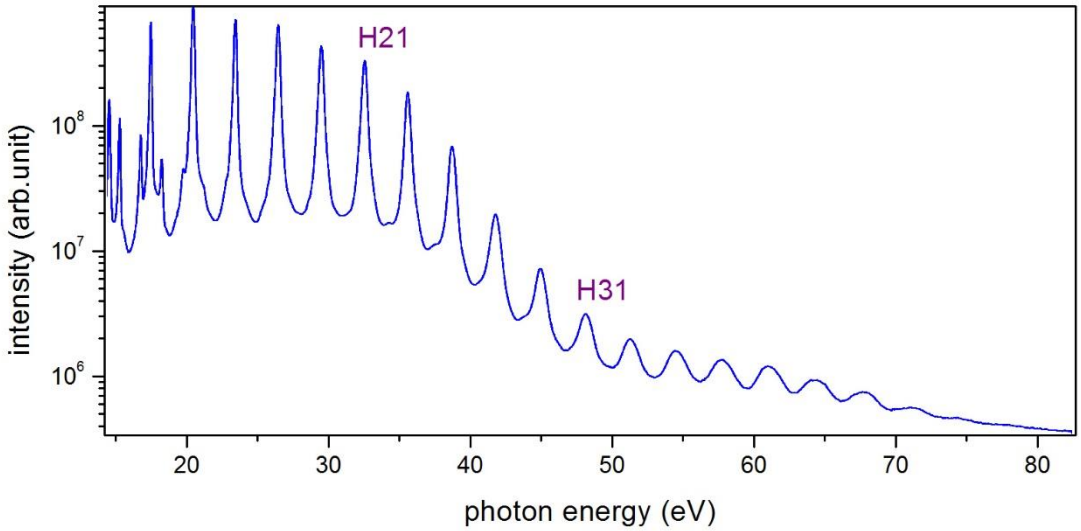


SE1: «spectroscopie de phase» en phase gazeuse

A. Borot, L. Barreau, C. Alexandridi, M. Turconi, M. Billon, G. le Chevallier, I. Vadillo-Torre, P. Salières

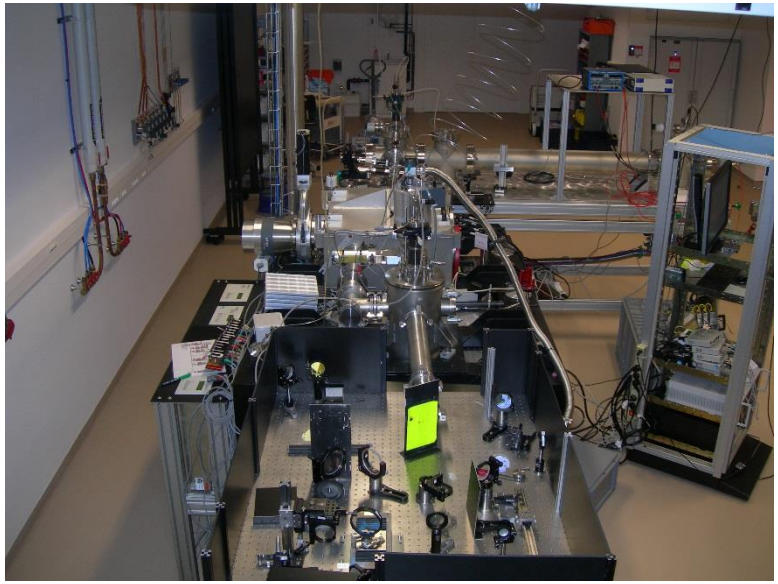


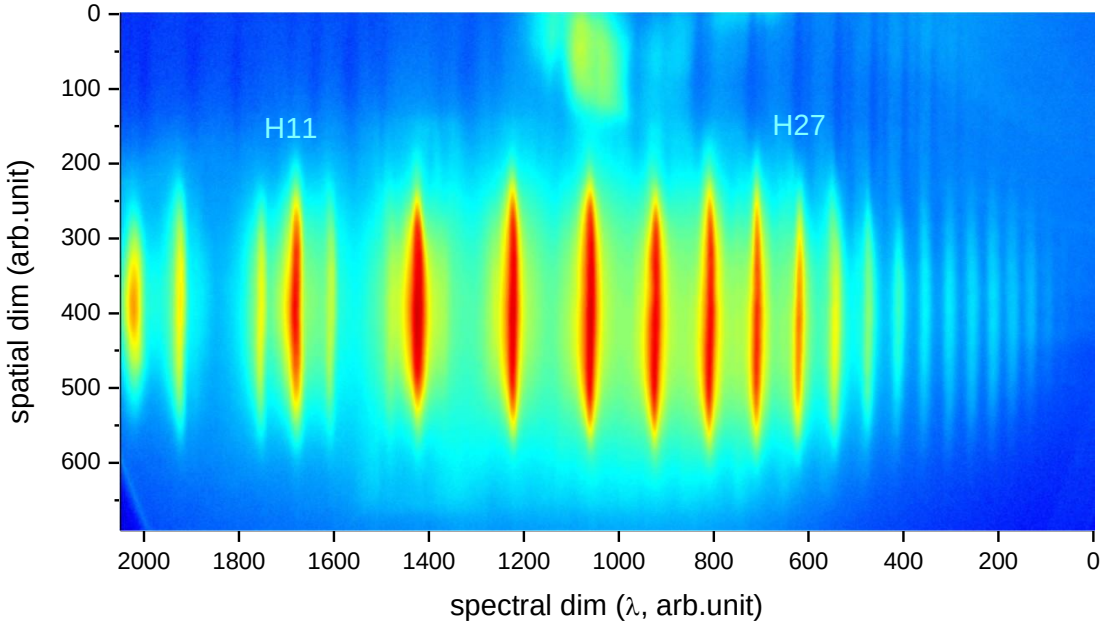


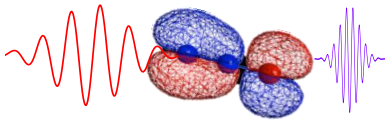
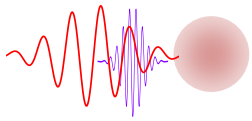
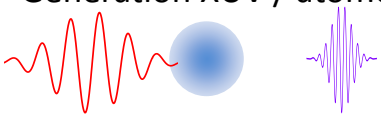
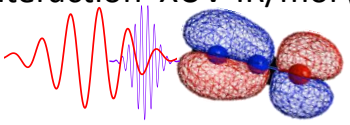


SE1: «spectroscopie de phase» en phase gazeuse

A. Borot, L. Barreau, C. Alexandridi, M. Turconi, M. Billon, G. le Chevallier, I. Vadillo-Torre, P. Salières

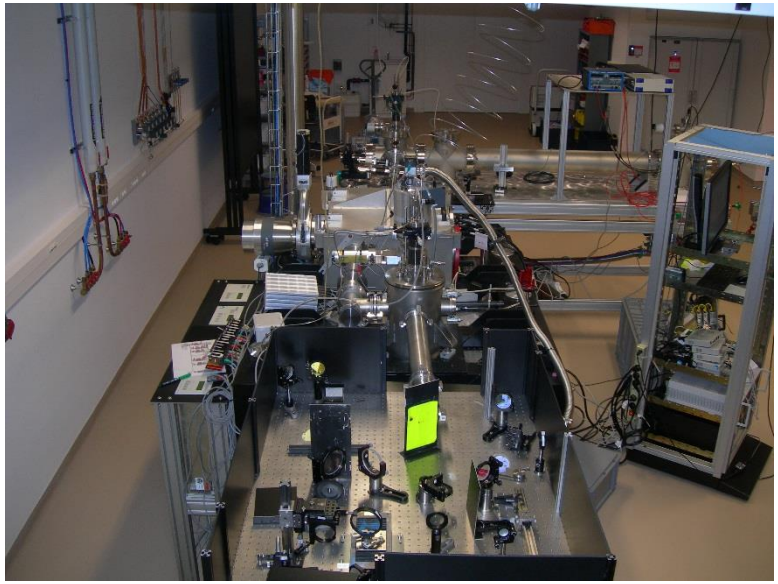


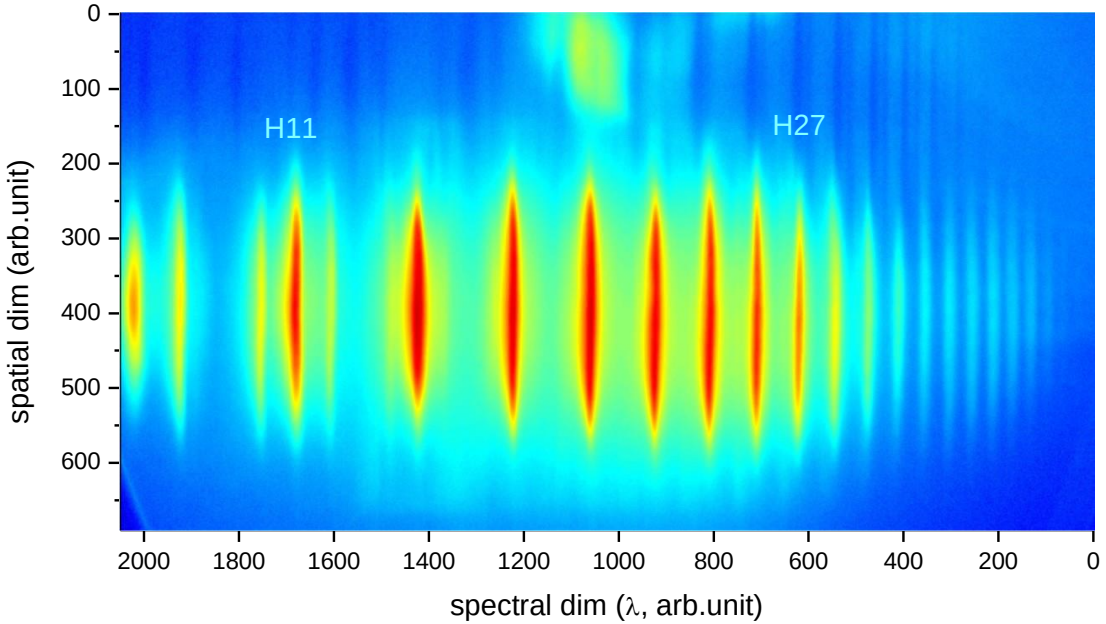


Spectroscopie harmonique	Interaction IR-mol / Gén. XUV 	caract. XUV (phase spectrale, polarisation) 
Spectroscopie « RABBIT »	Génération XUV / atome 	Interaction XUV-IR/mol (phase Observable) 

SE1: «spectroscopie de phase» en phase gazeuse

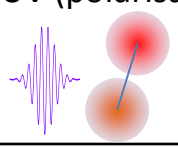
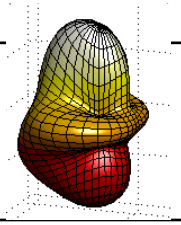
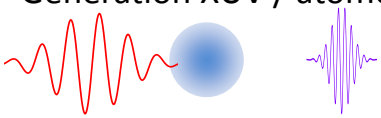
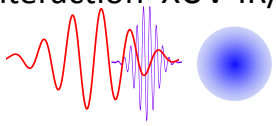
A. Borot, L. Barreau, C. Alexandridi, M. Turconi, M. Billon, G. le Chevallier, I. Vadillo-Torre, P. Salières





Molecular frame photoemission: a sensitive probe of the complete polarization state of XUV ionizing light applied to elliptical high-order harmonic emission

K. Veyrinas, V. Gruson, S. J. Weber, L. Barreau, T. Ruchon, J.-F. Hergott, J.-C. Houver, R. R. Lucchese, P. Salières, and D. Dowek, Faraday Discussion 2016

Spectroscopie harmonique	Interaction IR-mol / Gén. XUV 	caract. XUV (polarisation)  MFPAD 
Spectroscopie « RABBIT »	Génération XUV / atome 	Interaction XUV-IR/mol (phase Observable) 

Attosecond dynamics through a Fano resonance: Monitoring the birth of a resonant photoelectron wave packet

V. Gruson, L. Barreau, À. Jiménez-Galan, F. Risoud, J. Caillat, A. Maquet, B. Carré, F. Lepetit, J-F. Hergott, T. Ruchon, L. Argenti, R. Taïeb, F. Martín, P. Salières

Science 354, 734 (2016) DOI: 10.1126/science.aah5188

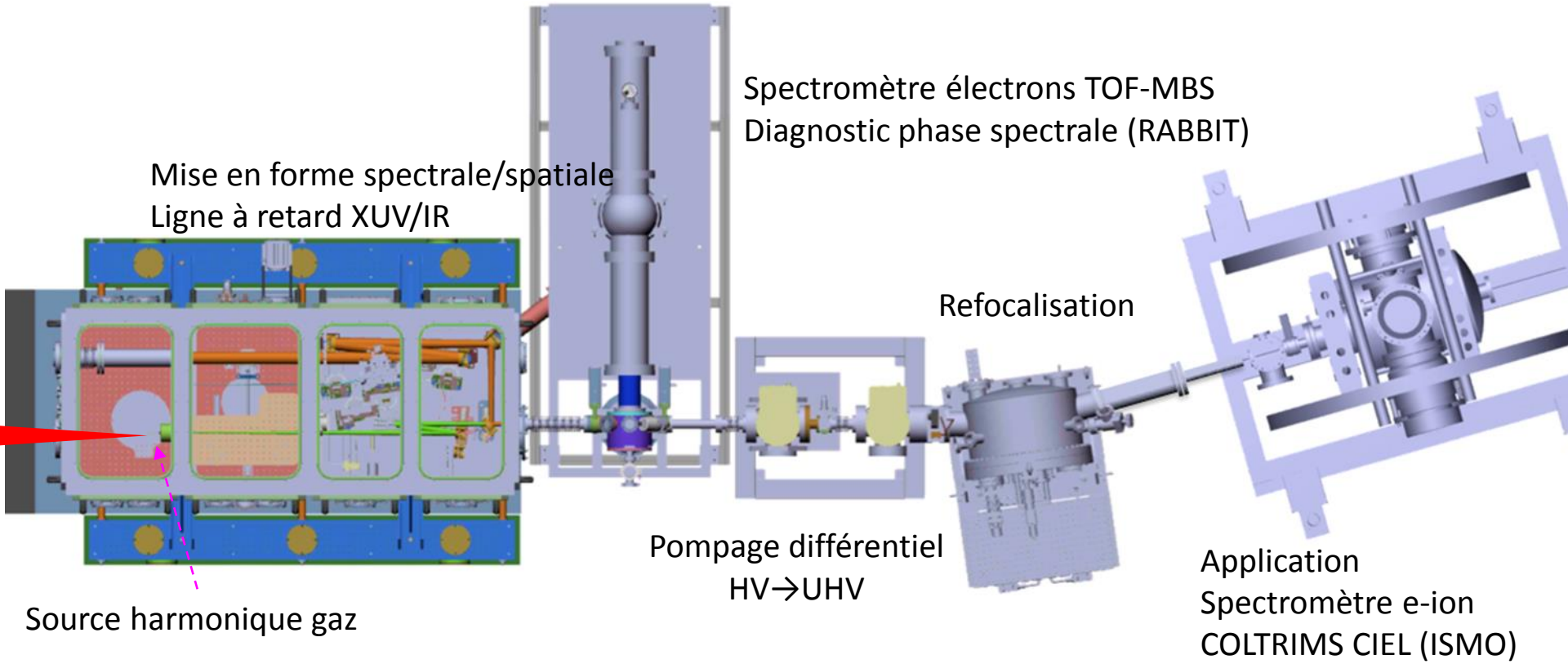
SE10 : «pompe-sonde multiéchelle » 100 as – 10 fs

OPT2X : C. Spezzani, J. Lenfant

SOLEIL D. Dennetière, F. Polack, L. Nahon

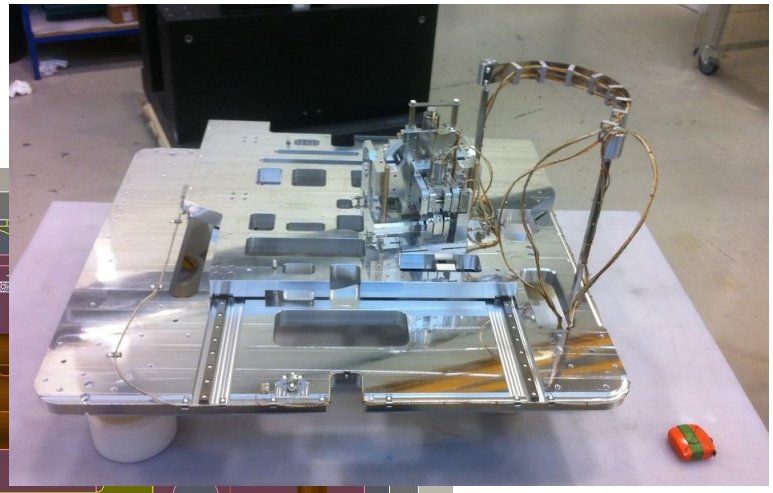
LCF M. Dehlinger, S. de Rossi, F. Delmotte

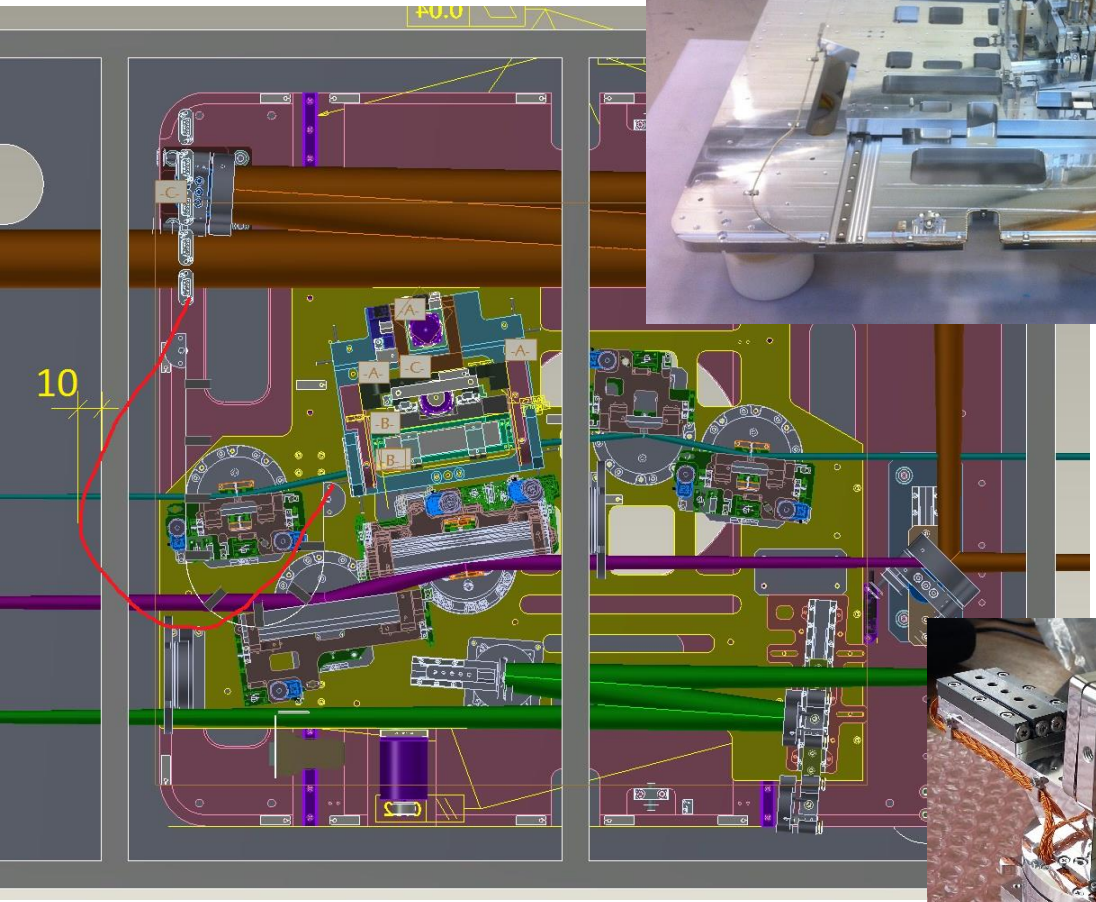
ATTO : M. Billon, G. le Chevallier, I. Vadillo-Torre, M. Bougeard, A. Fillon, S. Foucquart, C. Chappuis, T. Ruchon



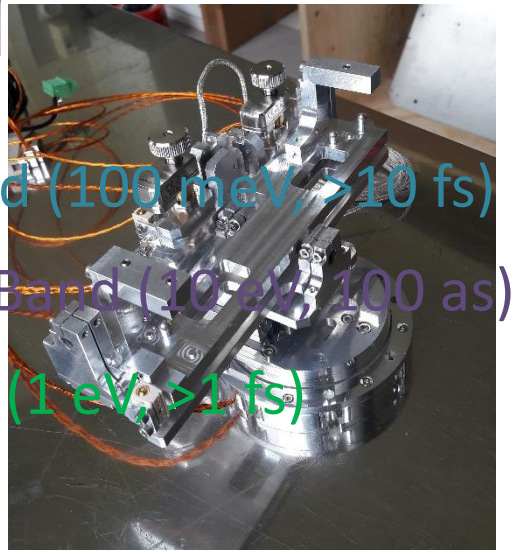
SE10 –OPT2X : sélection spectrale multiéchelle

« Narrow band »
(100 meV, >10 fs)
réseaux





« Very broad band »
(10 eV, 100 as)
M toriques



NarrowBand (100 meV, >10 fs)

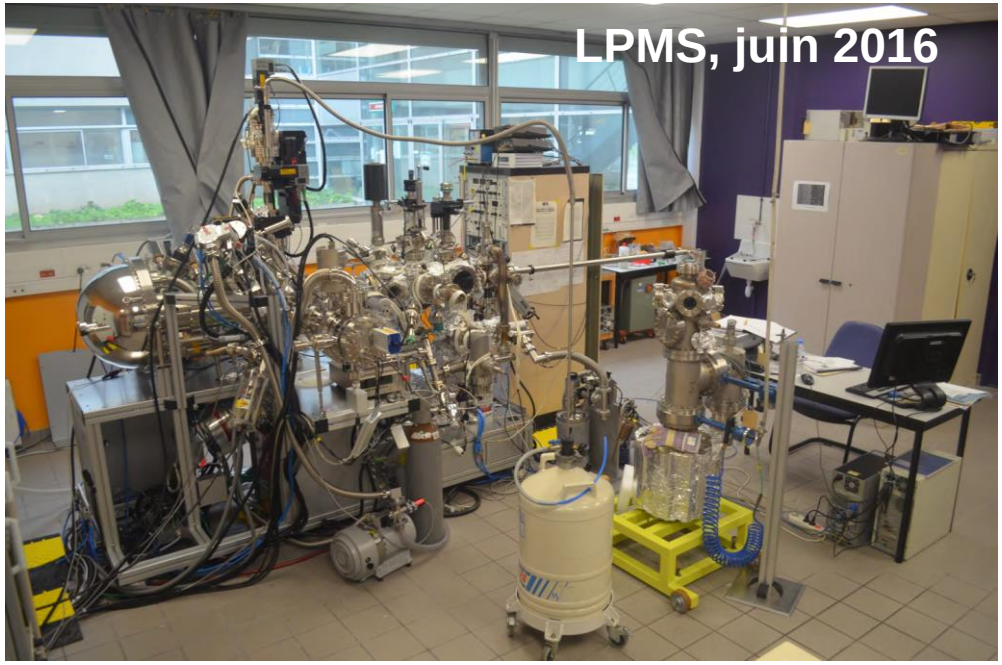
Very BroadBand (10 eV, 100 as)

and (1 eV, >1 fs)

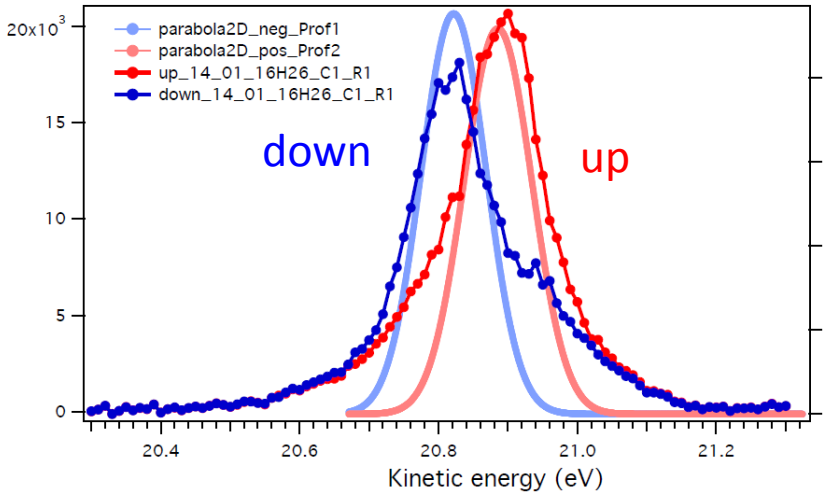
« Broad band » (& Very BB)
(1 eV, > 1 fs)
M multicouches

Solide : TOF-Spin spectromètre résolu en spin

LPMS : M. C. Richter, O. Heckmann, L. Nicolaï, K. Hricovini



commissioning: Au(111)



CLF – ARTEMIS

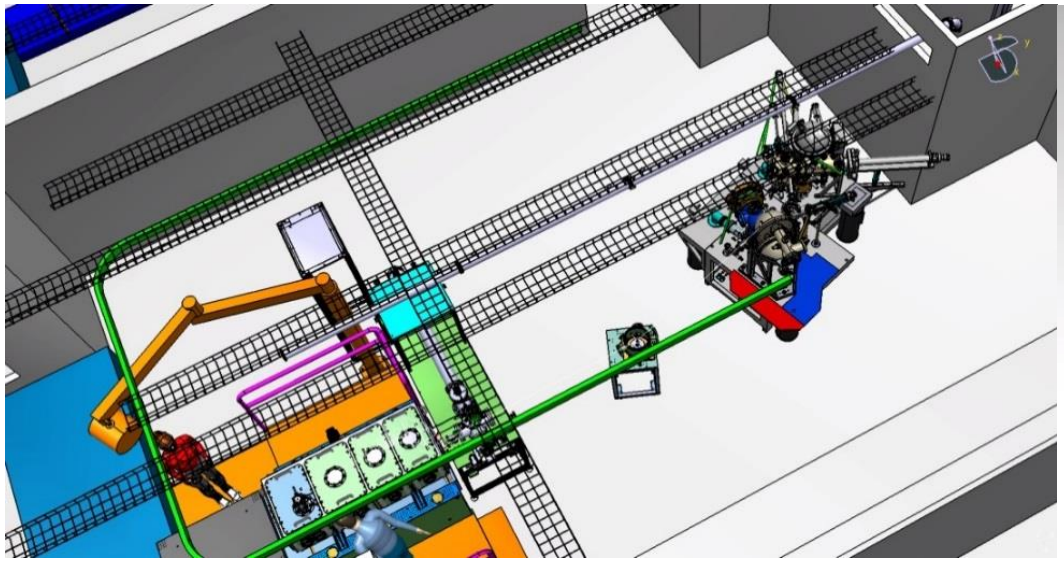
Momentum-Resolved Spin Dynamics of Bulk and Surface Excited States in the Topological Insulator Bi_2Se_3

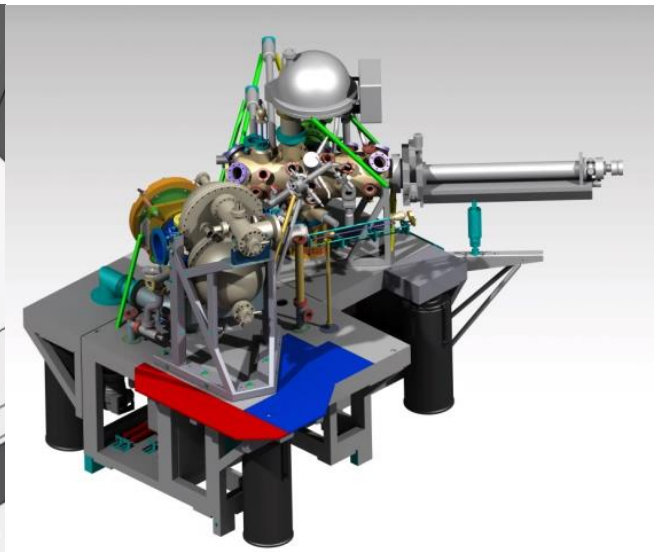
C. Cacho, A. Crepaldi, M. Battiato, J. Braun, F. Cilento, M. Zacchigna, M. C. Richter, O. Heckmann, E. Springate, Y. Liu, S. S. Dhesi, H. Berger, Ph. Bugnon, K. Held, M. Grioni, H. Ebert, K. Hricovini, J. Minár, F. Parmigiani

Phys. Rev. Lett. 114, 097401 (2015)

solide : X-PEEM MesoXcope

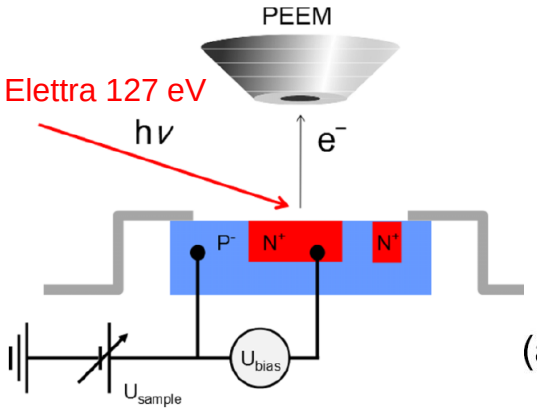
LENSIS : C. Mathieu, N. Barrett

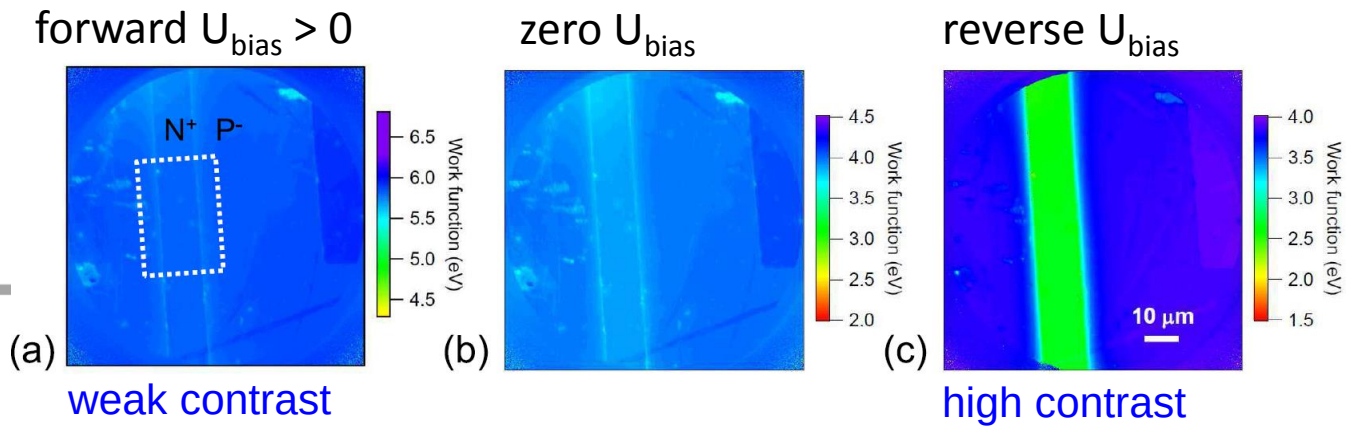




Operando x-ray photoelectron emission microscopy for studying forward and reverse biased silicon p-n junctions

N. Barrett, D. M. Gottlob, C. Mathieu, C. Lubin, J. Passicousset, O. Renault and E. Martinez, Rev Sci Instrum 87, 053703 (2016)





solide : FASTMAP

UltraFAST (fs) Band MAPping of Complex Materials (Oxides) - ARPES

LUCE (Lumière Ultrabrève, Cohérence et Electrons): E. Papalazarou, N. Moisan, M. Marsi

ALS - LCLS

Ultrafast evolution and transient phases of a prototype out-of-equilibrium Mott-Hubbard material

G. Lantz, B. Mansart, D. Grieger, D. Boschetto, N. Nilforoushan, E. Papalazarou, N. Moisan, L. Perfetti, V. L. R. Jacques, D. Le Bolloch, C. Laulhé, S. Ravy, J.-P. Rue, T.E. Glover, M.P. Hertlein, Z. Hussain, S. Song, M. Chollet, M. Fabrizio, M. Marsi

Nature Comm 7, 13917 (2016)

LOA : coherent e^- dynamics in plasmas

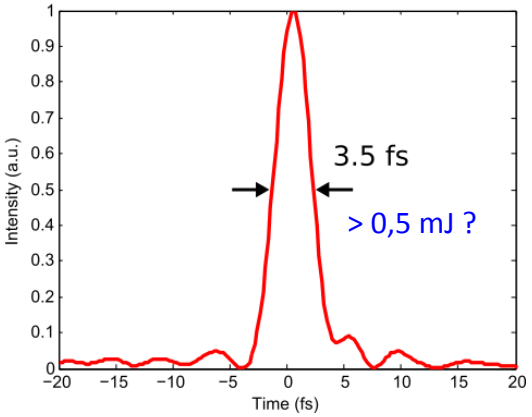
PCO : H. Jacqmin, S. Haessler, R. Lopez-Martens

Deux systèmes laser haute énergie / haut contraste temporel (financement hors ATTOLAB):

- **2016 : « Salle Noire 2.0 » : 800 nm, 10 mJ, 20 fs, contrast >10^{10}, CEP, 1 kHz → postcomp : > 3 mJ, < 4 fs**
- **2017 : « Salle Noire 3.0» : 800 nm, > 50 mJ, 20 fs, contrast >10^{11}, CEP, 1 kHz → postcomp : > 20 mJ, < 4 fs**

SN2.0

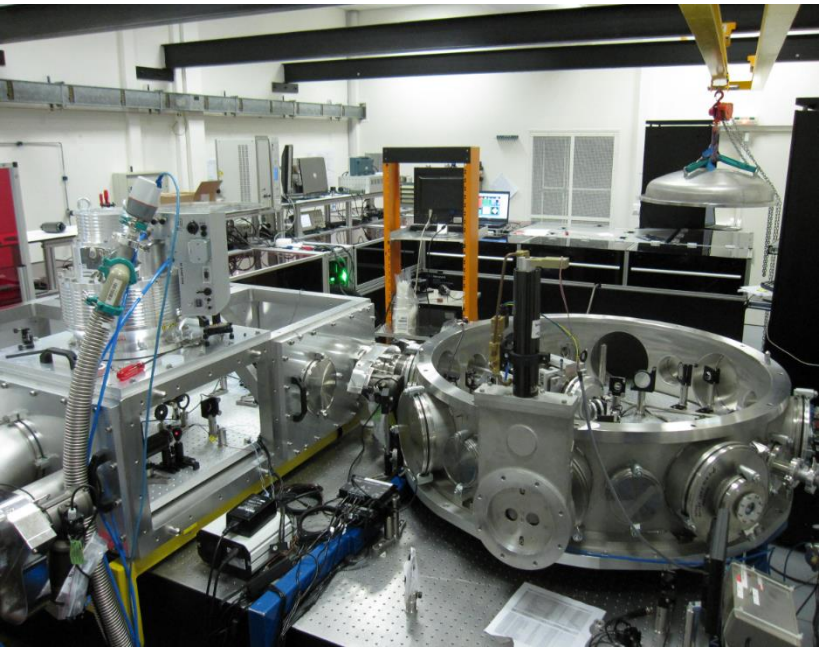
Postcompression d'impulsion dans une fibre



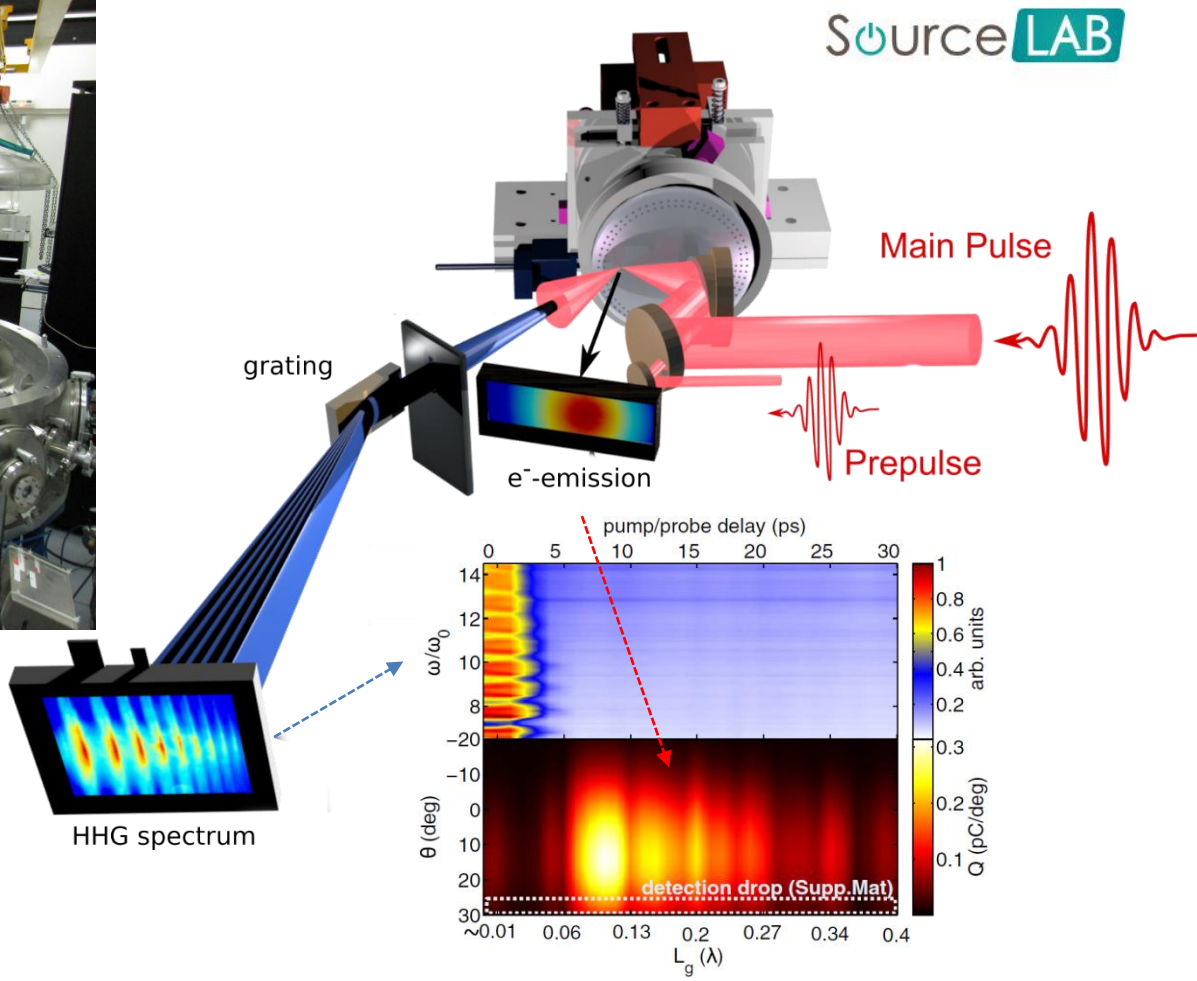
Passive coherent combining of CEP-stable few-cycle pulses from a temporally divided hollow fiber compressor
H. Jacqmin, A Jullien, B. Mercier, M. Hanna, F. Druon, D. Papadopoulos, R. Lopez-Martens, Opt Lett 40, 709 (2015)

FABP : Interaction laser-plasma (solide, gaz)

Salle Noire 2.0



- Cible solide haute précision



Anticorrelated Emission of High Harmonics and Fast Electron Beams From Plasma Mirrors

M. Bocoum, M. Thévenet, F. Böhle, B. Beaurepaire, A. Vernier, A. Jullien, J. Faure, R. Lopez-Martens

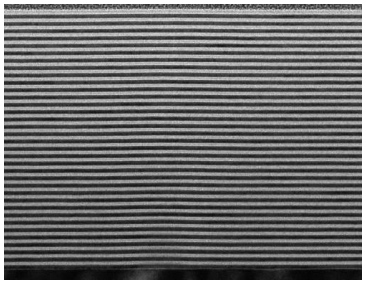
Phys. Rev. Lett. 116, 185001 (2016)

plateforme CEMOX pour l'optique XUV-X

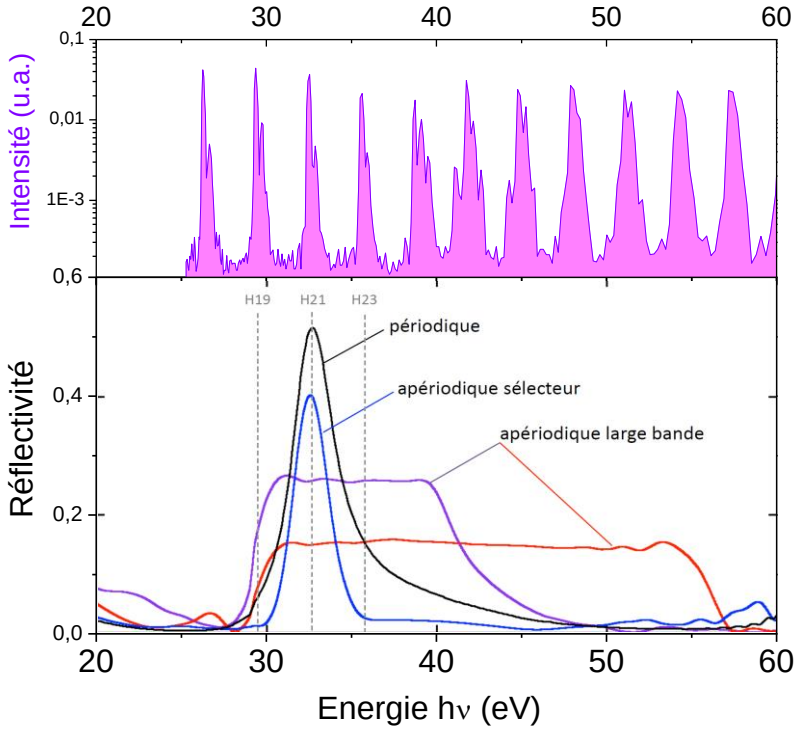
XUV Optics and Optical Surfaces : M. Dehlinger, E. Meltchakov, S. de Rossi, F. Delmotte

pulvérisation cathodique magnétron
(Plassys MP800S)

Multicouche (MC)



Etude miroirs MC broad & very broadband
M. Dehlinger (OPT2X)



Phase measurement of soft x-ray multilayer mirrors
S. de Rossi, C. Bourassin-Bouchet, E. Meltchakov, A. Giglia, S. Nannarone, F. Delmotte
Optics Letters 40, 4412 (2015)

Perspectives

- **2017**
  - achever le montage de SE10 au LIDYL, de SN3.0 au LOA → collaborateurs!
  - définir le programme scientifique 2017-2018 (réunions CUP janv, CP fév 2017)
  - mars 2017 : inauguration ATTOLAB l'Orme-des-merisiers
  - B. Carré (coordinateur) → Pascal Salières, Pascal d'Oliveira

- **2017-2018-2019**
  - Obtenir des résultats marquants en phase gaz, solide, plasma

    (acknowledgements to ANR11-EQPX0005-ATTOLAB!)
  - Accueillir les utilisateurs extérieurs
  - Préparer le financement du fonctionnement au-delà de 2019 :
    - ✓ financement Univ Paris-Saclay\Département PhOM
    - ✓ Appel Equipex n° 3 (fonctionnement) ?
    - ✓ financement européen : FET open, contrats avec ELI-ALPS ?
  - Associer source mid-IR + XUV haute cadence (>100 kHz) à ATTOLAB