

ALBA

Experiments Division's report

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- Experiments Division Report
 - + SAC17 general comments
 - + General status (staff & equipments)
 - + Selected on-going projects & activities
 - + Science highlights
- BLs phase-III process

As explained previously, phase-II has been launched

As I will describe later, phase-III BLs selection process has also been launched (although funds are still not secured)

In any case, the highest priority is to reliably operate the existing BLs

and we are all aware that this is a challenge !

Here I will deal with some general/important issues.

Some detailed technical comments will be treated in the corresponding talks of the specific BLs.

1. “... ALBA’s Publication policy advice...”

User office has implemented (and widely distribute) the guideline.

2. “... Life Science and Condensed Matter College...”

For internal micro-management issues we keep our section structure as it will be further discussed latter. However, at the section heads meeting we keep the highest possible coherence within our scientific program.

3. “ STAFF at CLAEISS- Define (or re-define) the mission of CLAEISS and target user communities (catalysis, materials, solid state physics? ...”

3.1. CLAEISS is right now fully staffed (after a full crew renewal).

3.2. The two main user communities are Catalysis (first) and Low-temperature solid state physics (second).

3.3. CLAEISS staff is aware of this and, in my opinion, they are serving the communities extremely well.

4. NCD "...SAC remain extremely concerned about the imXPAD project with its further delays; it is now over 18 months late....."

So do I. We have invested a lot of time pushing the company and FAT and SAC were carried out in April and May, respectively. 12 points were identified that it needs further improvement to fulfil specs and we agree that the imXPAD detector should be back to ALBA at the end of September with these issues solved.

For pragmatic reasons one spec has been relaxed to:

"the frame rate will be **250 f/s** with 1 μ s exposure in a bunch of 10000 images"

5. Sections "There seems to be the need for a better clarity of the role of the Colleges"

We are now clarified the roles of the section heads in a ToR document.

6. "Should the Colleges have a role with respect to BL operational budgets?"

6.1. We have very much improved the budget landscape in the division with independent budgets for BLs., Labs, in-house research projects, etc.

6.2. Section Head/Colleges have not budget, the budgets are split per BLs and Labs and the responsables of the BLs, Labs are also for budgets.

7. Optics, Metrology and Support “...Relative weight of Beamline Support, Developments, and Research needs to be defined.....”

7.1. We are aware that this is a critical issue as we have to combine:

i) support to on-going operation; ii) phase-II (and phase-III) BLs design and construction; and iii) research project and development of the section (f.i. nanobender).

7.2. ALBA has launched a technological transfer initiative for developing the final stages of the ‘nanobenders’ with industries and so far two Spanish companies have answered positively. We are starting negotiations.

8. CLEAR spectrometer now promised to users fall 2014

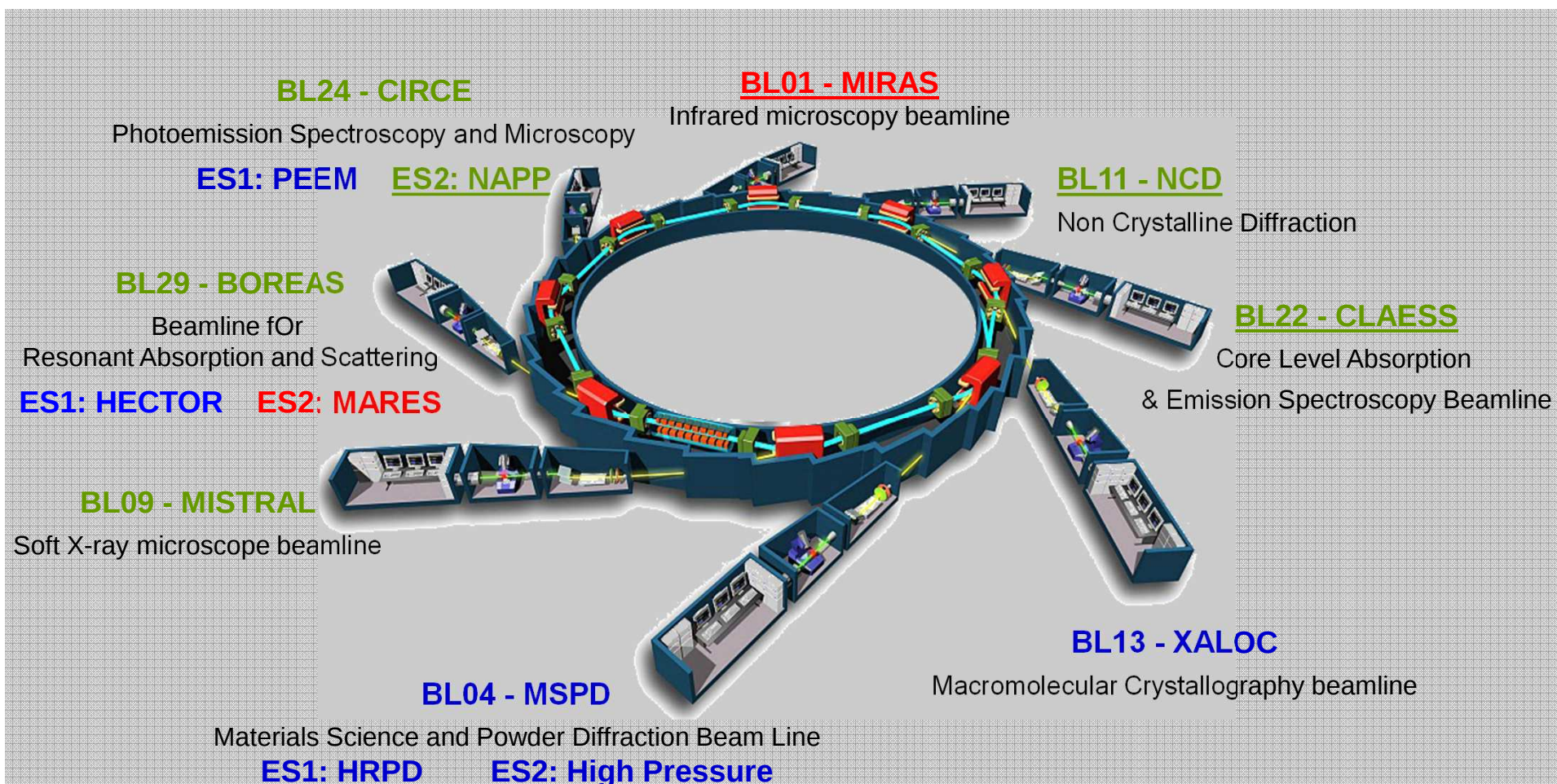
This was somehow a misunderstanding, we are collecting data already and we keep the commissioning but it will not be open to users until Mid-2015 in order to do not rise ‘early’ expectations.

Anyhow, we keep advancing the project and a new postdoc is being hired along this month to booster the development of this complex project.

We expect to open to users CLEAR with reasonable performances for mid June-2015.

EIGHT BEAMLINES

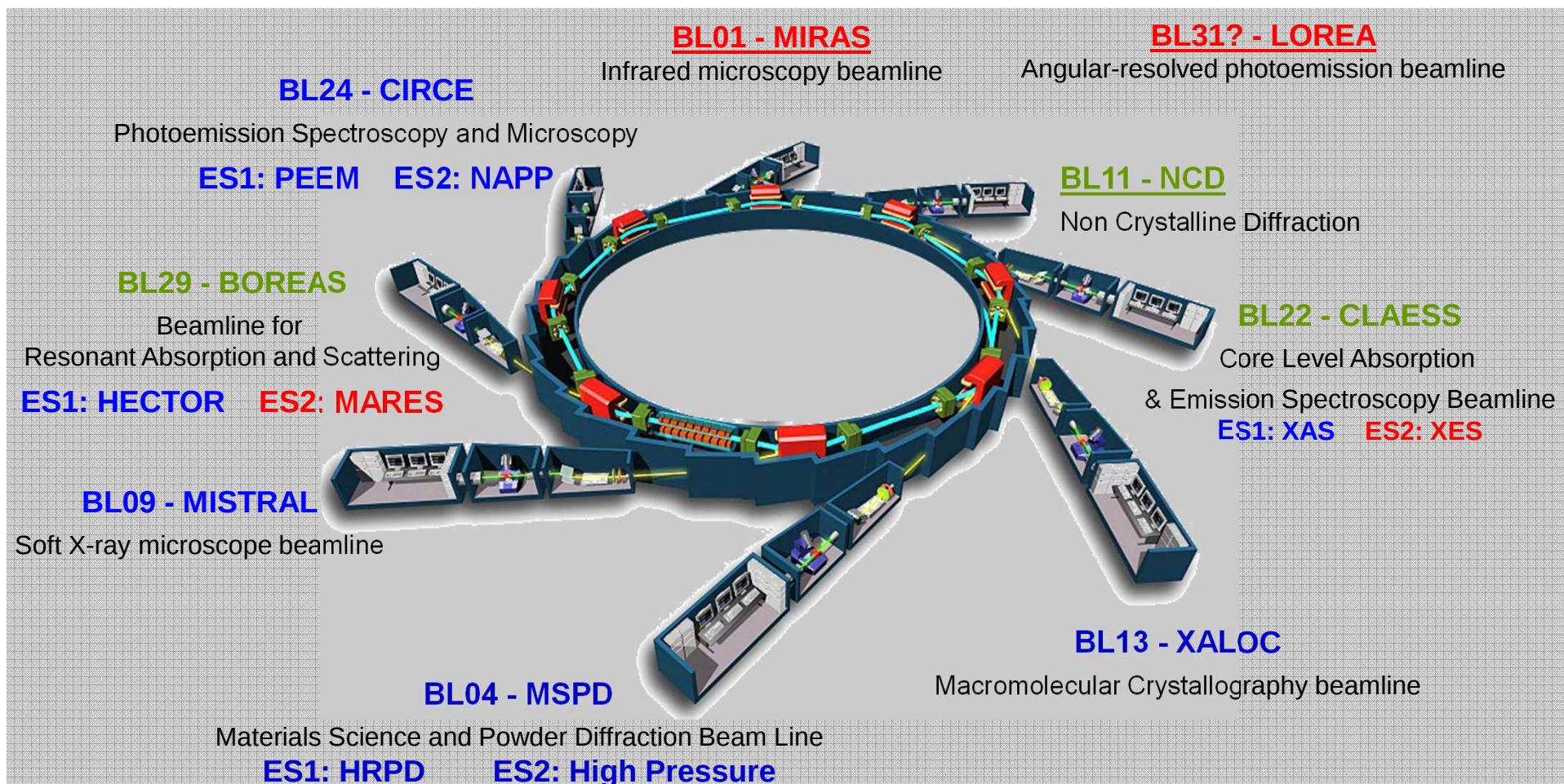
Bird's eye view on 08/11/2013



CLEAR spectrometer will start to collect data (commissioning with photons): May-2014
MARES endstation will start to collect data (commissioning with photons): October-2014

NINE BEAMLINES

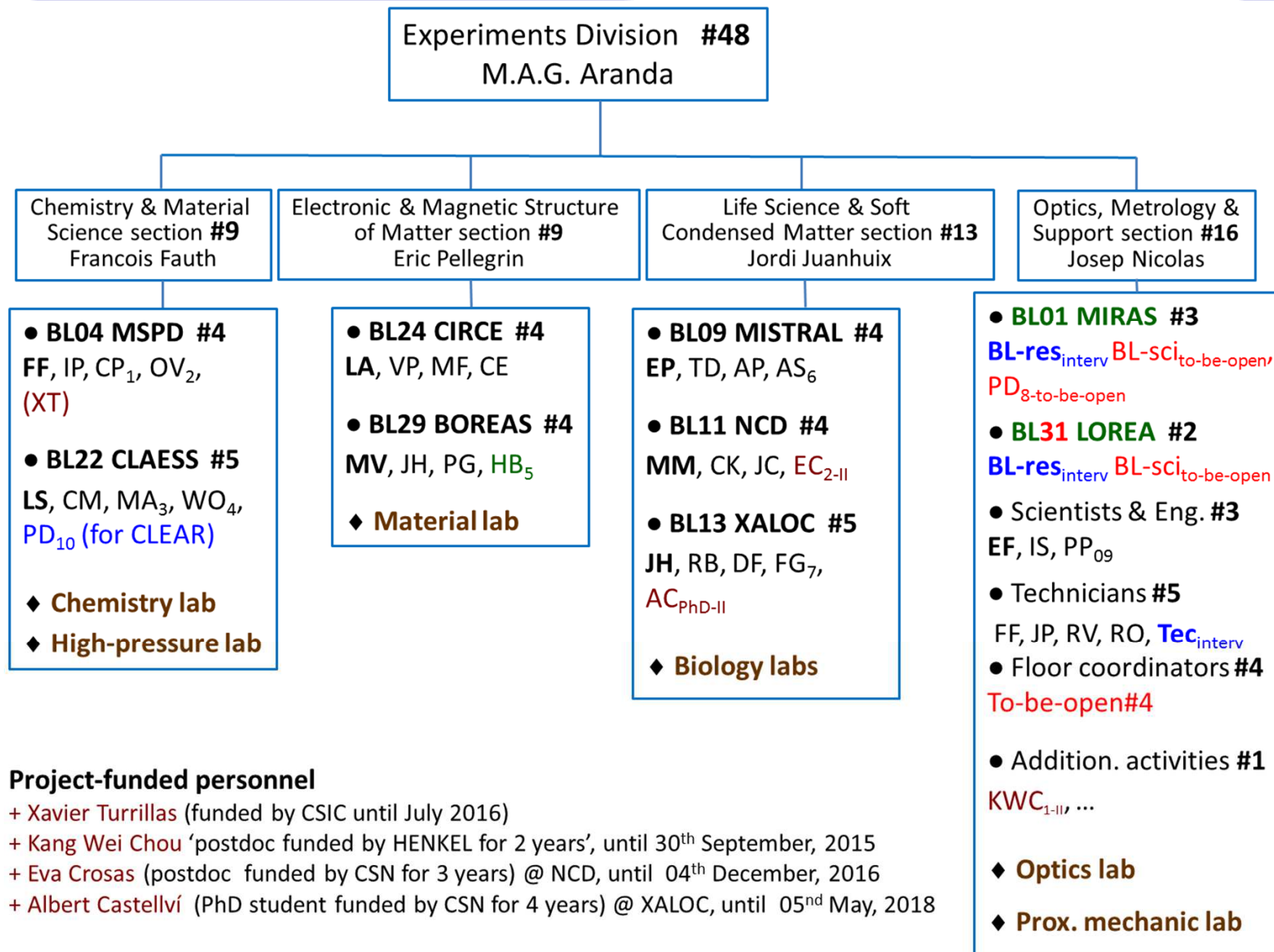
Bird's eye view on 01/07/2014



CLEAR spectrometer ~~will start~~ to collect data (commissioning with photons): started !

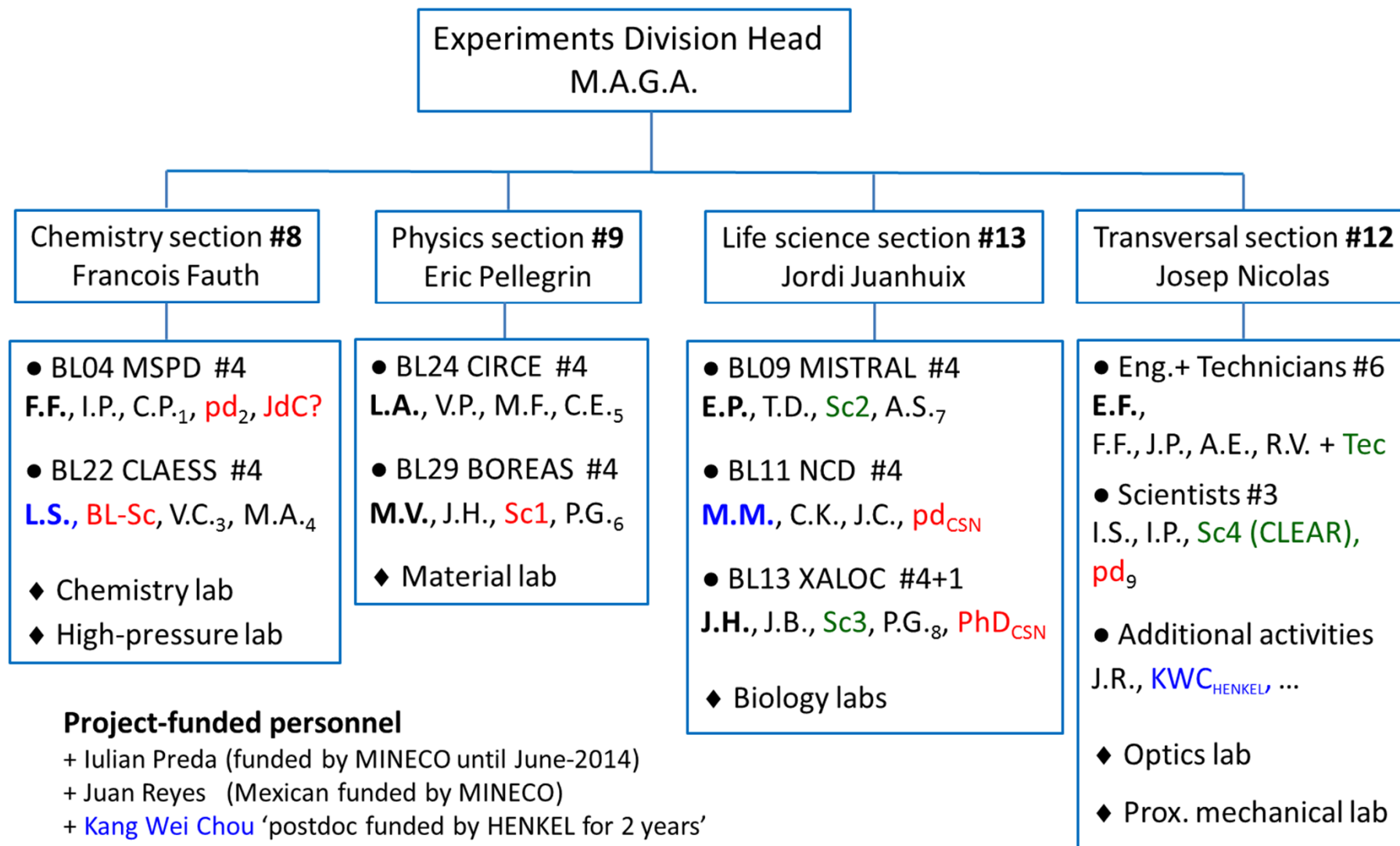
MARES endstation ~~will start~~ to collect data (commissioning with photons): started !

Overall status: Experiments Division staff



Project-funded personnel

- + Xavier Turrillas (funded by CSIC until July 2016)
- + Kang Wei Chou 'postdoc funded by HENKEL for 2 years', until 30th September, 2015
- + Eva Crosas (postdoc funded by CSN for 3 years) @ NCD, until 04th December, 2016
- + Albert Castellví (PhD student funded by CSN for 4 years) @ XALOC, until 05nd May, 2018



Project-funded personnel

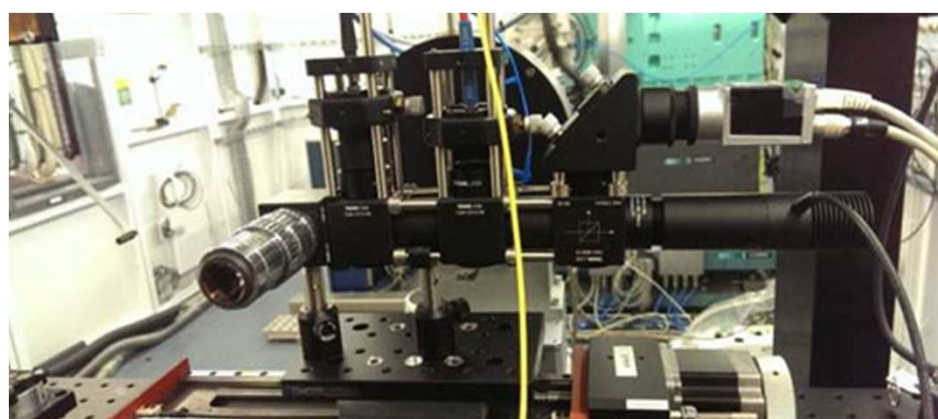
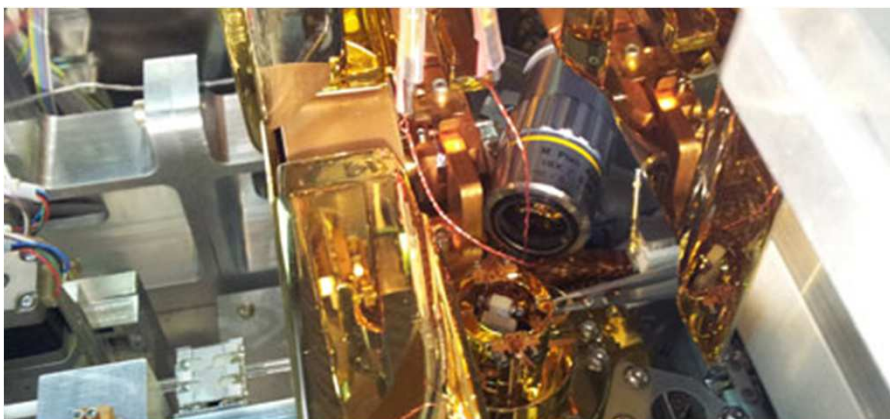
- + Iulian Preda (funded by MINECO until June-2014)
- + Juan Reyes (Mexican funded by MINECO)
- + Kang Wei Chou 'postdoc funded by HENKEL for 2 years'
- + pd_{CSN} (funded by CSN for 3 years) @ NCD
- + PhD_{CSN} (funded by CSN for 3 years) @ XALOC



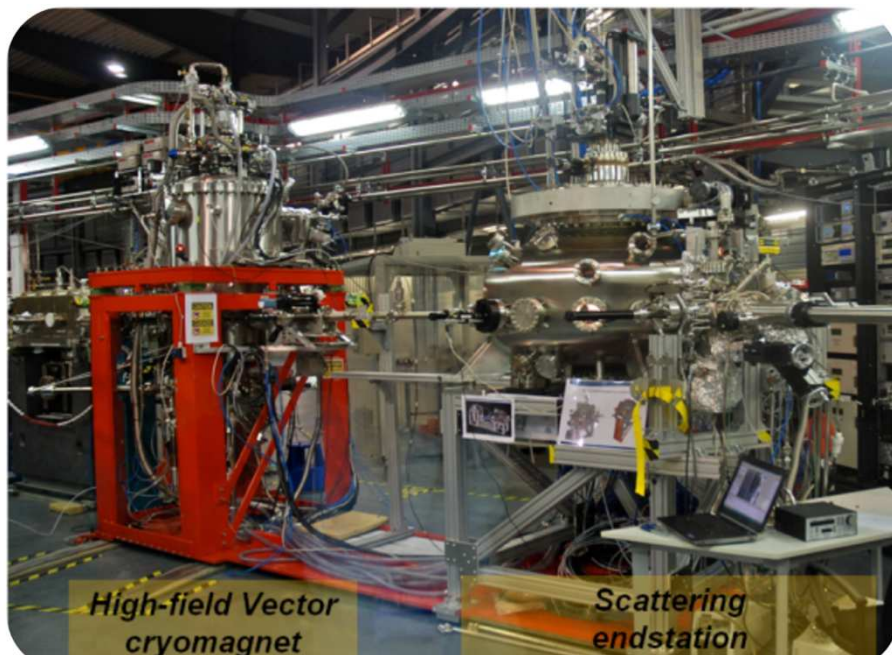
Ricardo Valcárcel and Jose Ávila won the category of "best experiment" for their work **"Imaging magnetic domains at Mistral"**



Igor Šics and Catalin Popescu won the category of "best instrumental development" for their work **"Inline pressure calibration set-up"**

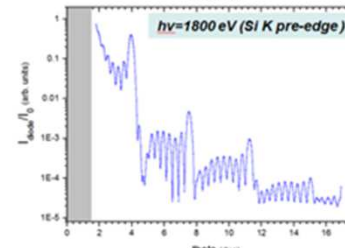
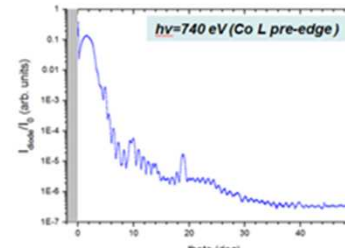
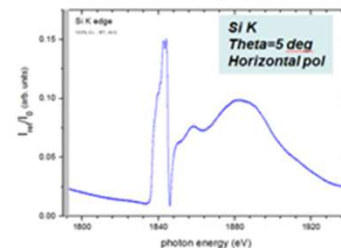
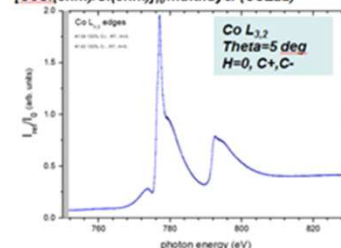


MARES @ BOREAS



First tests with beam of the *MaReS* scattering endstation checking a CoSi/Si 10-period multilayer, last March. Test demonstrate excellent data quality, reproducibility in 5-6 orders of magnitude for continuous spectra and reflectivity even at high photon energies.

[CoSi(5nm)/Si(3nm)]₁₀ multilayer (CSZ22)



Left: Reflectance resonant spectra.

Right: extended angle specular reflectivity at "magnetic atom" energies, and at rather exclusive high energy (Si K edge)

Ready for users on next cycle starting Jan'15

Ready For resonant scattering with 20K sample cryo-cooling, UHV in-situ preparation/evaporation.

HOWEVER, magnet or special detectors will be made available when ready along the year (related hardware by Eng. Div., and some cabling is pending)

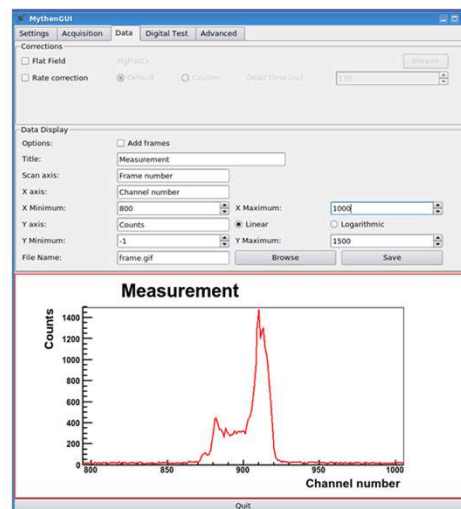
CLEAR @ CLAESS

CLEAR: X-ray emission spectrometer (2-22 keV)



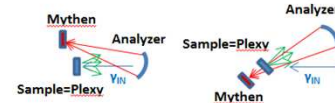
Si(555) reflection on Mythen

Verbeni's Si(555) bent – $3.5 \cdot 10^4$ cps

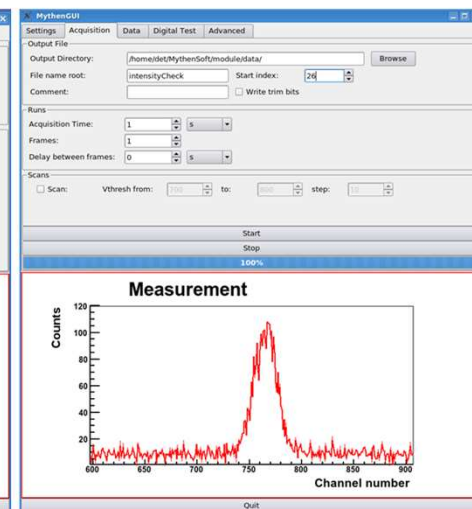


Side view

Top view

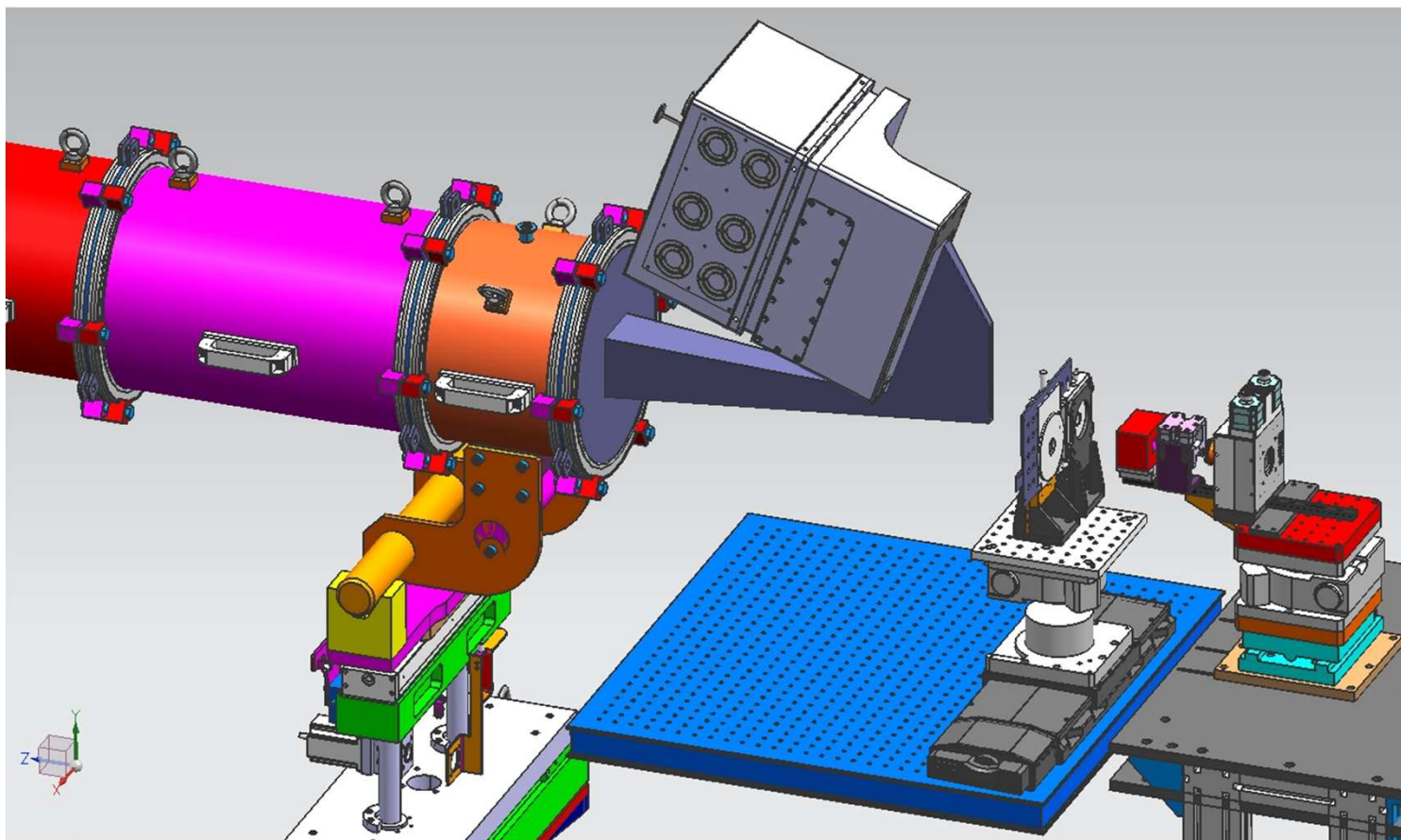


Verbeni's Si(555) diced – $3 \cdot 10^3$ cps



CLEAR installation on CLAESS - April 2014,
In commissioning from May 2014 but keeping
the operation for XAS proposals

BL11-NCD



NCD development and refurbishment:

Some key activities: Im-XPAD detector SAT (and commissioning after October), detector supports, sample table, ...

We have already a full draft of the **ALBA 2013 Annual report** and the final version should be available by the end of July-2014

I pick up a single example (out of many highlighted papers and developments)



2013
ANNUAL REPORT

BL22 – CLFESS: Core Level Absorption & Emission Spectroscopies

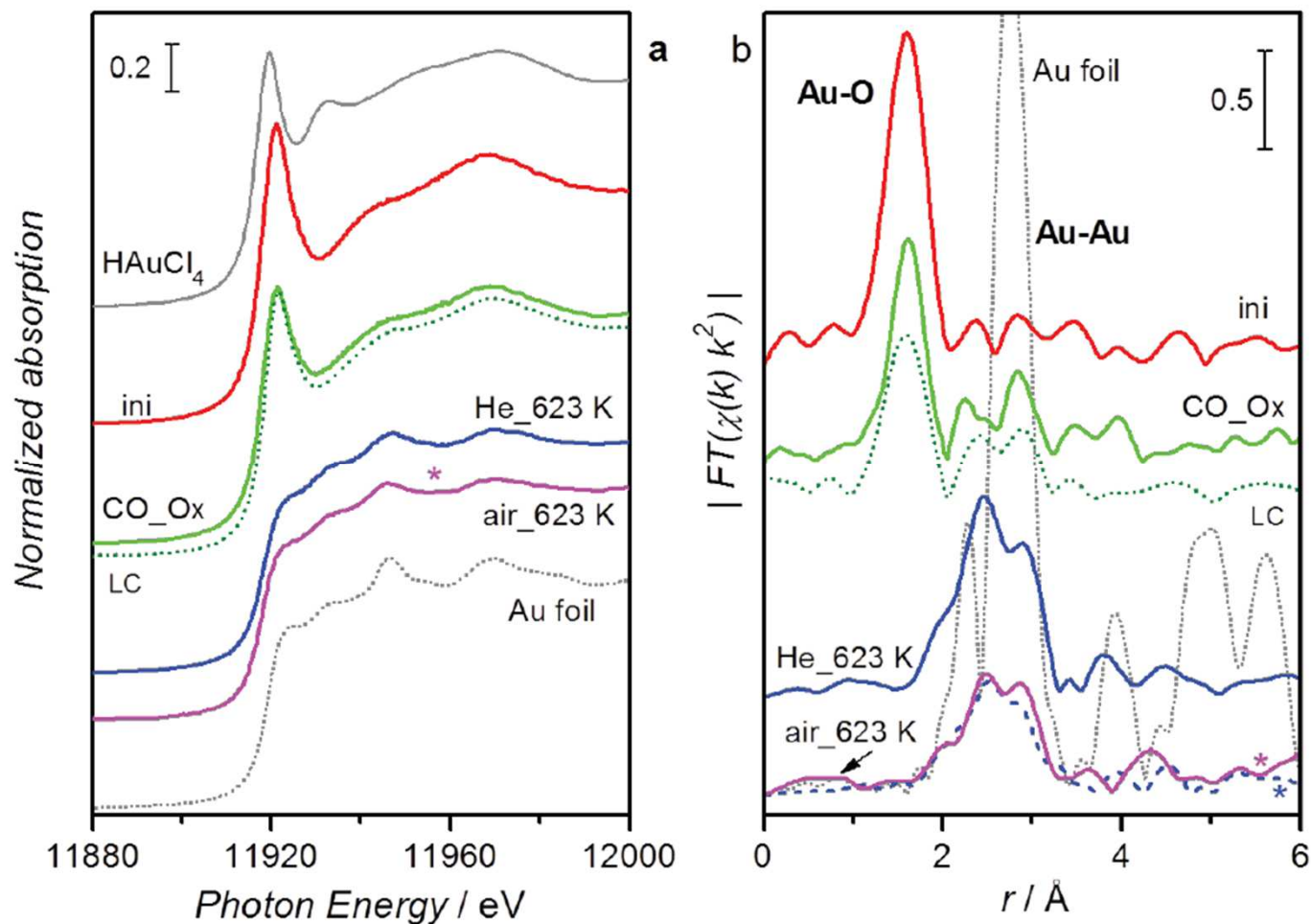
HOW XAFS HELPS TO UNDERSTAND THE STRUCTURE OF THE ACTIVE SPECIES IN A REAL Au/TiO₂ CATALYST

Low-Temperature Oxidation of Carbon Monoxide with Gold(III) Ions Supported on Titanium Oxide.
Angewandte Chemie 53, 3245-3249 (2014)

ILYA SINEV, DENNIS GROSSMANN, WOLFGANG GRÜNERT

Despite the remarkable potential of supported gold catalysts, the nature of their active sites is under debate even for a reaction as simple as CO oxidation. Regarding the Au oxidation state in them, most researchers favor Au(0) at the perimeter between metal cluster and support. Typical mechanisms involve reaction of oxygen activated on the support with CO adsorbed on perimeter sites, e.g. on slightly positively charged clusters Au_n^{δ+}. Activation of both reactants by exposed Au sites on the nanoparticles has been also proposed.

Spectra from self- supporting pellets, wrapped in Kapton tape were measured, at LN₂ temperature (X1-DESY) or at RT (CLASS). The Au/TiO₂ catalyst was investigated in the as-prepared state, after CO oxidation at room temperature, after heating in He flow at 623K, and after subsequent treatment in air at 623 K.



Main short-term actions (2014-2015)

- To boost the research grant applications to 'Plan Estatal' and Horizon2020
- To help to increase the collaboration of ALBA with the local industry
- To implement the participation of ALBA synchrotron in the UAB Master: *"Master in nanosciences and nanotechnology"*
- Implementing key relationships with selected group: catalysis, cultural heritage, ...
- Next Monday-7th of July we have a workshop with 7 Turkish colleagues about a possible Turkish-PBL at ALBA synchrotron
- ***To keep improving several safety issues related to our Division***

Main medium-term additional actions (2014-2016)

- Helping in the fund raising for our CRG-type BLs. ALBA names them: **Partnership BeamLines, PBLs**
- Try to secure funding for developing an ALBA PhD program. There is no budget for 2015
- To boost international participation @ ALBA: Mexico, Turkey, Morocco, Portugal...

First ALBA User Meeting

From September 3 to 6, 2013, ALBA Synchrotron hosted its first User Meeting at ALBA's facilities in Cerdanyola del Vallès (Barcelona). During four days, 115 participants showcased the first results obtained at ALBA and discussed the applications and advantages that synchrotron radiation has on Spanish science.

The meeting was held in conjunction with the VI National Meeting of the Spanish Synchrotron User Association (AUSE). AUSE was founded in 2004 with the aim of establishing a contact point and source of information for scientists from Spanish institutions who use synchrotron light in their research. Currently, AUSE has 630 members, including physicists, chemists, biologists, medical doctors, engineers, etc.

During the opening ceremony on September 3, Caterina Biscari, director of ALBA, expressed her satisfaction about organizing



Participants of the first ALBA User Meeting at ALBA's experimental hall.

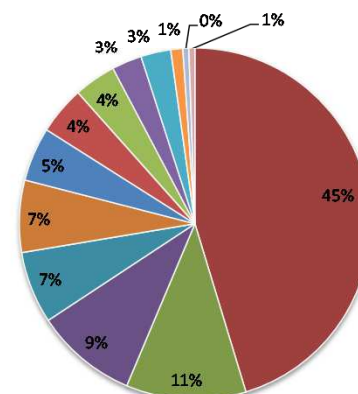
QUESTION 4		
Strong interest, will actively support it		
Micro PX	82	31%
MIRAS (Infrared Microspectroscopy)	20	8%
Single Microcrystal diffraction	17	6%
LOREA (Angle Resolved Photoemission)	12	5%
Hard X-ray imaging	12	5%
Nano-focusing	9	3%
Absorption Diffraction	8	3%
Circular Dichroism	7	3%
Surface/Interface diffraction	5	2%
Energy and polarization dependent scattering	5	2%
Medical imaging	2	1%
Instrument development	1	0%
Coherent-diffraction	1	0%
Blanks	85	32%

USERS survey in Autum-2013

Number of total responses	266
Number of contacts at the e-mail list distribution (Number aprox agreed with IRamos: some of ALBA users are the same that AUSE)	1.000
% success	27%

Strong interest, will actively support it

- Micro PX
- Single Microcrystal diffraction
- Hard X-ray imaging
- Absorption Diffraction
- Surface/Interface diffraction
- Medical imaging
- Coherent-diffraction
- MIRAS (Infrared Microspectroscopy)
- LOREA (Angle Resolved Photoemission)
- Nano-focusing
- Circular Dichroism
- Energy and polarization dependent scattering
- Instrument development



Workshop on Phase-III BLs on 10th April 2014

	Beamline	Speaker	Alba Speaker preselected BLs
1	Microfocus diffraction for macromolecular crystallography	Núria Verdaguer IBMB-CSIC, Barcelona	Jordi Juanhuix
2	Submicrometer-beam diffraction, fluorescence and absorption	Adela Muñoz, Universidad Sevilla	Josep Nicolas Laura Simonelli
3	High-energy imaging and diffraction	Juan Gómez Barreiro, Un. Salamanca	Eva Pereiro Xavier Turrillas (ICMAB)
4	Microfocus diffraction for medium size molecules	Fernando Lahoz, ISQCH, Zaragoza	
5	Surface-interface diffraction	Xavier Torrelles , ICMAB-CSIC, Barcelona	Salvador Ferrer
6	Energy and polarization dependent scattering	Joaquin García Ruiz, CSIC, Zaragoza	
7	Biomedical applications (imaging & therapy)	Silvia Gil, UAB, Barcelona	
8	Skiron: Chiroptical spectroscopy	Salvador Ferrer, Alba	Salvador Ferrer
9	Instrument development	Josep Nicolas, MAG Aranda	Josep Nicolas, MAG Aranda
10	Powder diffraction and absorption	X. Turrillas, F. Fauth	Francois Fauth

Phase-III : next milestones

- By mid October-2014, the full scientific cases of phase-III BLs should be sent to SAC for evaluation
- These proposals will be reported to SAC on 3rd and 4th of December-2014
- SAC should give its advice to ALBA management before the end of the year
- ALBA management will make a proposal to its governing bodies and it will try to secure the funding

Thanks

