ALBA synchrotron

What is it?

What's for?

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Capital of romanesque cloister of Monastir de Santa Maria del l'Estani, circa 1300

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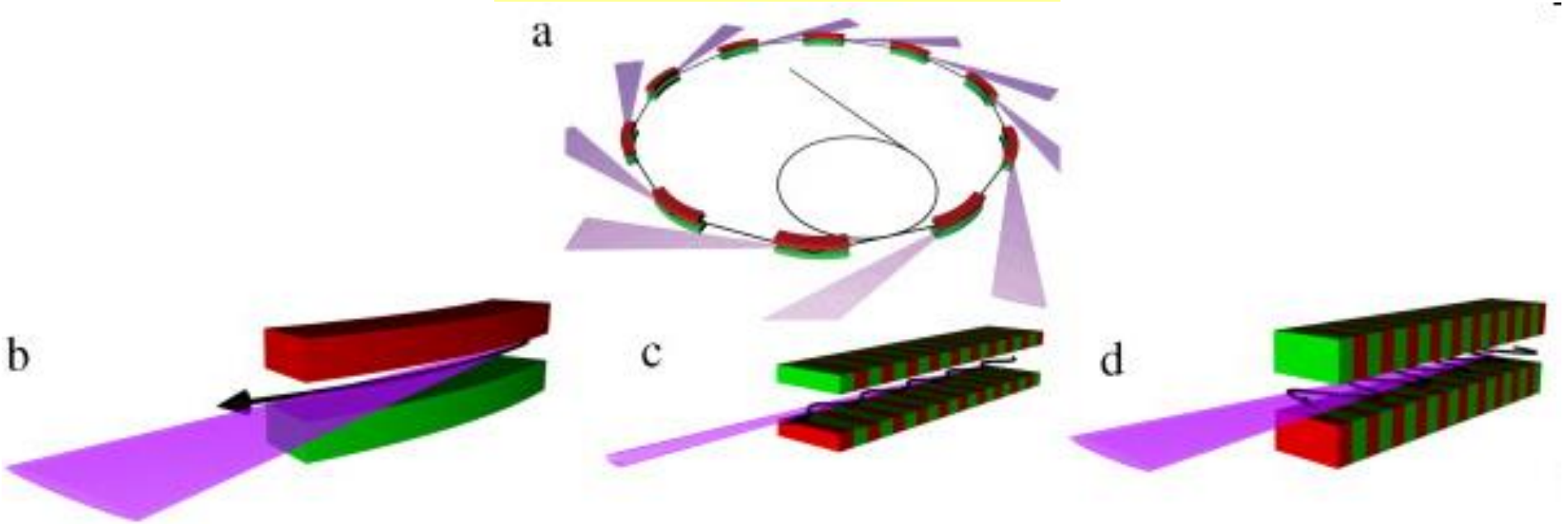
A **Synchrotron** Large Facility is:

i) A complex of ***accelerators*** devoted to produce synchrotron radiation

ii) A set of instrumentation to carry out cutting-edge analytical characterization and research

iii) A interdisciplinary human group devoted to give service to academic and industrial users in their respective fields (chemistry, physics, materials, biology, etc.)

V_e- from 99.998% to 99.99999855% of c



A large facility to study the structure and the interior of matter

1st
SCIENCE FACILITY
IN SOUTH-WEST EUROPE
(in terms of investments)

220 M€
PUBLIC INVESTMENT
(2012)

~1000
Users/Researches
per year (2015)

~ 200 staff (May-2016)

TOP-NOTCH RESEARCH IN:

- BIOTECHNOLOGY AND LIFE SCIENCES
- CULTURAL HERITAGE
- MICROELECTRONICS AND NANOTECHNOLOGY
- ENVIRONMENT AND ENERGY
- MATERIALS DESIGN, DRUGS AND FOOD
- CATALYSIS, HIGH-PRESSURE, etc.

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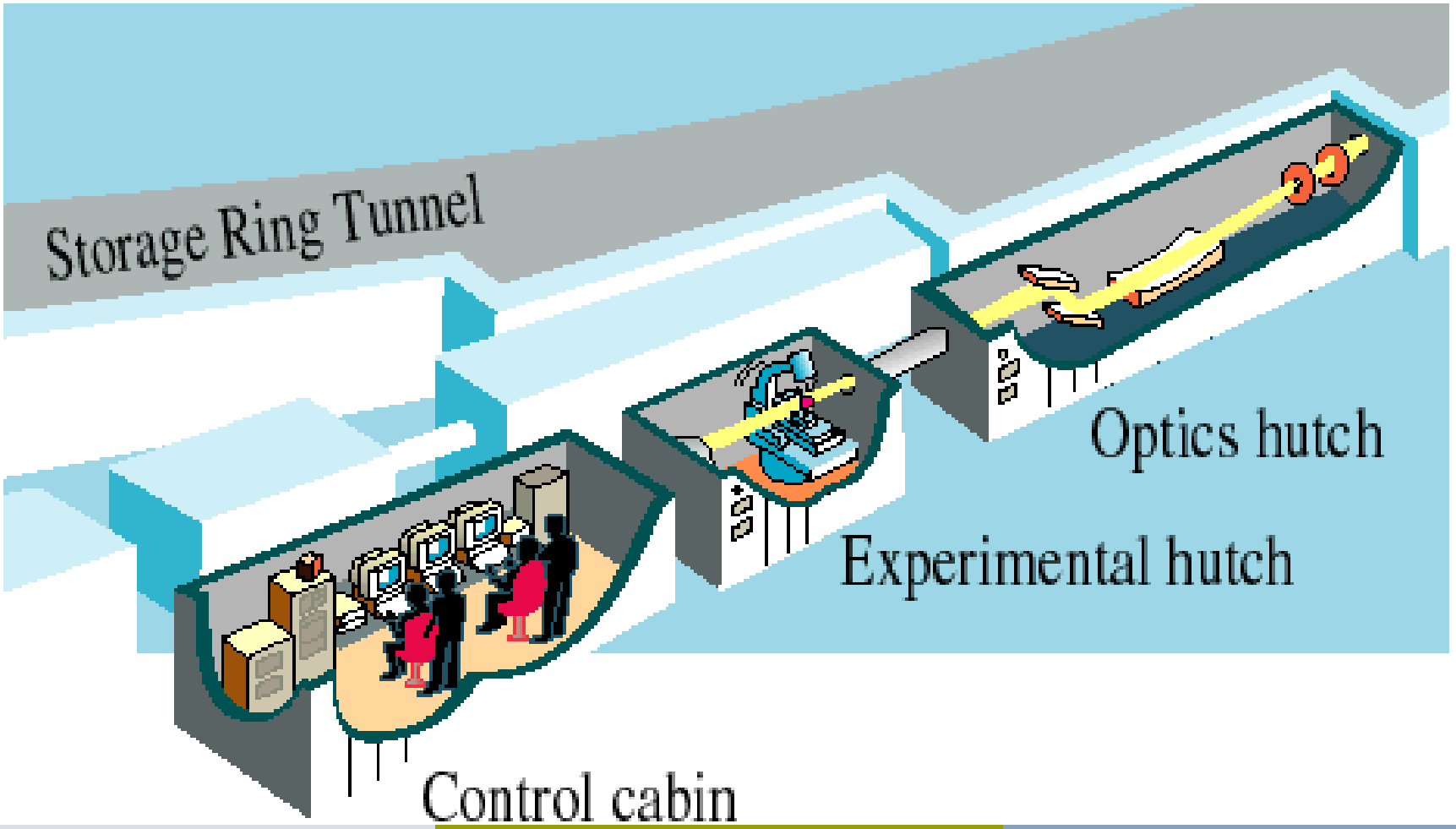
A BeamLine gives service in a given technique (or two) that it may helps in several scientific fields.

For instance **BL04-MSPD**

Technique(s): i) High-resolution powder diffraction; ii) microdiffraction
Fields: pharma, cultural heritage, materials science, solid state physics, etc.



Summary of scientific applications of 7 phases-I BLs

BL29-BOREAS

Tech.: soft XR spectroscopy (XM c/ℓ D) (ES1) & scattering (ES2)

Fields: ES1: studies of magnetic materials; ES2: studies of electronic & magnetic materials

BL22-CLAESS

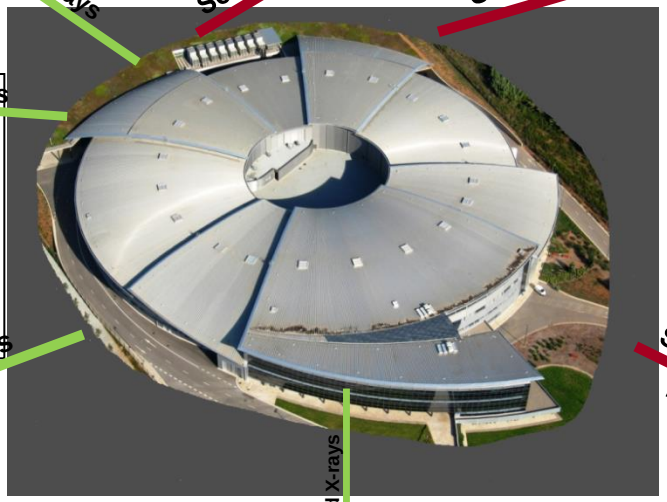
Tech.: Absorption & emission spectroscopies

Fields: catalysis, solid state physics, cultural heritage, environmental sciences,…

Hard X-rays

Soft X-rays

Soft X-rays



BL24-CIRCE

Tech.: Photoelectron handling (*imaging & spectroscopy*)

Fields: ES1-PEEM: nano-sciences, mag. domains, … ES2-NAPP: catalysis, surface chemistry, environmental sci.

Hard X-rays

BL04-MSPD

Tech.: Powder diffraction

Fields: ES1: material structure, catalysis, solid state physics; ES2: high pressure, microdiffr.

Hard X-rays

Soft X-rays

Photo.e-

BL13-XALOC

Tech.: S.C. diffraction

Field: macromolecular crystallography

Hard X-rays

BL11-NCD

Tech.: t-resolved SAXS/WAXS (scattering / diffraction)

Fields: materials chemistry biosciences (bio-SAXS), …

BL09-MISTRAL

Tech.: soft XR cryo-nano-tomography (*imaging*)

Fields: cell cartography, materials science (magnetic domains, …)

Phase II and III BLs

blue BLs under commissioning or construction

Sub-microfocus

Tech.: Absorption & emission spectroscopies

Fields: catalysis, cultural heritage, environmental sciences, biosciences…

SIRENA

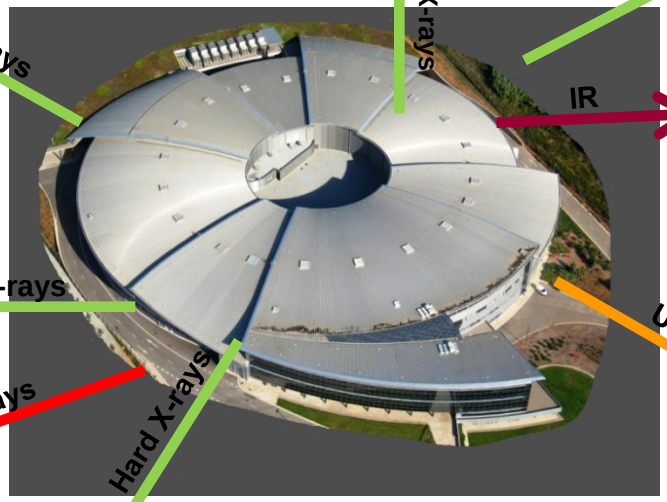
Tech.: GIXRD, GISAXS, XRR, GIDAFS, Polarization,

Fields: Catalysis, materials science,

FaX-ToR *(imaging)*

Tech.: fast/hard XR tomography & radiology

Fields: materials science, catalysis, geosciences, food, paleontology, …



BL01-MIRAS

Tech.: Infrared micro-spectroscopy (*imaging*)

Fields: biosciences, cultural heritage, materials science (polymers, etc.), food sciences, environmental sciences, …

Microfocus-MX

Tech.: S.C. diffraction

Field: macromolecular crystallography

Beamsize: ≈2 μm

BL24-Skiron

Tech.: Advanced chiroptical spectroscopy (UV: 3-40 eV)

Fields:

ES1: CD of deep molecular orbitals from liquid jets

ES2: CD, LD in anisotropic media

BL20-LOREA

Tech.: ARPE-spectroscopy

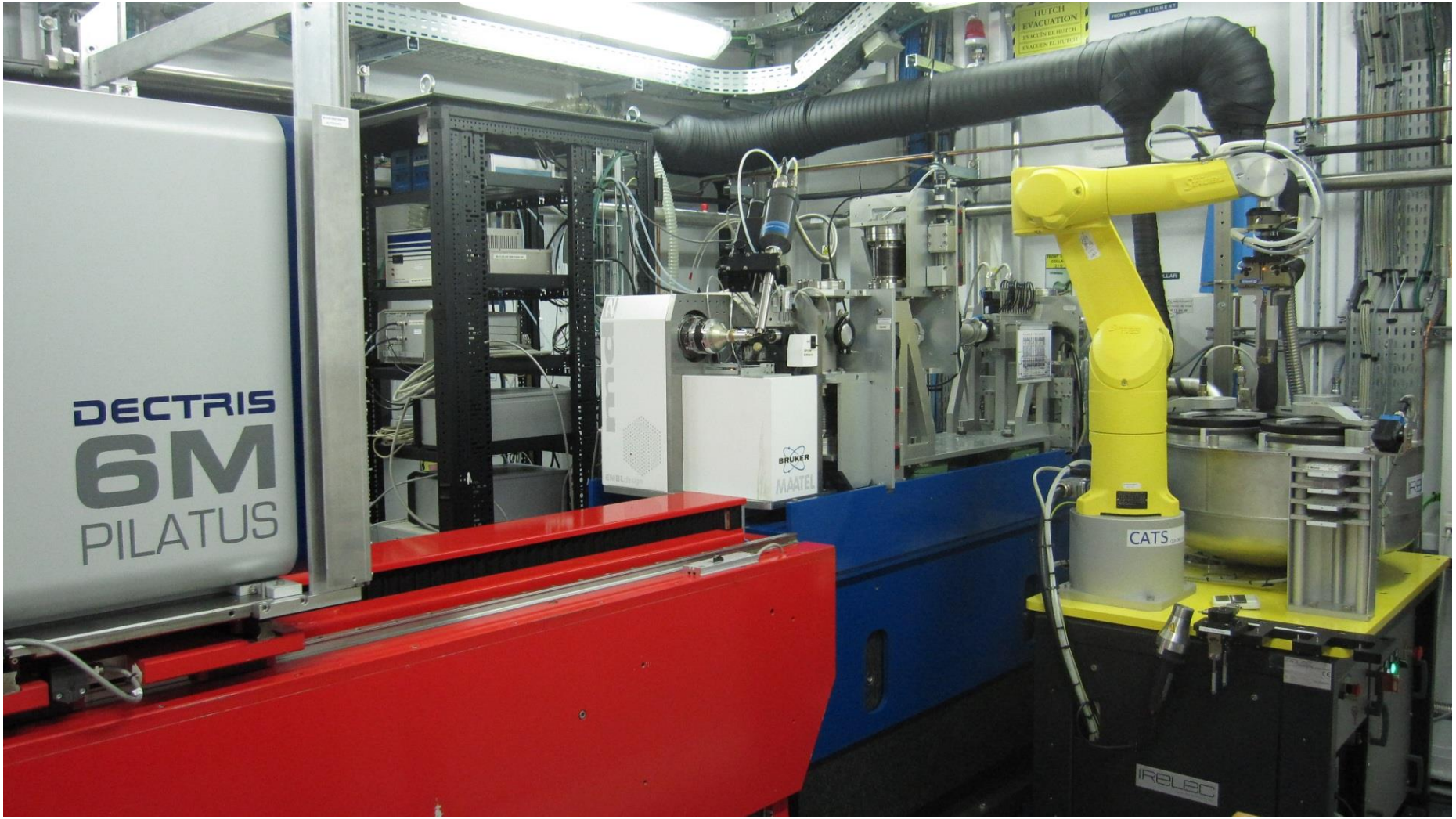
Fields: solid state physics, electron correlated materials,

NOTOS

Tech.: Diffraction, imaging spectroscopy,

Fields: Instrument development & metrology

An example of instrumentation



BL13-XALOC endstation

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ALBA: structure and staff

In May 2016 ALBA has
~200 staff , plus more than 15 additional colleagues hired from external funding


President: Ramón Pascual De Sans


Director: Caterina Biscari

International representation ~ 25%
Average age ~ 35 years

Accelerator

Head: Francisco José Pérez Rodríguez

Andriy Nosych

Ángel Olmos

Ángela Salom

Beatriz Bravo

David Yépez

Ferran Fernández

Gabriele Benedetti

Administration

Head: Mariano Sazatornil Miró

Clara Reyero

Concepción Girbau

Daimí Pérez

Eduardo Moreno

Elisenda Sanchís

Enric Vinyals

Irene Sánchez

Laura

Computing

Head: David Fernández Carreiras

Abel Fontsere

Alberto Rubio

Alberto Ruz

Antoni Pérez

Antoni Fernandez

Antonio Camps

Bern Saló

Engineering

Head: Joan Casas Bullich

Alejandro Crisol

Carles Colldelram

Cristina Orozco

David Carles

David Calderón

Esteban Criado


Experiments

Head: Miguel Ángel García Aranda

Alejandro Enrique

Ana Joaquina Pérez

Andrea Sorrentino

Carlo Marini

Carlos Escudero

Catalin Alexandru Popescu

Christina Kamma-Lorger

Safety

Officer: Xavier Queralt Compte

Arnaud Devienne

Carme Mármol Moreno

Jose Aguilar Mena

María García Fusté

Management

Alejandro Sánchez Grueso

Ana Belén Martínez Bonillo

Eva García Ruz

Gastón García López

Inmaculada Ramos Lerate

Maria del Pilar Casamada Puig

Nuria Valls Vidal

Raquel Jimenez Alvarez

Salvador Ferrer

Experiments Division **#59**
M.A.G. Aranda

User Office **#4**
Inma Ramos
MPC, MJS, NGG

Chemistry & Material Science section **#10**
Francois Fauth

- **BL04 MSPD #5**
  FF, CP, OV_1, AM_2, AC,
- **BL22 CLAESS #5**
  LS, CM, NR_3, WO_4 DH_{CLEAR}
- ♦ **Chemistry lab** (FF)
- ♦ **High-pres. lab** (CP)

Electronic & Magnetic Structure of Matter section **#10**
Eric Pellegrin

- **BL24 CIRCE #5**
  LA, VP, MF, CE, $DR_{PhD_3\text{-}NAPP}$, XX_{PhD_4}
- **BL29 BOREAS #4**
  MV, JH, PG, HB_5
- ♦ **Material lab** (EP)

Life Science & Soft Condensed Matter section **#15**
Jordi Juanhuix

- **BL09 MISTRAL #4**
  EP, TD, AP, AS_6
- **BL11 NCD #4**
  MM, CK, JC, $EC_{CSN\text{-}11}$
- **BL13 XALOC #6**
  Open, RB, FG, BC_7, AC_{PhD_1}, IC_{CSN}
- **BLxx μ-MX #1**
  JJ,
- ♦ **Biology labs** (RB)

Optics, Metrology & Support section **#20**
Josep Nicolas

- **BL01 MIRAS #3**
  IY, MK, Open, NB_{09}
- **BL20 LOREA #2**
  MT, FB,
- Scientists & Eng. **#3**
  EF, IS, PP_{08}
- Technicians **#5**
  FF, JP, RV, JP, JF_{MINECO}
- Floor coordinators **#5**
  RO, IM, IG, PM, AR
- HM_{PhD_2},
- ♦ **Optics lab** (JN)
- ♦ **Prox. mechanic lab** (EF)

Nationalities of the scientists (22 foreigners out of 45, **50%**, 15 nationalities): Spanish (23), Italian (5), German (2), French (2), Greek (1), Romanian (1), Swiss (1), Serbian (1), Dutch (1), Latvian (1), Jordan (1), Polish (1), Indian (2), Russian (1), Colombia (1), Portuguese(1). **Gender of the scientists** (12 women out of 45, **27%**)

Project-funded personnel and long term visitors

- ♦ 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
- ♦ Isidro Crespo (Young researcher funded by CSN for 1 year) @ XALOC, until 04nd March, 2016
- ♦ Harol Moreno (Industrial PhD funded by Generalitat & IBSS Inc.) @ Transversal, 3 years starting 2015-05-18
- ♦ Daniel Ruano, PhD funded by ITQ-ALBA agreement for 4 years, started October 2015 @ CIRCE-NAAP
- ♦ Ana Cuesta (Postdoc funded by a MINECO project for 2 years) @ Experiments, until 11th January, 2018
- Xavier Turrillas, funded by CSIC until July 2016
- Rodrigo Ichikawa, PhD student from Brazil, visitor for one year started June- 2015 @ MSPD
- Andrey Nascimento, Postdoc from Brazil, visitor for one year started September- 2015 @ XALOC

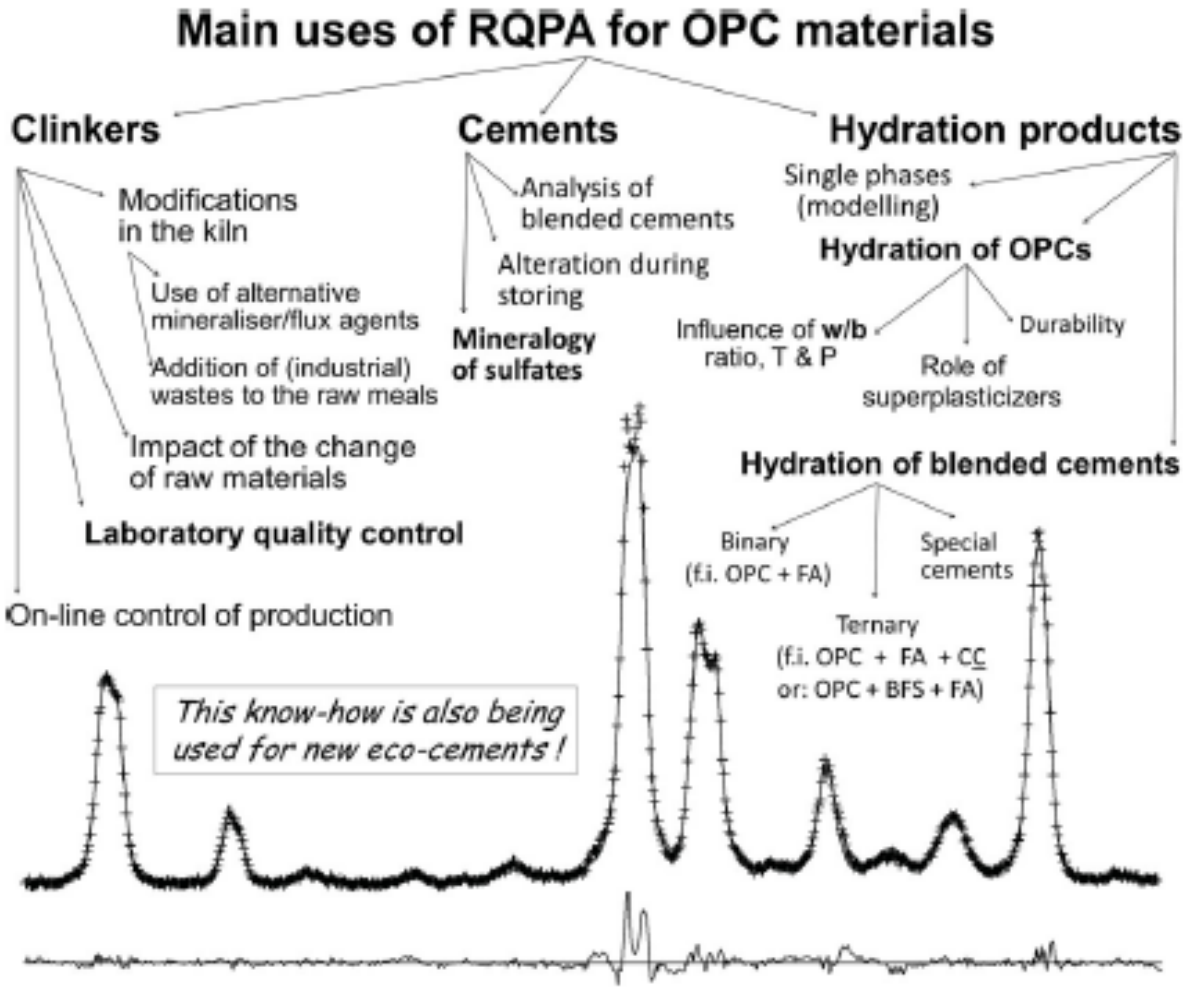

Figure 6. Main uses of Rietveld quantitative phase analysis for studying ordinary Portland clinkers, cements and hydration products. Reprinted from reference 47 with permission from the Mineralogical Society of America.

Thanks