



ALBA Synchrotron for Industry applications



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ALBA Synchrotron in short

A large facility to study the structure and the interior of matter by synchrotron light



1st
SCIENCE FACILITY
IN SOUTH-WEST EUROPE

180
STAFF (20% INTERNATIONAL)

~1000
RESEARCHERS PER YEAR

~200
EXPERIMENTS PER YEAR

210 M€
PUBLIC INVESTMENT
(2011)

~5000
HOURS PER LAB PER YEAR

TOP-NOTCH RESEARCH IN:

- BIOTECHNOLOGY AND LIFE SCIENCES
- CULTURAL HERITAGE
- MICROELECTRONICS AND NANOTECHNOLOGY
- ENVIRONMENT AND ENERGY
- MATERIALS DESIGN, DRUGS AND FOOD

7 BEAMLINES (LABS) IN OPERATIONS 2 MORE COMING

BL01 - MIRAS

Infrared microscopy beamline

BL31 - LOREA

Angular-resolved photoemission beamline

BL24 - CIRCE

Photoemission Spectroscopy and Microscopy

ES1: PEEM **ES2: NAPP**

BL11 - NCD

Non Crystalline Diffraction

BL29 - BOREAS

Beamline for
Resonant Absorption and Scattering

ES1: HECTOR **ES2: MARES**

BL22 - CLAESS

Core Level Absorption
& Emission Spectroscopy Beamline

ES1: XAS **ES2: XES**

BL09 - MISTRAL

Soft X-ray microscope beamline

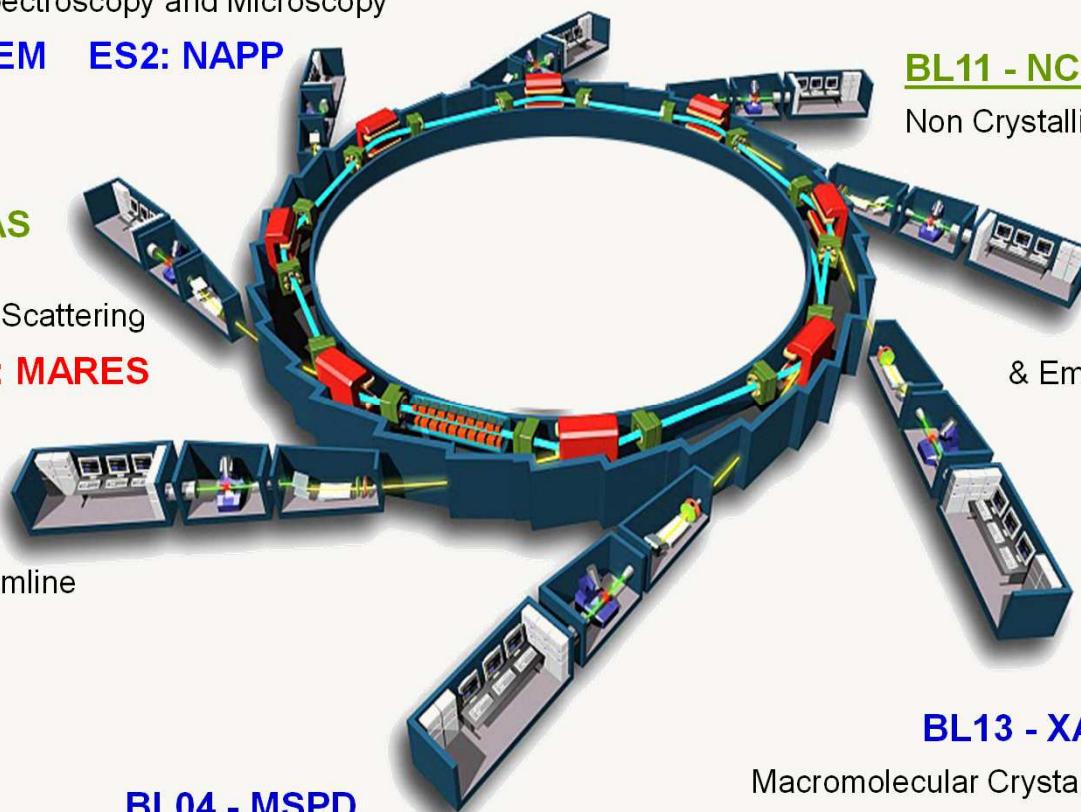
BL13 - XALOC

Macromolecular Crystallography beamline

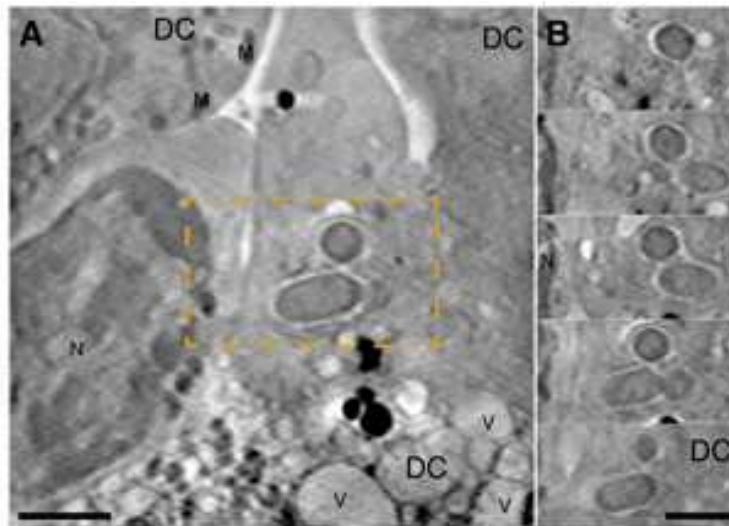
BL04 - MSPD

Materials Science and Powder Diffraction Beam Line

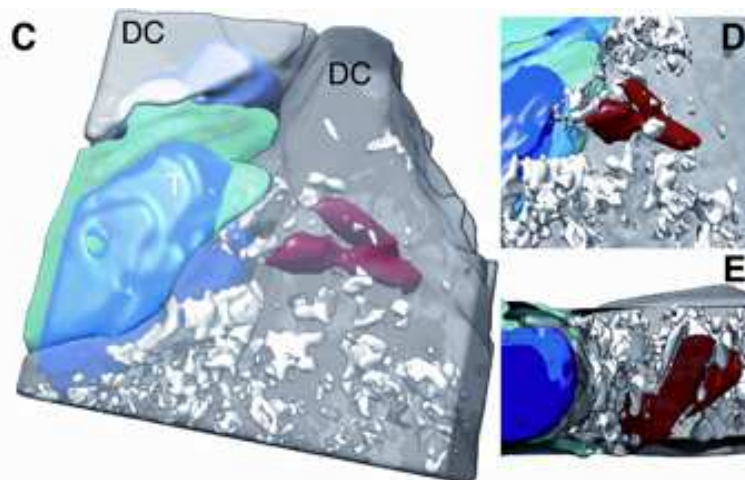
ES1: HRPD **ES2: High Pressure**



Discovered that T cells are able to capture and kill bacteria from dendritic cells by transinfection



A) Virtual slice of a tomogram showing an infected dendritic cell (DC) exposing internal bacteria near the immune synapse (IS) with a T cell (T). N labels the nucleus position of the T cell and V some vesicles. Bacteria are visible in the dashed orange square. B) Consecutive virtual slices every 460 nm showing the proximity of the three bacteria, in the orange square of A, to the IS with a T cell. Scale bars in A and B represent 2 microns



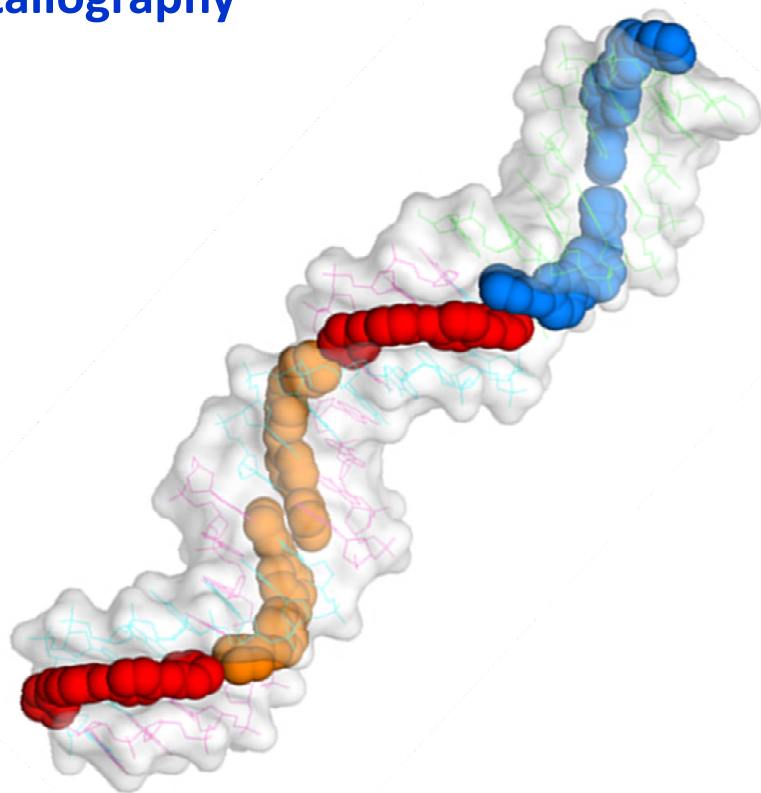
C, D and E) Volumetric representations of the tomogram in A and B. The T cell is represented in cyan and its nucleus is shown in blue. The dendritic cells (DC) are shown in grey and the bacteria in red.



BL13 - XALOC

**Macromolecular
Crystallography**

Crystal structure of the DNA with the CD27 drug that is a true alternative against malaria



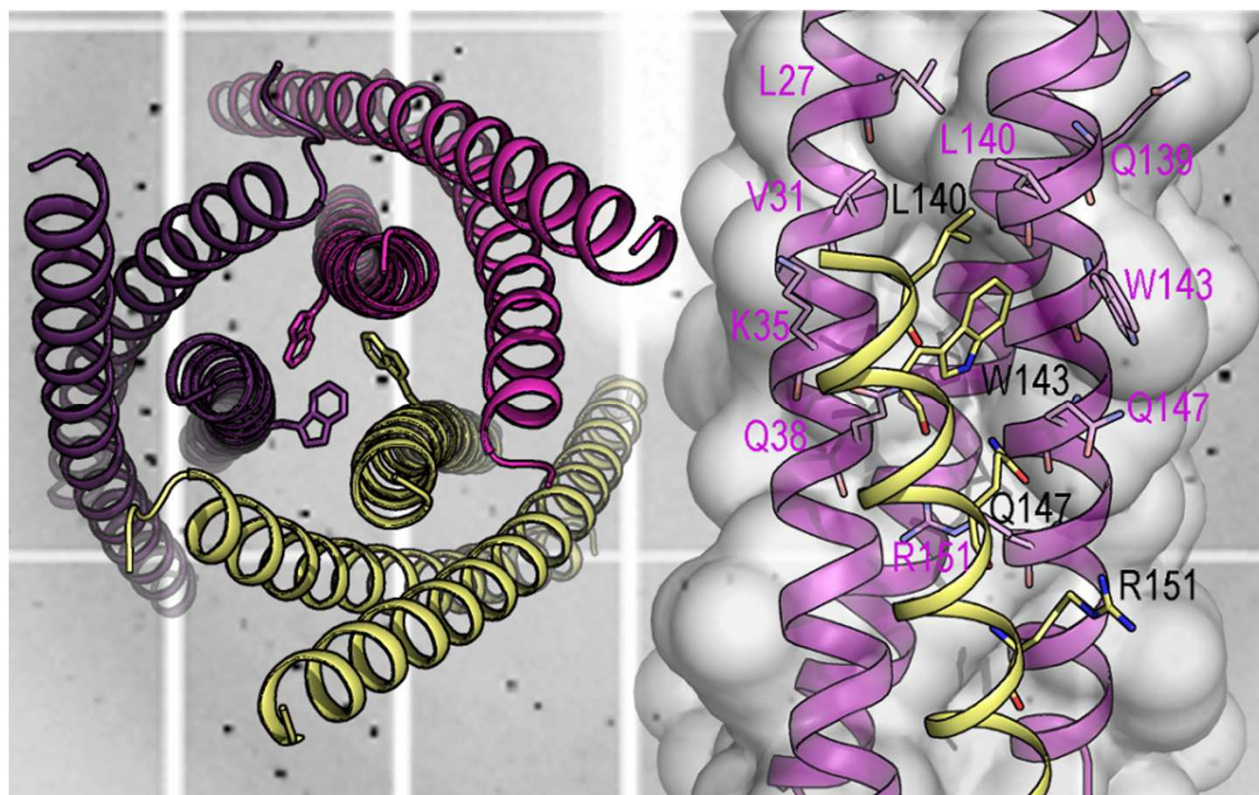
In the image, the CD27 drug completely covers the minor groove of the DNA, preventing the typical development of the parasite and causing its death.



BL13 - XALOC

**Macromolecular
Crystallography**

Resolution of the crystal structure of rationally designed single-chain protein constructs that can prevent HIV-1 infection



Crystallographic structure of the protein construct. Representation of the superposition of the protein construct onto the theoretical model of the gp41 ectodomain



BL04 - MSPD

Powder X-ray Diffraction (PXRD)

Active Pharmaceutical Ingredient polymorphs detection and identification

“Although a standard laboratory PXRD diffractometer is a fairly powerful technique with a detection limit acceptably low (0.1-1% depending on the API), sometimes even lower quantities of an undesired polymorph need to be detected in order to avoid transformation (due to microseeding), to comply with regulatory aspects or to avoid any legal issues concerning patent infringement.

These technical principles can be applied using the high energy synchrotron light at ALBA (beamline BL04 - MSPD: Materials

Science and Powder Diffraction), giving more sensitive data and a much better peak resolution.”

(Customer's opinion)





ALBA INDUSTRIAL OFFICE

VISION

- Contributing to improve the Industry competitiveness by using the latest Synchrotron Light developments.

MISSION

- To promote and to make available to the Industry all the potential of the Synchrotron Light applications.

STRATEGY

- Customer satisfaction, one-stop shop service.

ORGANIZATION

- Office reporting to the Director.

Industrial Workshop at ALBA



Next ALBA Industrial workshop is devoted to the Biomedical Industry (May 7th, 2015)

Summary

- **The ALBA Synchrotron is a valuable tool for the R&D and innovation activities of the public and private Industry, specially of the Biomedical Industry.**
- **One of the ALBA main goal is to improve Industry competitiveness.**
- **The ALBA Synchrotron offers a wide range of industrial research services and collaboration possibilities in the public-private domain.**

