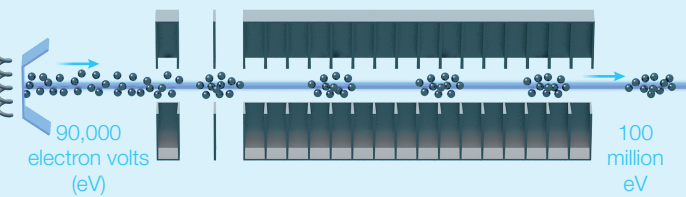


ACCELERATORS

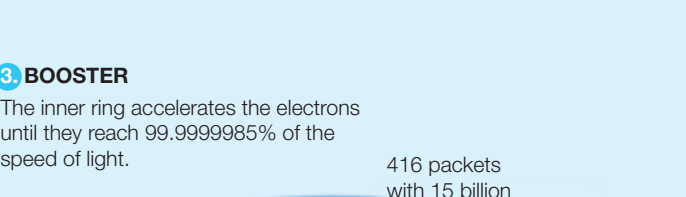
Electrons are emitted and accelerated

1. ELECTRON GUN
Metallic surface heated to more than 1,000°C that emits electrons (•)



90,000 electron volts (eV) 100 million eV

2. LINEAR ACCELERATOR
Radio frequency cavities group electrons into packets and accelerate them.

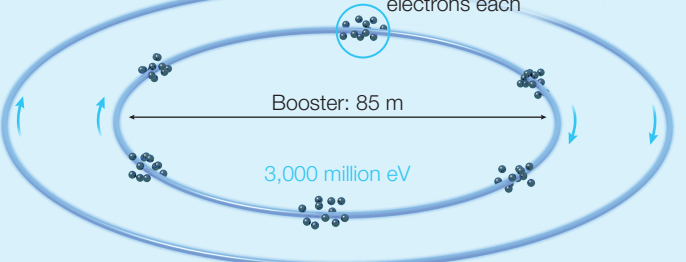


416 packets with 15 billion electrons each

Booster: 85 m

3,000 million eV

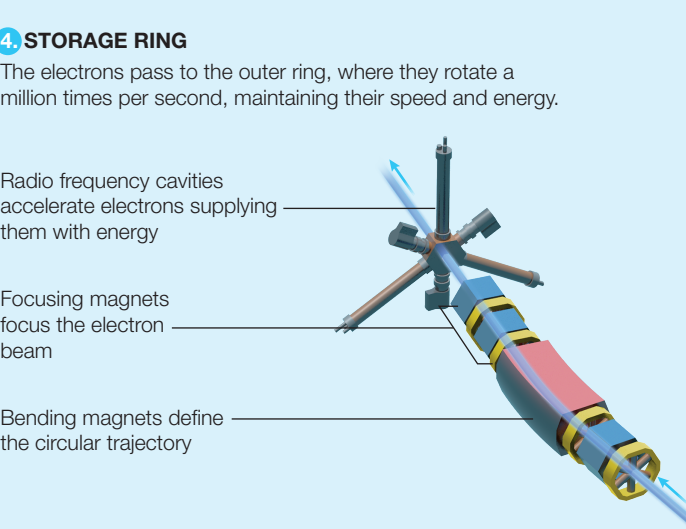
3. BOOSTER
The inner ring accelerates the electrons until they reach 99.999985% of the speed of light.



Booster: 85 m

3,000 million eV

4. STORAGE RING
The electrons pass to the outer ring, where they rotate a million times per second, maintaining their speed and energy.

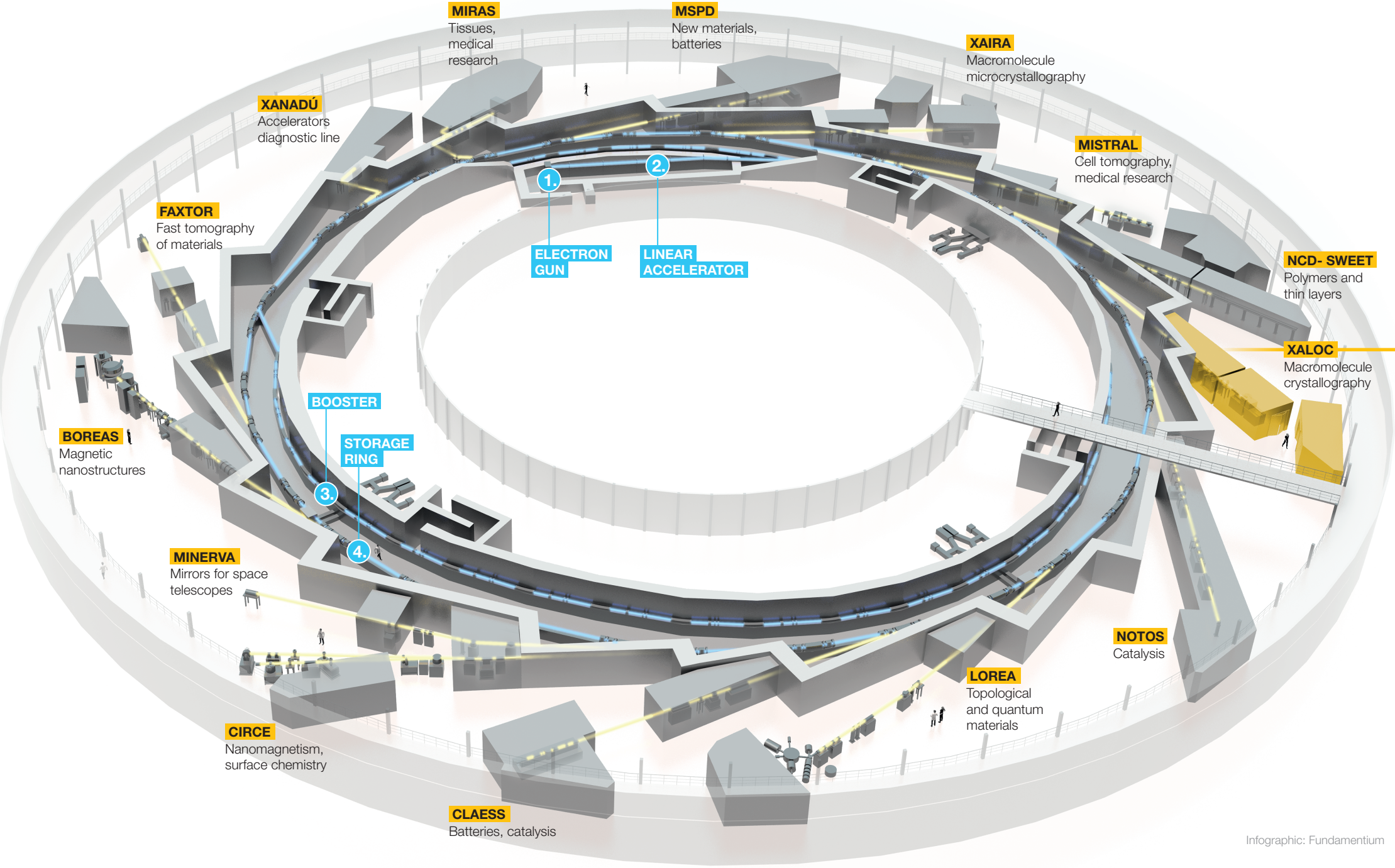


Radio frequency cavities accelerate electrons supplying them with energy

Focusing magnets focus the electron beam

Bending magnets define the circular trajectory

THE ALBA SYNCHROTRON

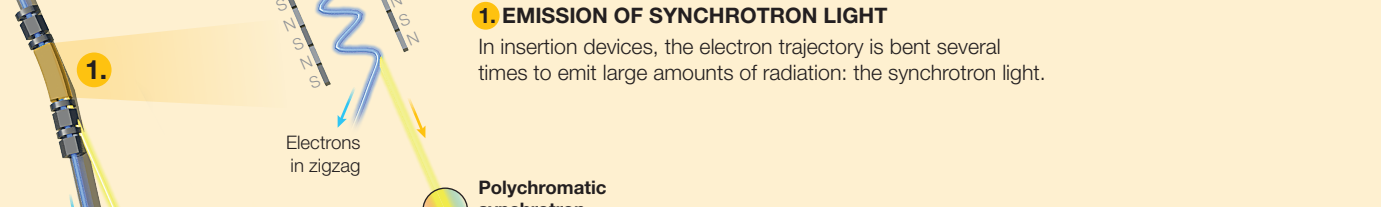


Infographic: Fundamentium

BEAMLINES

The light emitted by the electrons is used for research

1. EMISSION OF SYNCHROTRON LIGHT
In insertion devices, the electron trajectory is bent several times to emit large amounts of radiation: the synchrotron light.

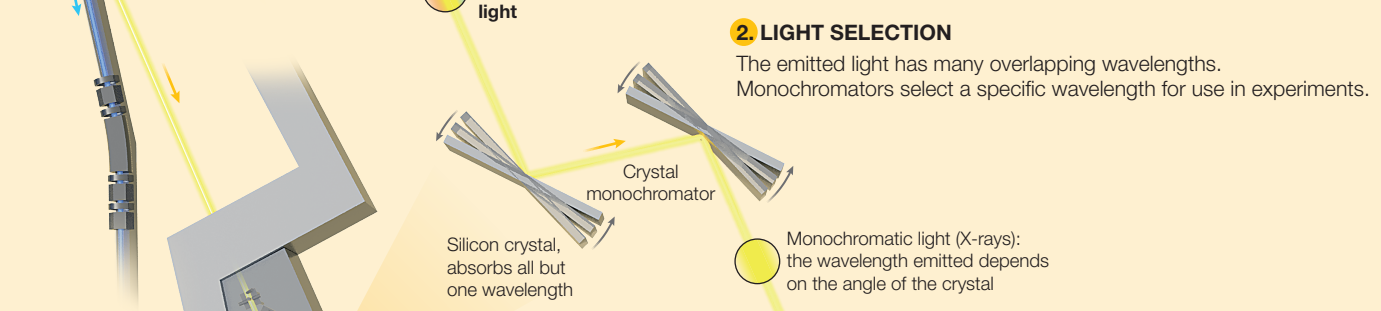


Insertion device

Electrons in zigzag

Polychromatic synchrotron light

2. LIGHT SELECTION
The emitted light has many overlapping wavelengths. Monochromators select a specific wavelength for use in experiments.




Crystal monochromator

Silicon crystal, absorbs all but one wavelength

Monochromatic light (X-rays): the wavelength emitted depends on the angle of the crystal

3. SAMPLE ANALYSIS
In each of the lines, research teams from many areas of science use focused X-rays to investigate the nature of the samples.



Sample to be analysed (crystal protein)

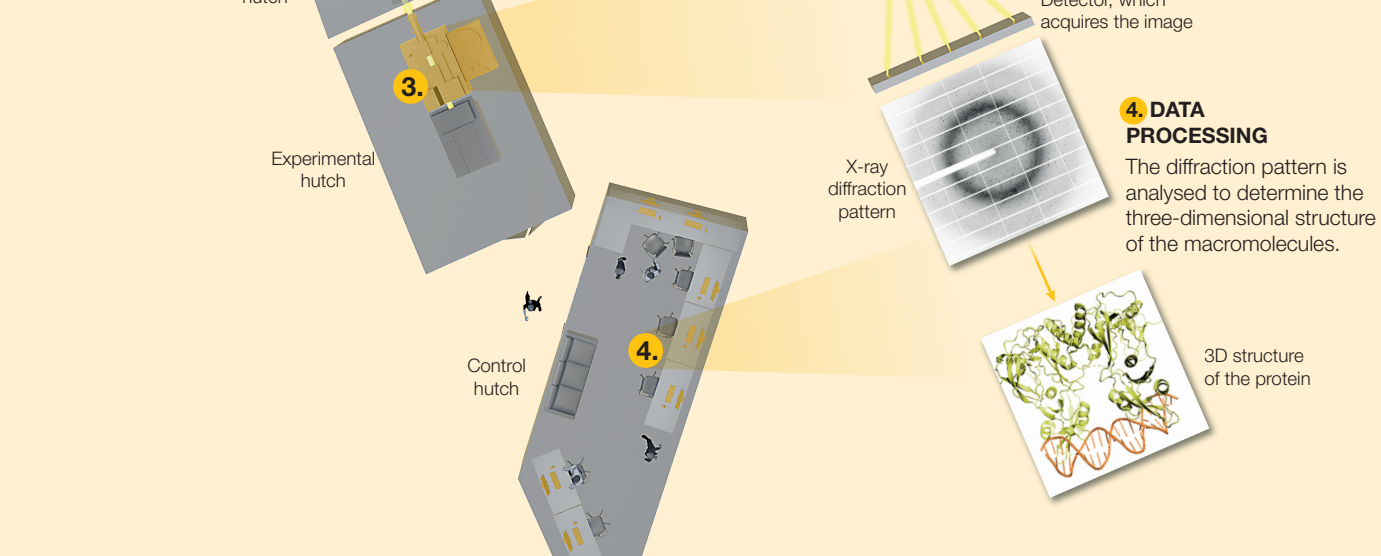
Diffracted rays

Detector, which acquires the image

Optical hutch

Experimental hutch

4. DATA PROCESSING
The diffraction pattern is analysed to determine the three-dimensional structure of the macromolecules.



X-ray diffraction pattern

3D structure of the protein

Control hutch