

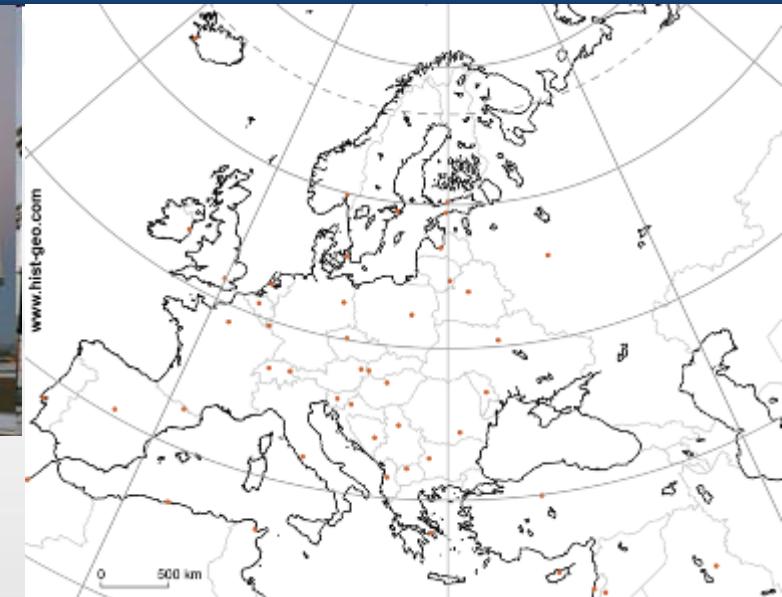


European Synchrotron Radiation Facility

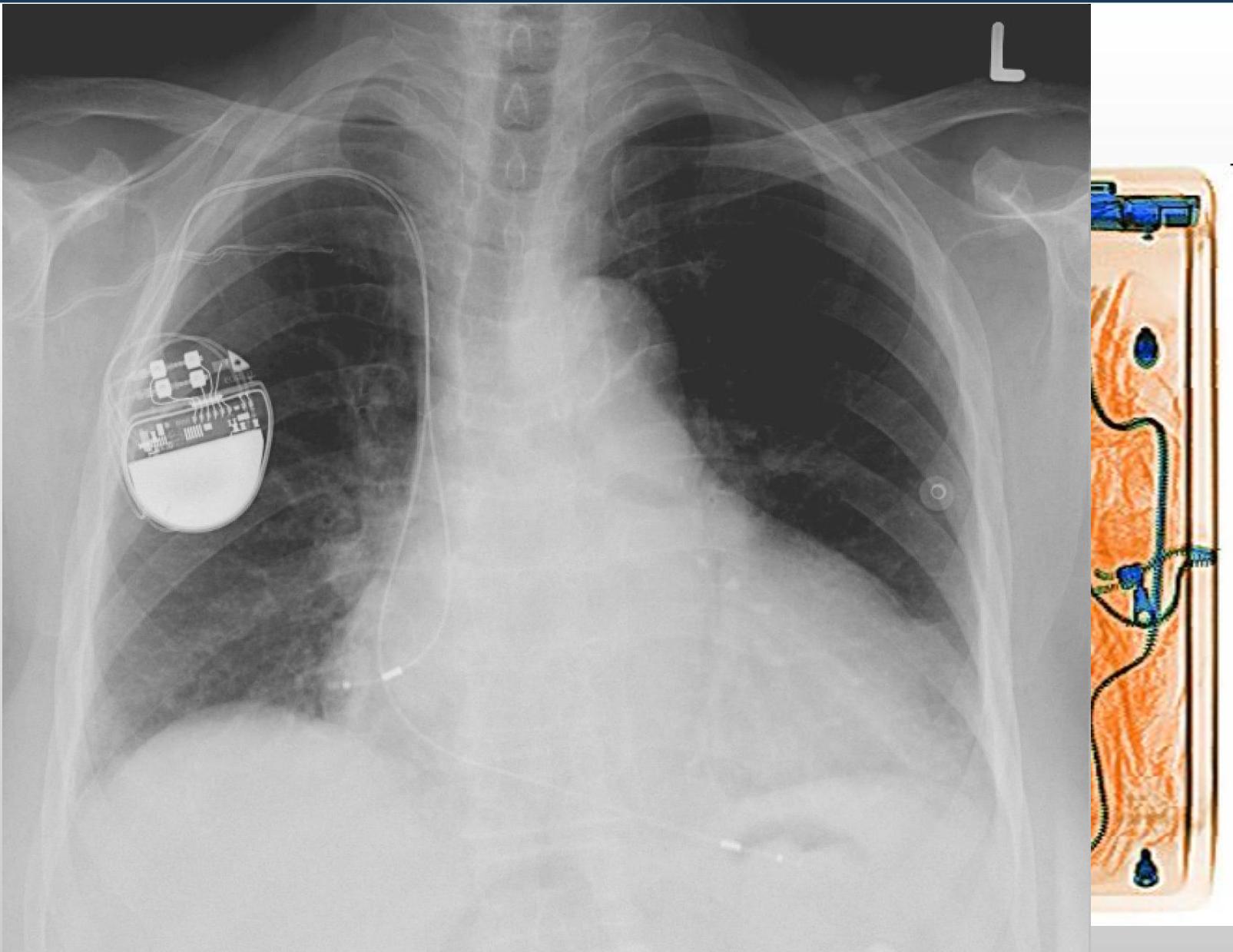
Claus HABFAST



European
Science
1953
1962
1975
1988









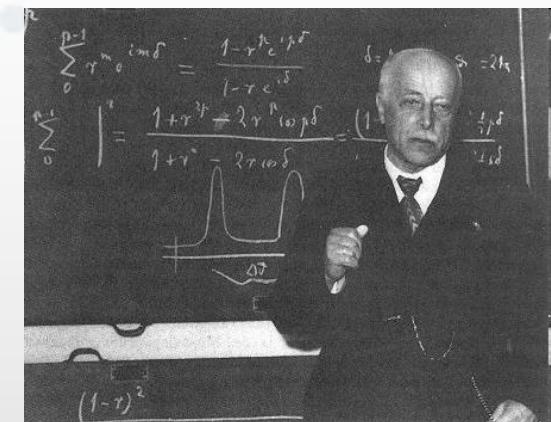
Röntgen discovered X-rays in 1895 and received the first Nobel Prize in physics in 1901.



X-rays



BEFORE LEAVING THE EXHIBITION
“SEE”
THE WONDROUS
X RAYS
The
Greatest Scientific Discovery
of the Age.
By the aid of the New Light you are
enabled to see
“THROUGH A SHEET OF METAL”
“THROUGH A BLOCK OF WOOD”
“Count the Coins within your Purse.”
ADMISSION - 3d.
OPEN ALL DAY.
X RAY PHOTOGRAPHS TAKEN.
PTO

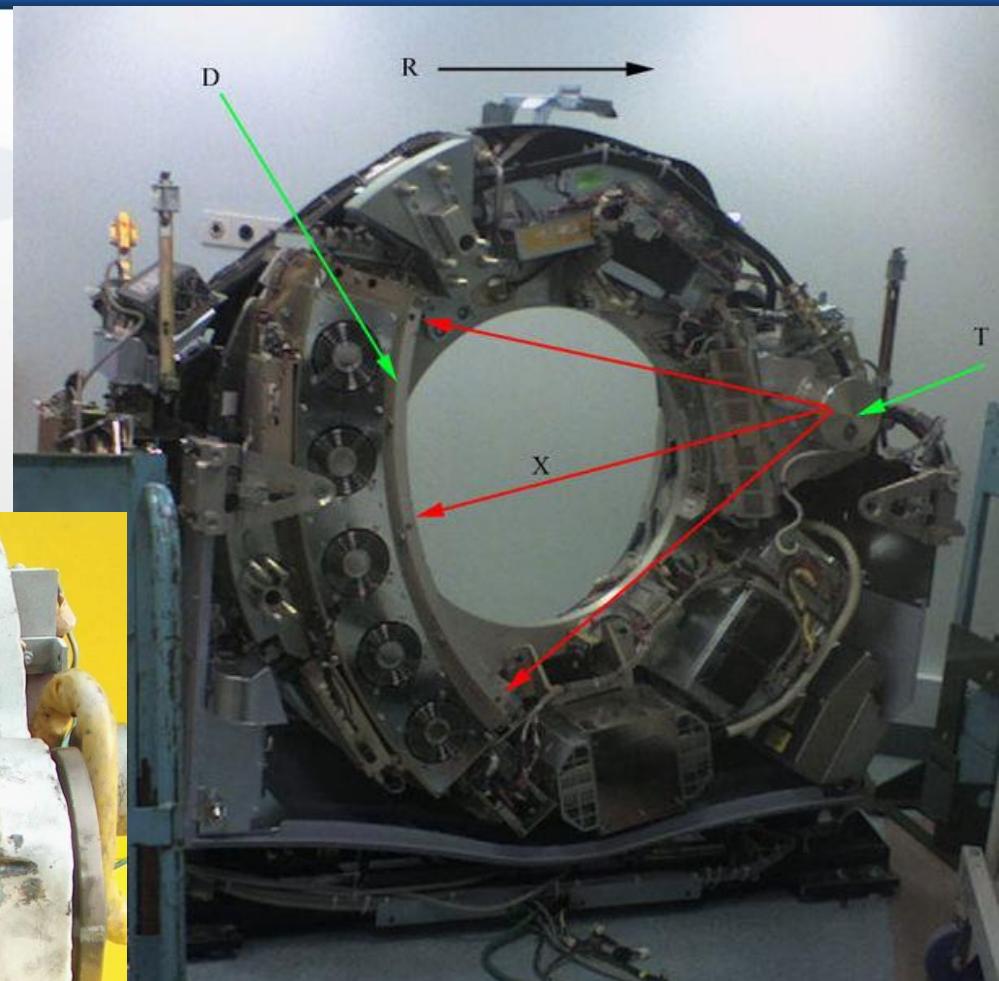
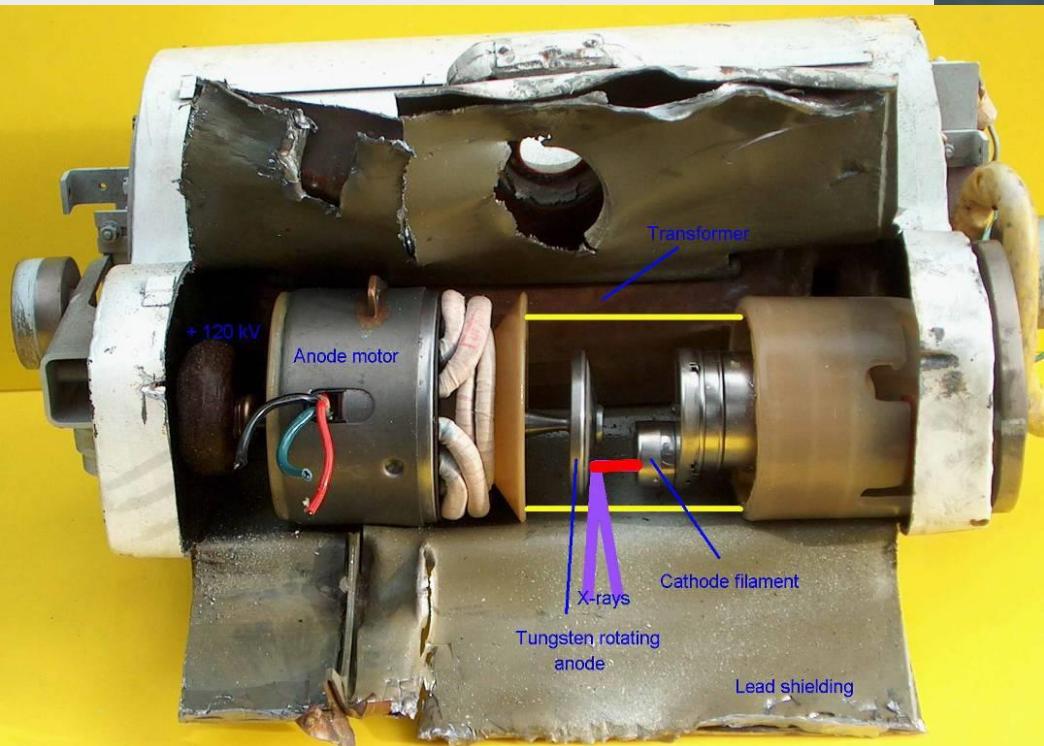


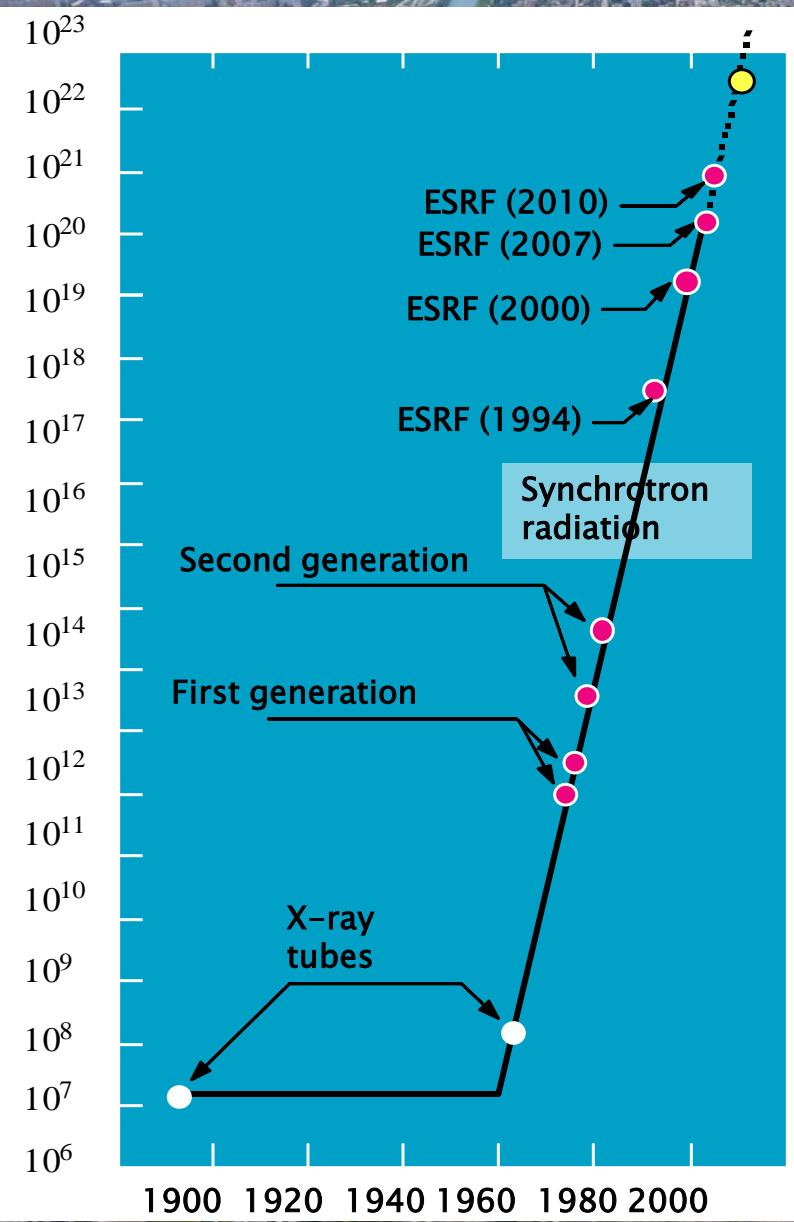
Max von Laue



Medical X-ray Tube

X-ray CT scanner



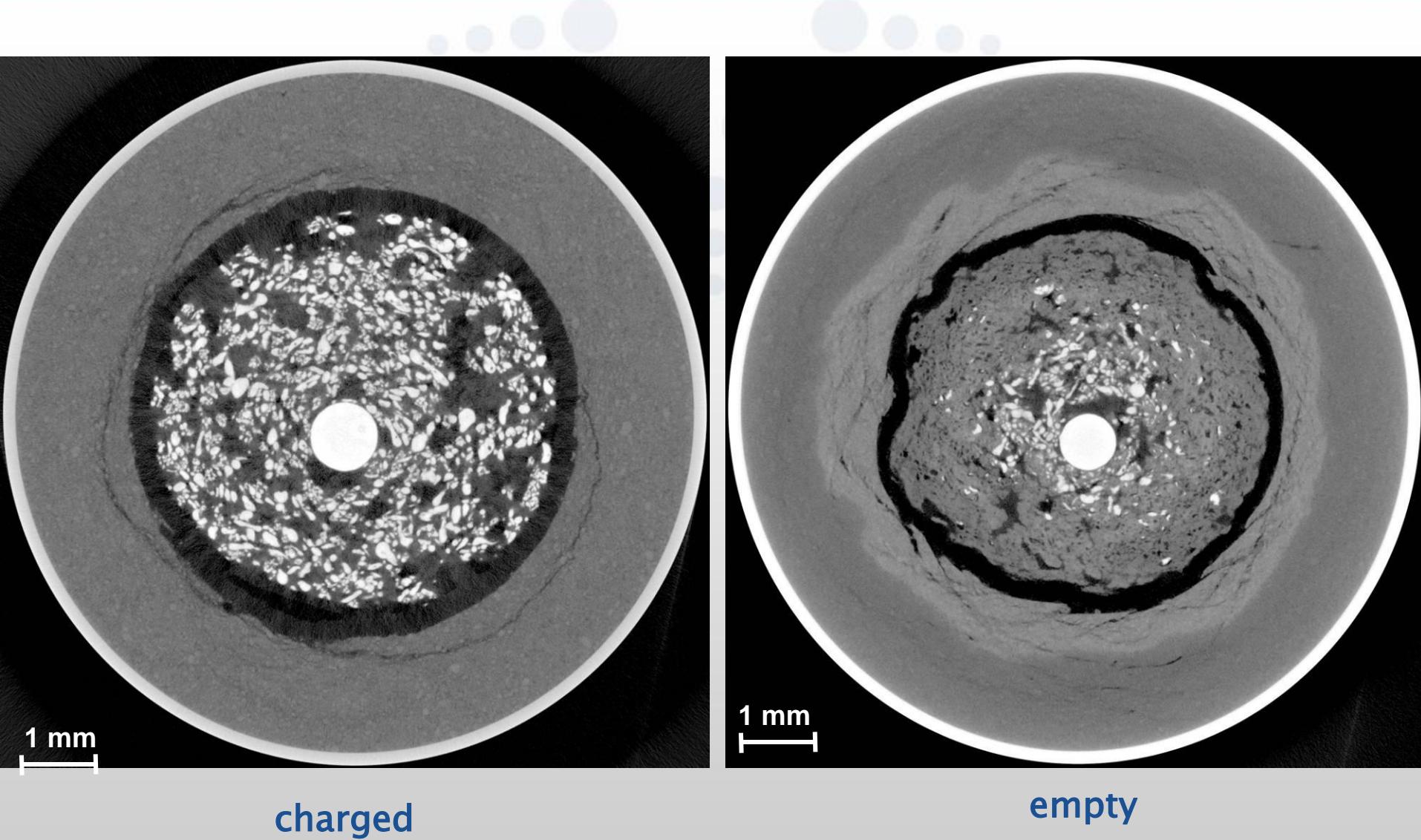


X-Ray Tomography

charged

or empty ?





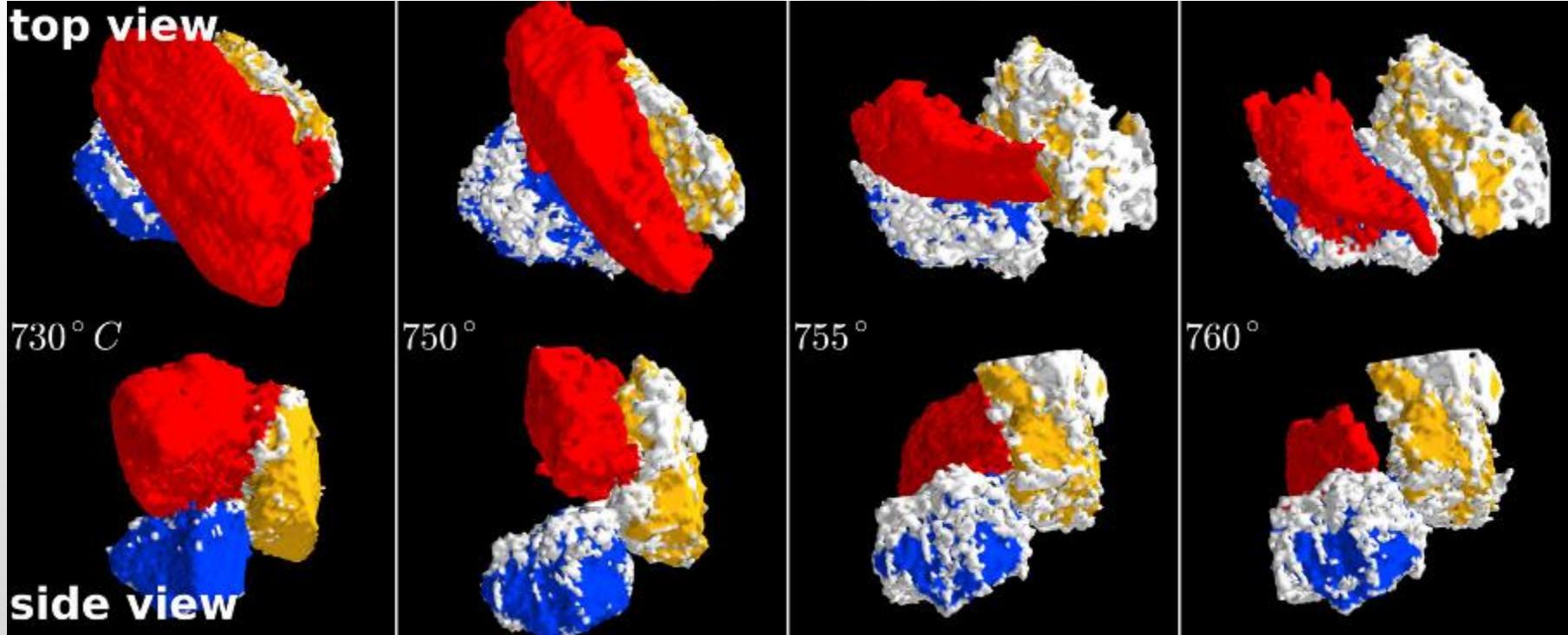
M. Scheel, Max Planck Institute for Dynamics and Self-Organization, Göttingen

La
de

Glass raw materials at room temperature

CNRS – Saint Gobain - ESRF

top view



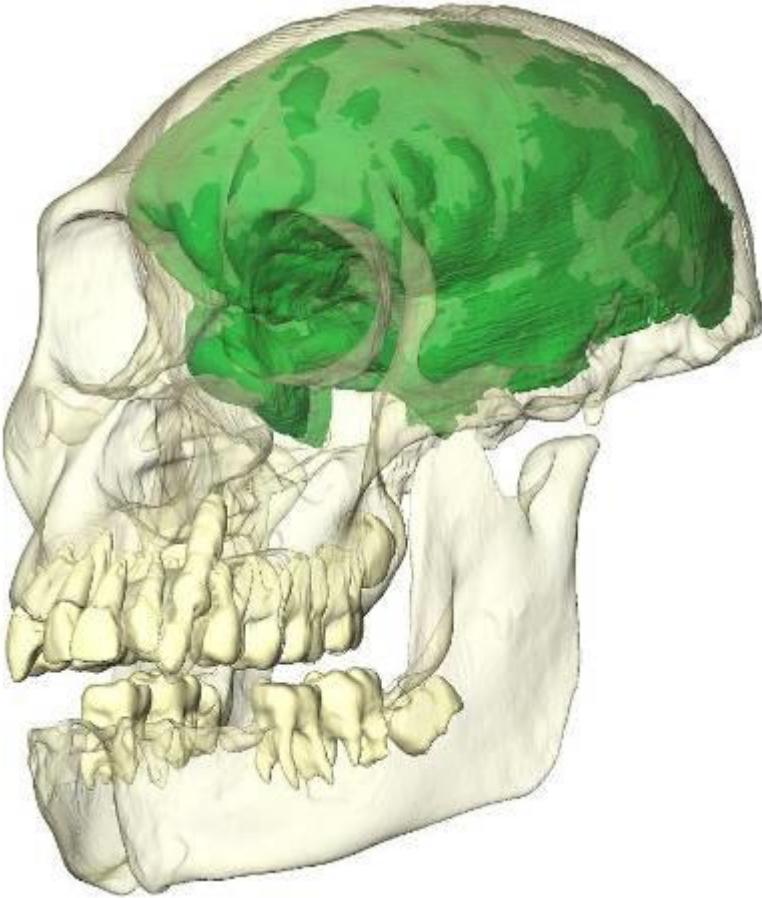
86.5 TWh
*Consommation
d'énergie (2005)
de l'industrie du
verre mondiale*

27.5€
*Prix pour 1 MWh
de gaz naturel*

3.2 Mrd €
*Coûts annuels
pour l'énergie
de l'industrie du
verre*

**Saint-Gobain Glass est au
1er rang des producteurs
de verre plat en Europe de
l'ouest et au second au
niveau mondial.**

Our closest ancestor? *Australopithecus Sediba*



9 April 2010

9 September 2011



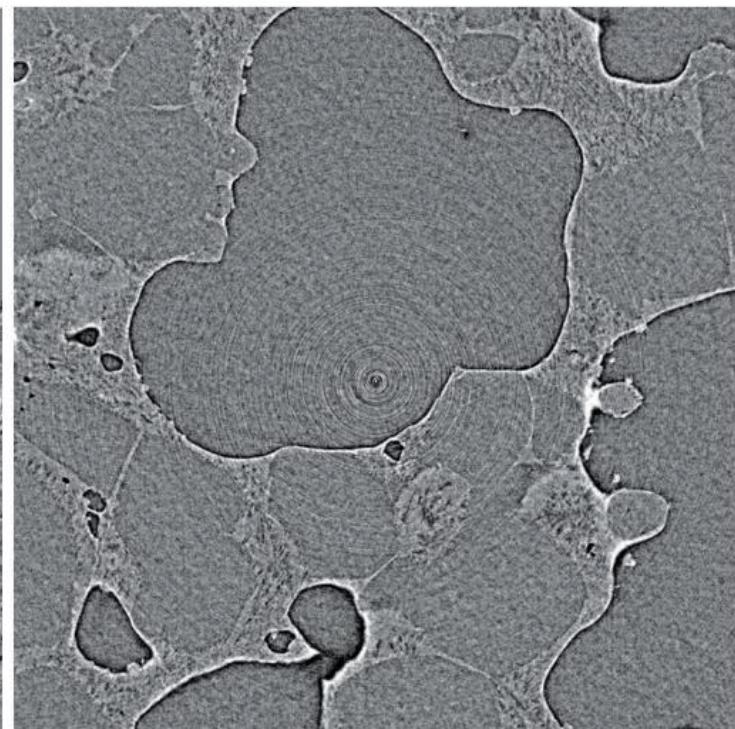
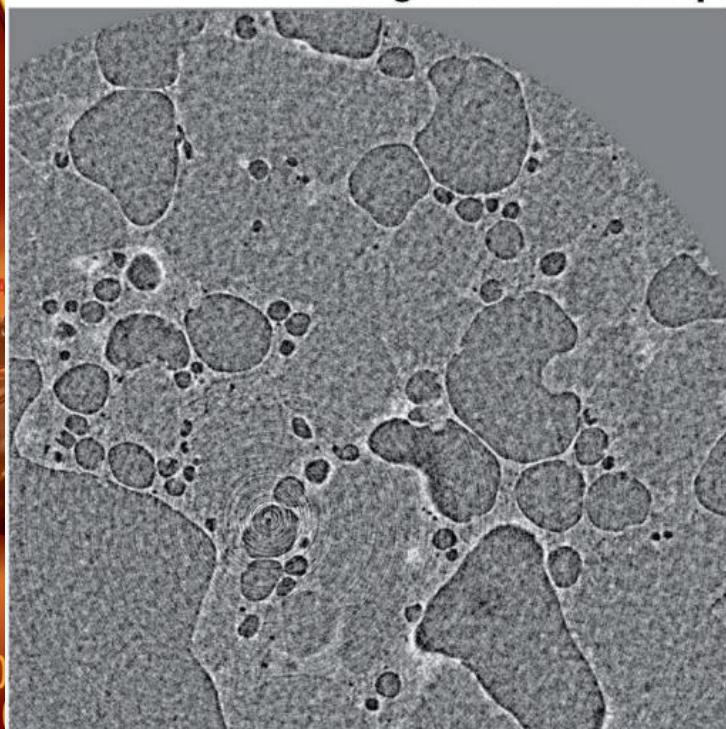
Five papers on:
Brain (ESRF)
Hand
Hip bone (pelvis)
Foot and ankle
Exact age

"The many very advanced features found in the brain and body ...make it possibly the best candidate ancestor for our genus, the genus Homo."

Lee Berger, Wits U, Johannesburg



Image size = $725*725\text{px}^2 = 0.41*0.41 \text{ mm}^2$





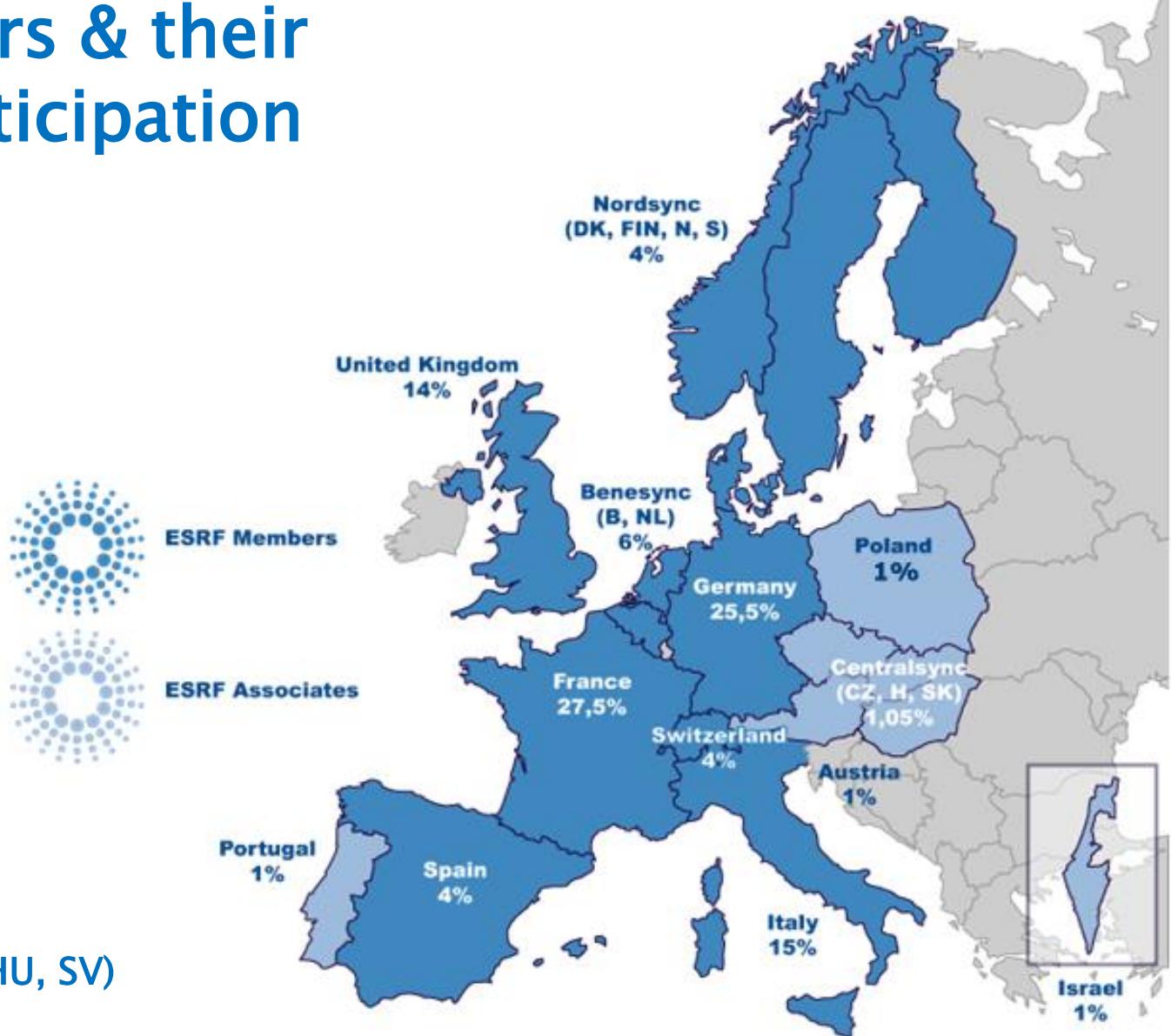
Major synchrotrons in the world

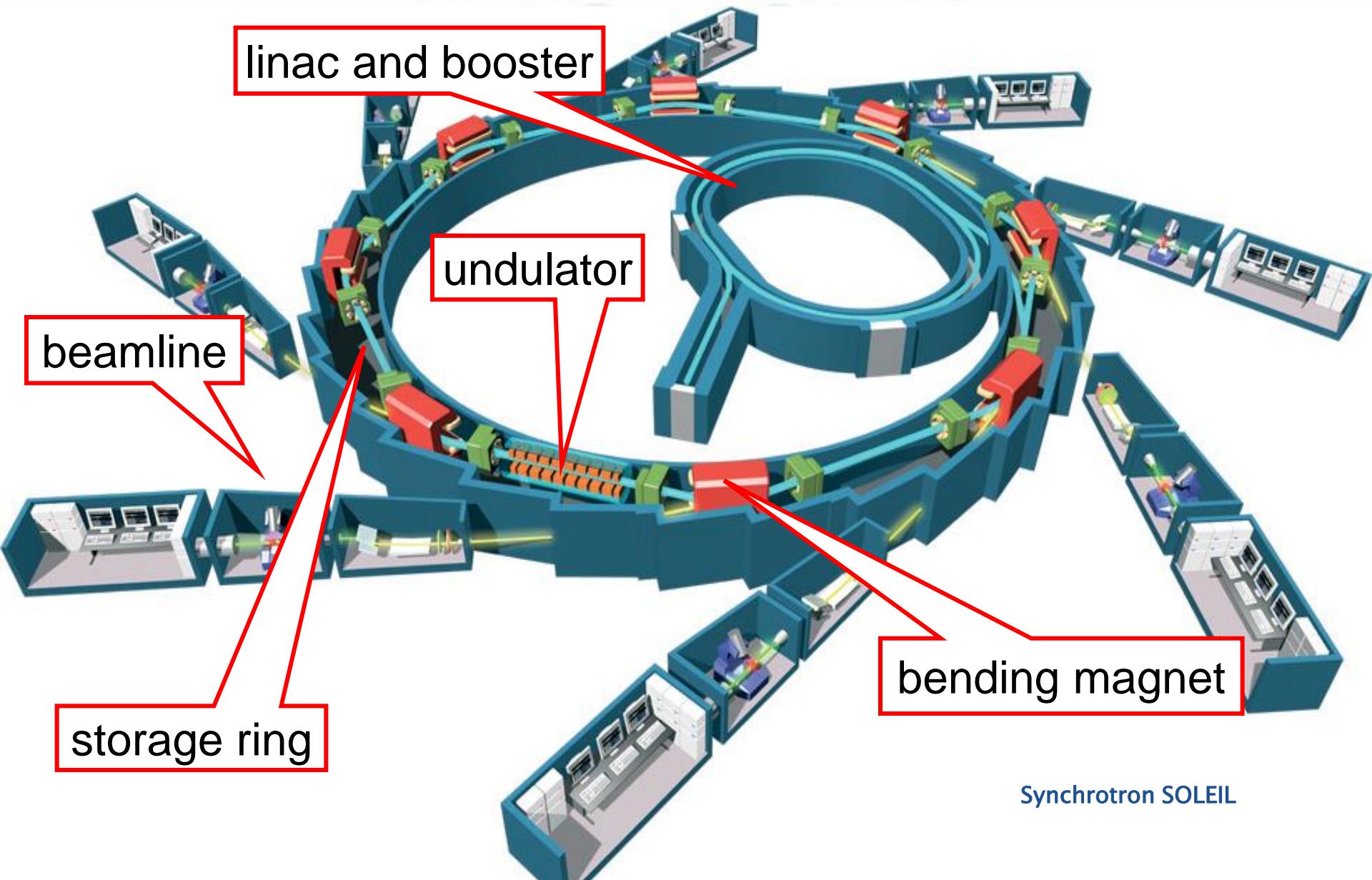


ESRF Members & their financial participation

27.5% France
25.5% Germany
15% Italy
14% United Kingdom
4% Spain
4% Switzerland
6% Benesync
(BE, NL)
4% Nordsync
(DK, SF, NO, SE)

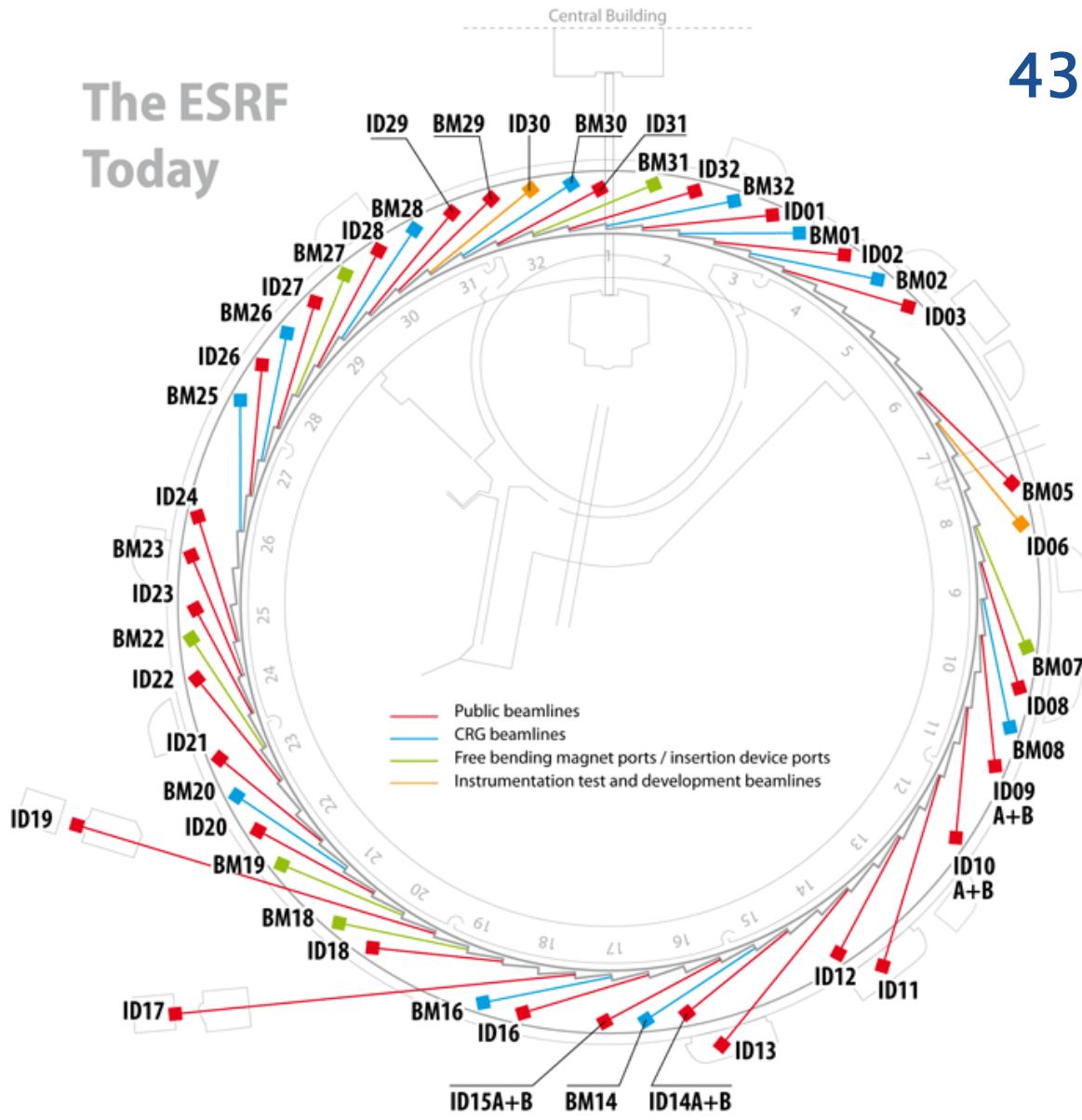
1% Portugal
1% Israel
1,5 % Austria
1% Poland
1.05% Centralsync (CZ, HU, SV)
0.3% South Africa





Synchrotron SOLEIL

The ESRF
Today



43 experimental stations operating in parallel

**29.5 run by ESRF
13 run by Members**

User operation:

**5200 hrs/year
for external users**

24h/24h and 6d/7d availability

>98.5% reliability

An X-ray Swiss Army Knife for Scientists

ESRF serves a wide range of science:

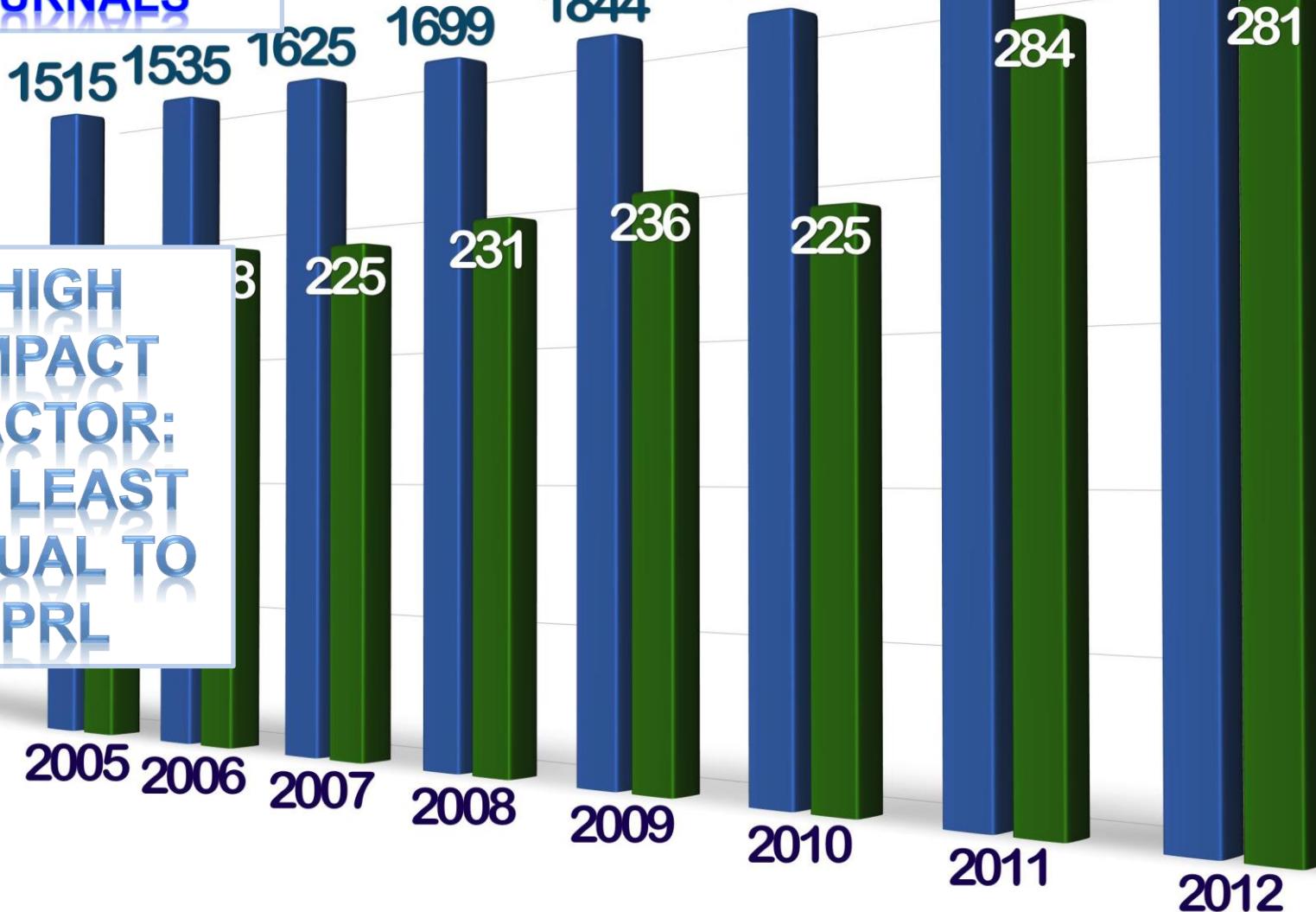
- Biology
- Chemistry
- Materials
- Paleontology
- Physics
- Archeology
- Medicine
- Nanoscience
- Geosciences
- Environment
- ...



Which is mirrored in industrial beam time applications:

- Pharma – drug discovery
- Pharma - formulation
- Automotive
- Food
- Aerospace
- Petrochemicals
- Cosmetics
- ...

PUBLICATIONS IN PEER REVIEWED JOURNALS



HIGH
IMPACT
FACTOR:
AT LEAST
EQUAL TO
PRL

Some of our Partners

A Light for Science



ArcelorMittal



Schneider
Electric



Bayer HealthCare
Bayer Schering Pharma



TOTAL AREVA



Rhodia

GALDERMA
R & D
SOPHIA ANTIPOLIS

CORNING



N
NERVIANO MEDICAL SCIENCES



TOYOTA CENTRAL R&D LABS., INC.

JM
Johnson Matthey

syngenta

Sareum

L'ORÉAL
RECHERCHE

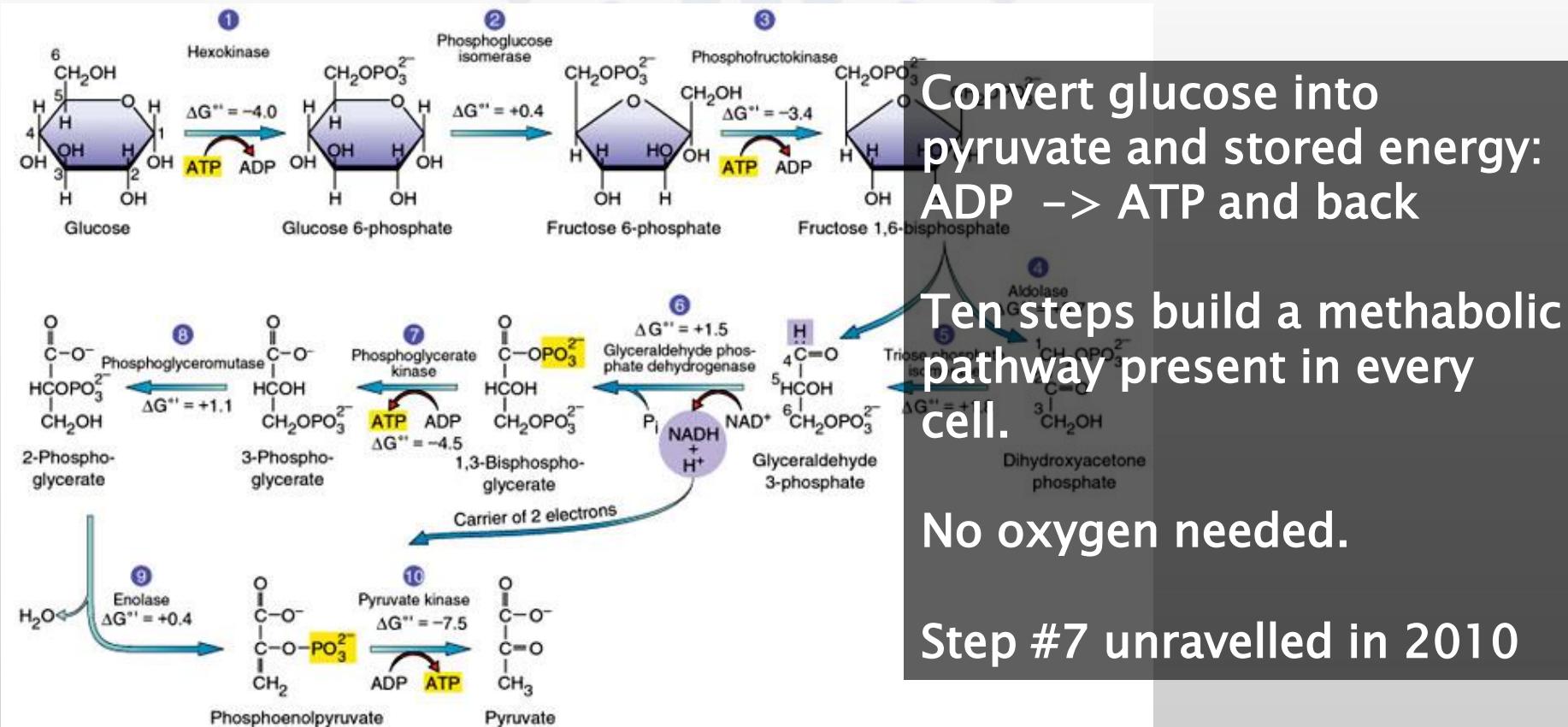
gsk
GlaxoSmithKline

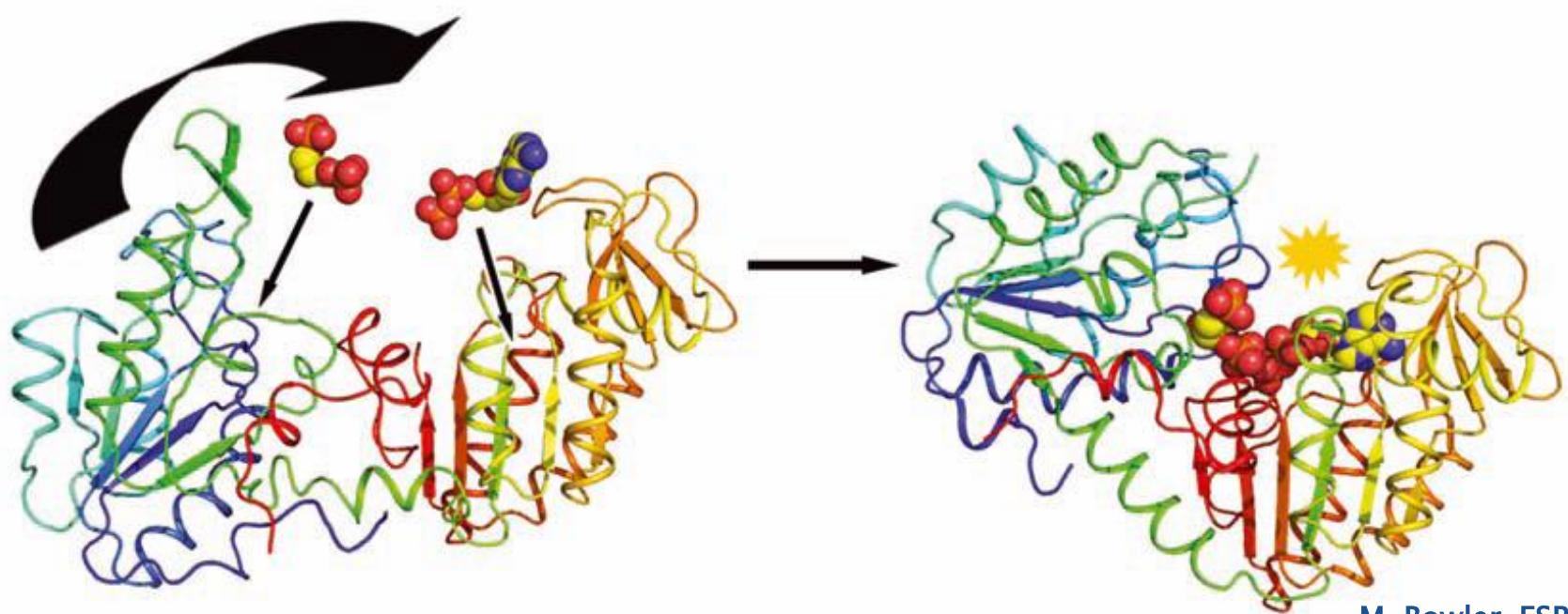
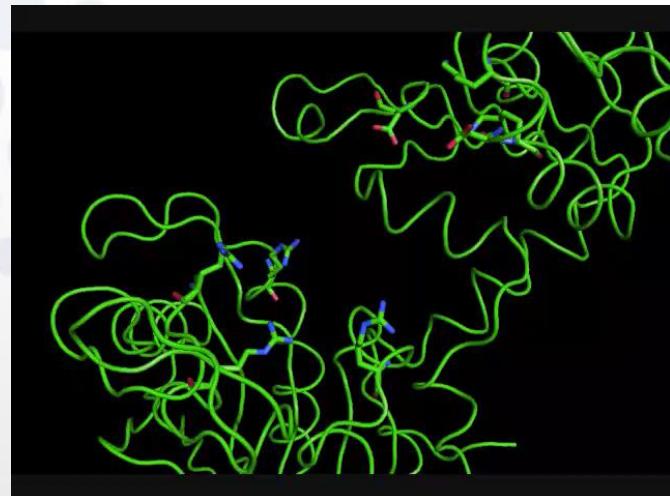
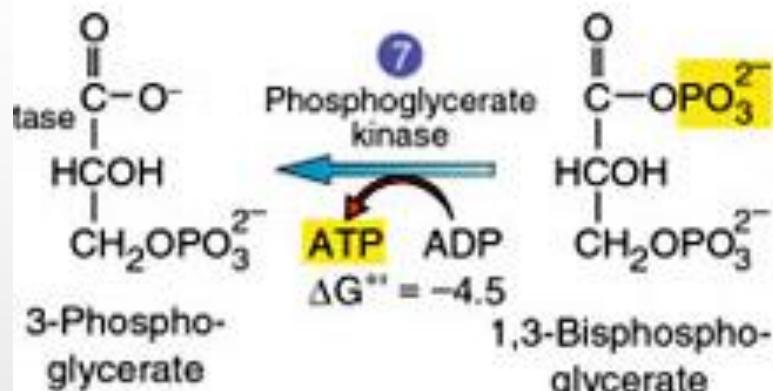
DAIHATSU

AstraZeneca

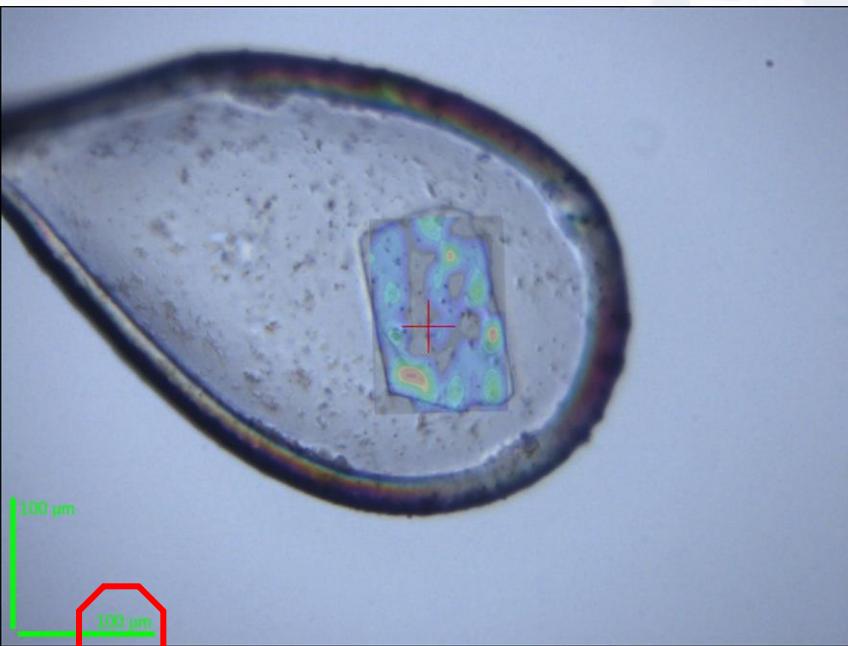
Unilever

Glycolysis: an efficient use of biomass?





G-Coupled Protein Receptors



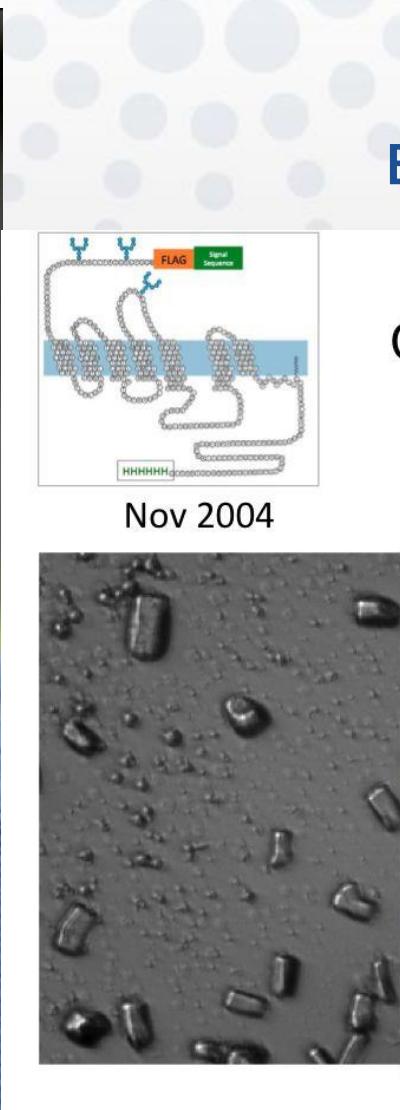
800 different proteins
controlling
“cell communication”

The challenge:
obtain GPCR
crystals



Rasmussen et al, Stanford & Cambridge

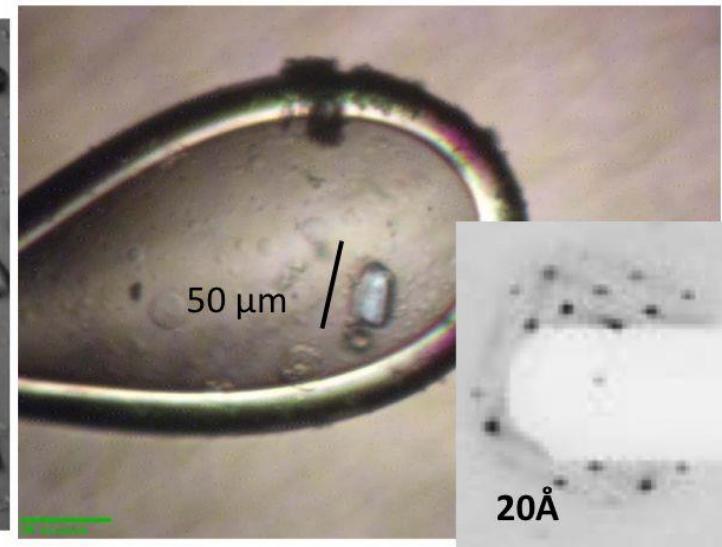
Brian Kobilka (Stanford University)



Chemistry Nobel Prize 2012
with Robert Lefkowitz
ESRF user from 2005 to 2007

Crystals of wild-type β_2 AR

ESRF microfocus beamline ID13, July 2005

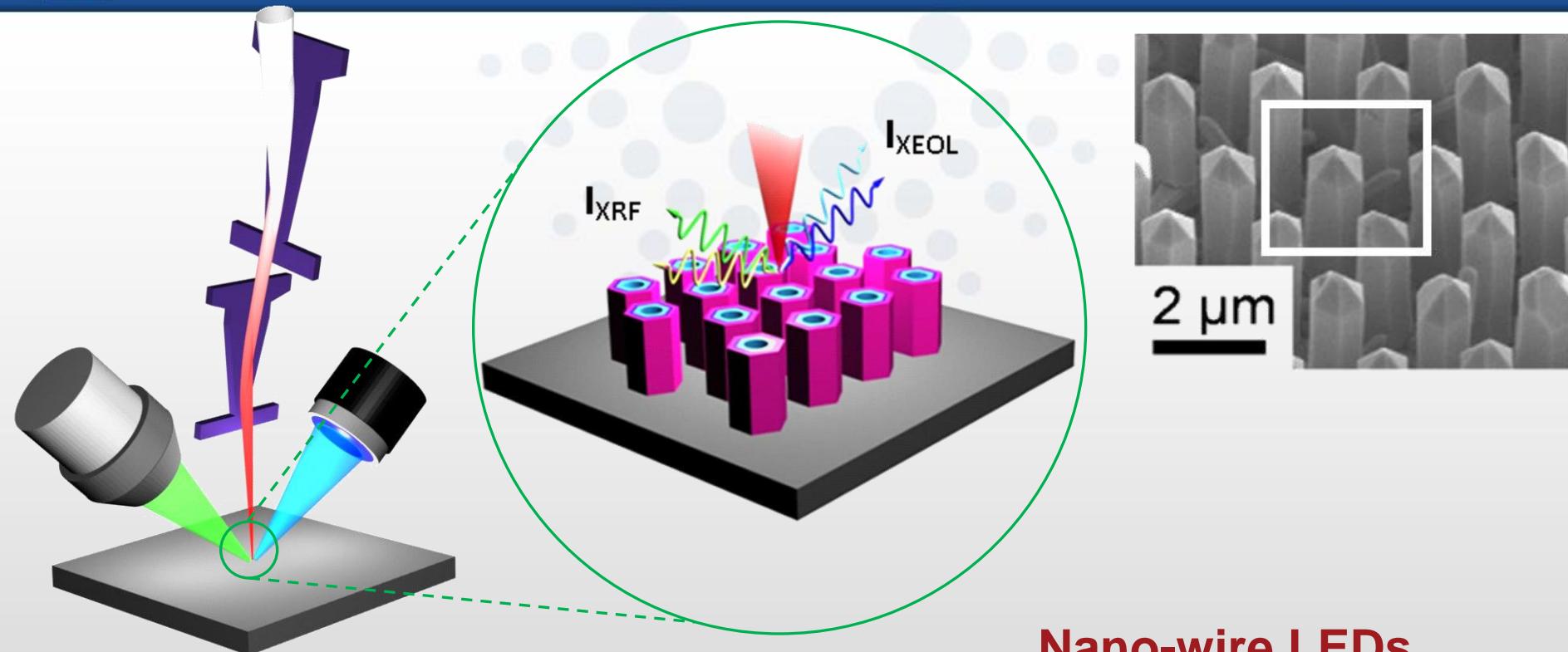




Light source world market:
73 Mrd € (2011) → 100 Mrd € (2020)

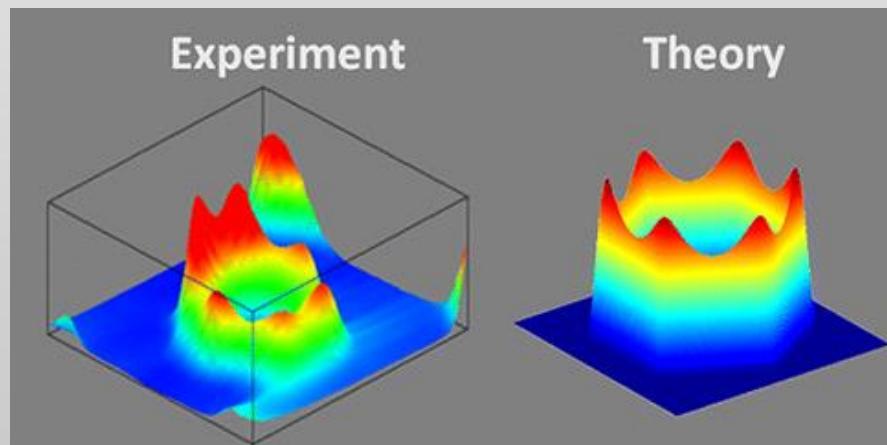
LED market share:
12% (2011) → 41% (2016) → 63% (2020)

Source: McKinsey



Nano-wire LEDs

G. Martinez et al. (2012):
ESRF, along with
Spanish, French and Korean
National Research Centres



Thank you !

