



| The European Synchrotron



# ESRF

## The European Synchrotron

# A UNIQUE SITE FOR RESEARCH AND INNOVATION



EMBL



# AT THE HEART OF THE GLOBAL INNOVATION CAMPUS GIANT



HH

1980

**1988 Launch of the construction of the ESRF**



1990

**1992 1<sup>st</sup> electron beam in the storage ring**

2000

HH



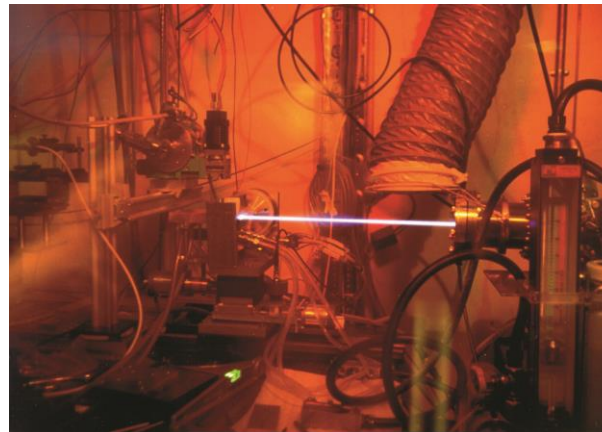
1980

**1994 The ESRF opens for the users**



1990

**1998 40 beamlines are in operation**



X-ray beam and  
its air-ionization

2000

# Today – The ESRF: 22 partner nations

## 13 Member states:

Country	Contribution to the budget in %
France	27.5 %
Germany	24 %
Italy	13.2 %
United Kingdom	10.5 %
Russia	6 %
Benesync (Belgium, The Netherlands)	5.8 %
Nordsync (Denmark, Finland, Norway, Sweden)	5 %
Spain	4 %
Switzerland	4 %

## 9 Associate countries:

Israel	1.75 %
Austria	1.75 %
Centralsync (Czech Republic, Hungary, Slovakia)	1.05 %
Poland	1 %
Portugal	1 %
India	0.66 %
South Africa	0.3 %



**22 partner nations**

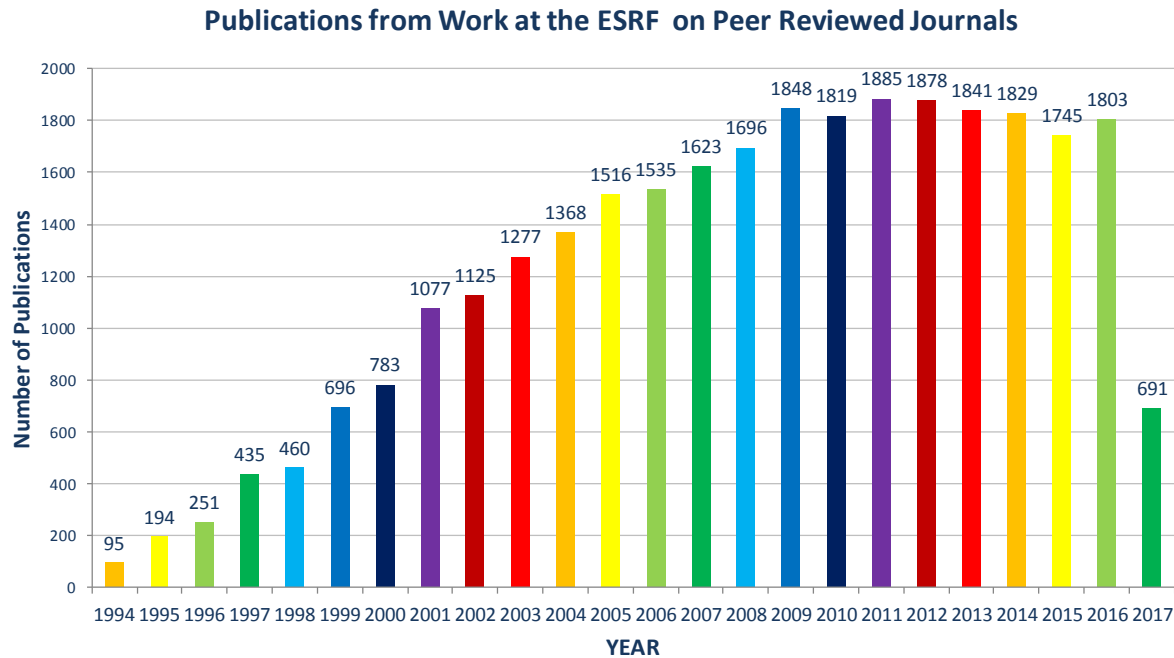
**Annual budget: 100 million euros**

**Staff: 650 people, 40 different nationalities**

**Legal status: French “société civile”**

## Research at the ESRF: How does it work?

- Scientific committee selects the best proposals
- More than 9,000 scientific visits every year



- Public research and industry



## Research at the ESRF: How much does it cost?

	Member states	Other states
Public research	Free + All travel expenses are covered	Free
Proprietary research	450€/hour	540€/hour

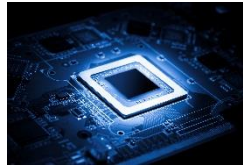
## Health, Biology



## Earth sciences, Paleontology



## Nanosciences, Information technology



## Chemistry, Energy, Materials



## Cultural heritage



## Scientific example: Palaeontology

### Australopithecus Sediba

1.9 million years



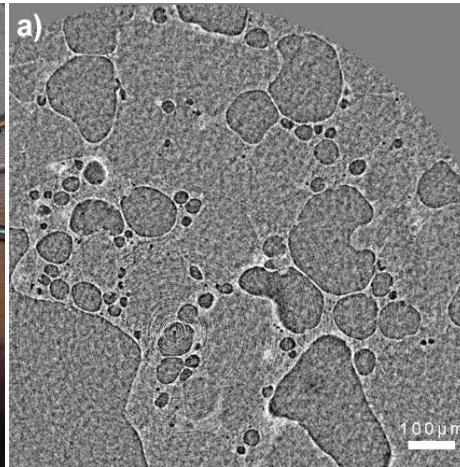
## Scientific example: Food

### Ice cream

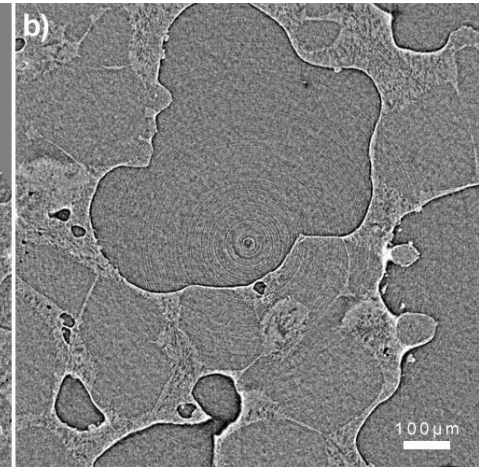
Microstructures characterization of ice cream



Credit: ElinorD, creative commons

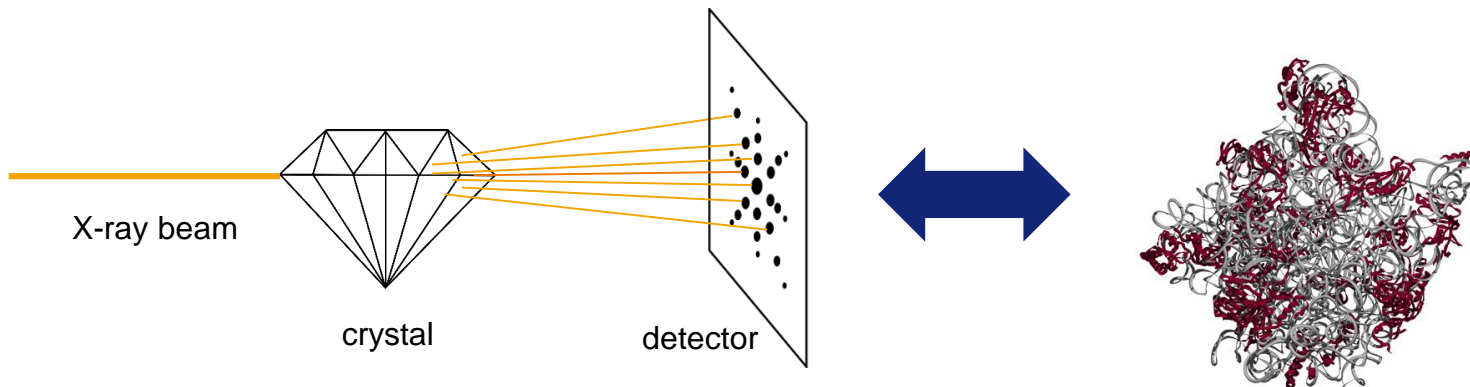
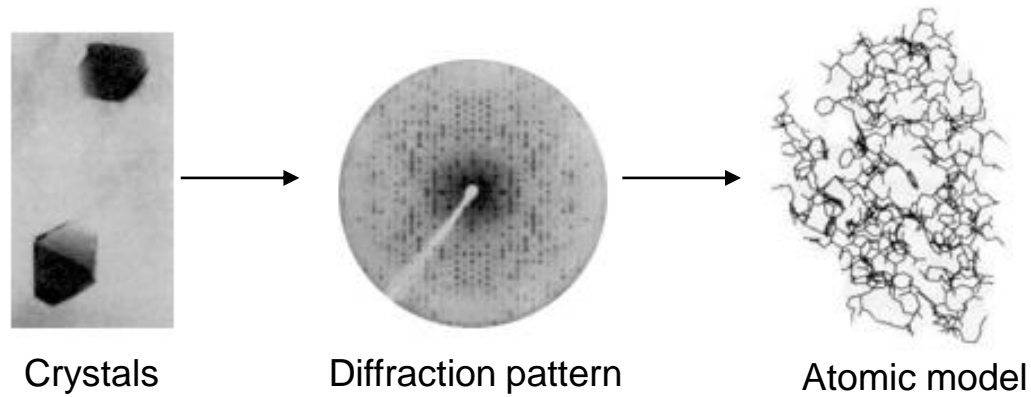


*Fresh ice-cream*



*"Temperature-abused" ice cream*

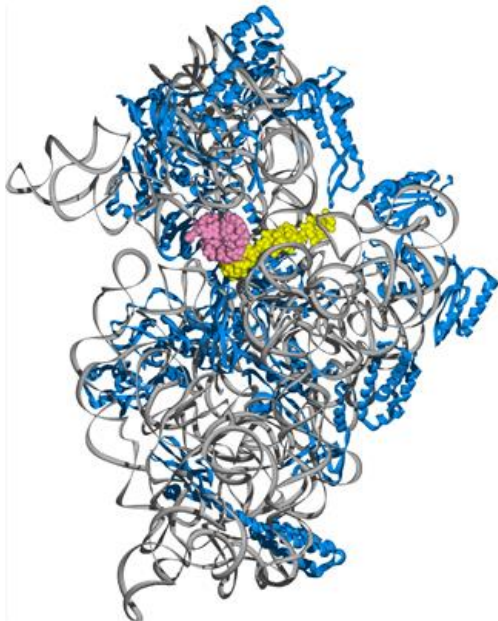
## Scientific example: Structural Biology



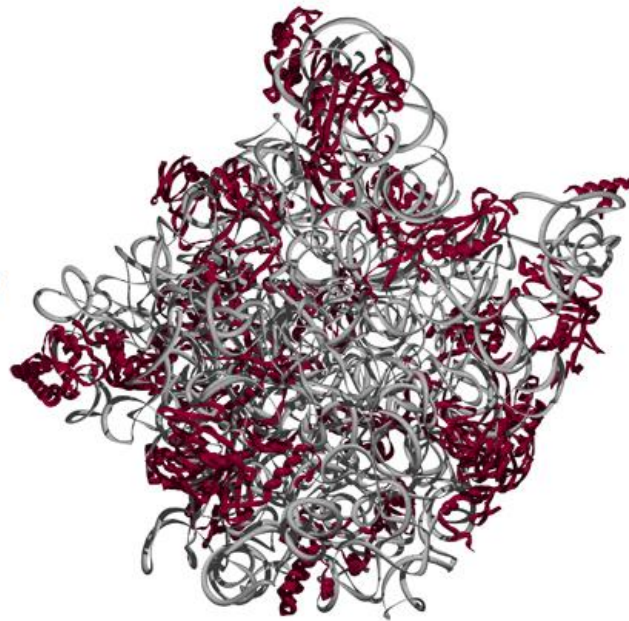
# Scientific example: Structural Biology

## Ribosome

Protein synthesis mechanism



**SMALL RIBOSOMAL SUBUNIT**



**LARGE RIBOSOMAL SUBUNIT**

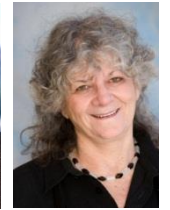
Nobel prize in Chemistry 2009



**Venkatraman Ramakrishnan**  
MRC Laboratory of Molecular, Cambridge, UK



**Thomas A. Steitz**  
Yale University, New Haven, CT, USA

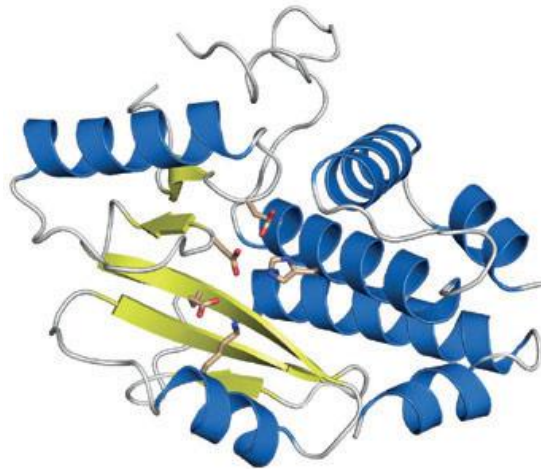


**Ada E. Yonath**  
Weizmann Institute of Science, Rehovot, Israel

## Scientific example: Health

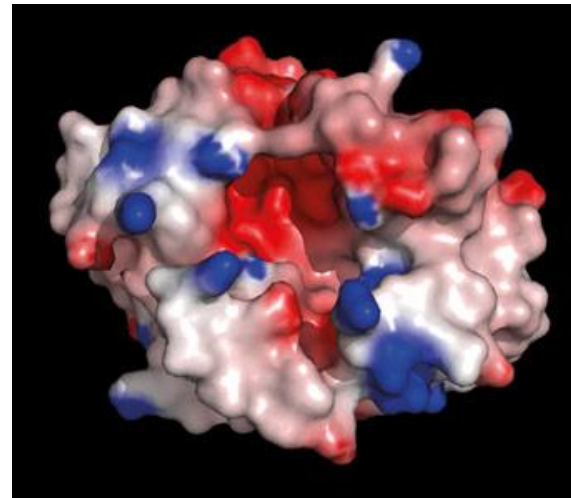
### Influenza virus

Understand how the influenza virus works



*Crédit : S Cusack/EMBL*

*Key domain of flu virus polymerase*

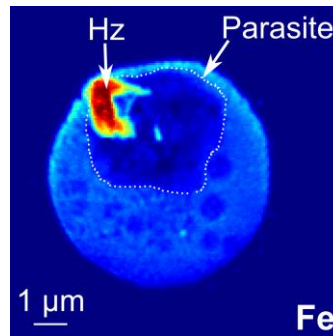
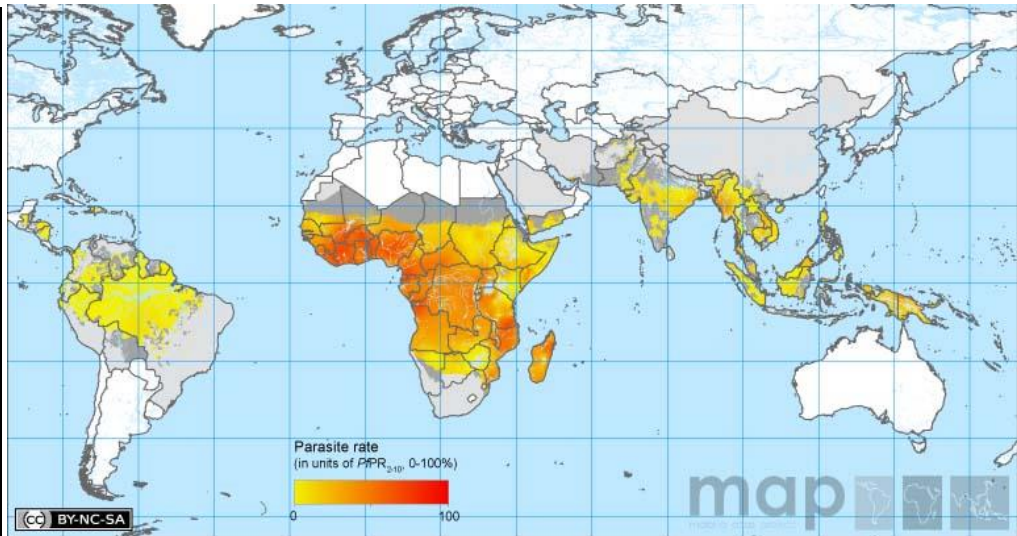


*Crédit : EMBL-UVHCI*

*3D image of the "PA" protein domain*

# Scientific example: Health

## Anti-malaria drugs

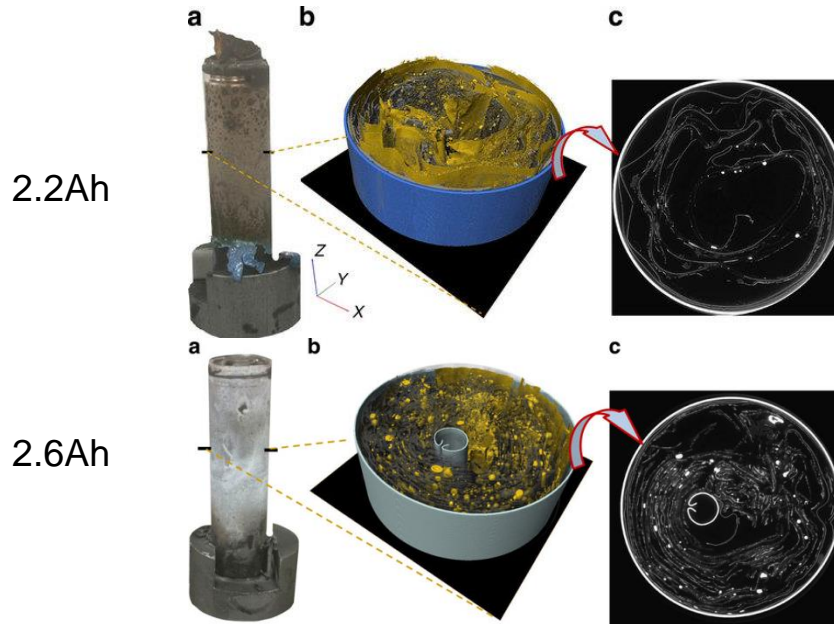


*Fe fluorescence in malaria infected red blood cell*

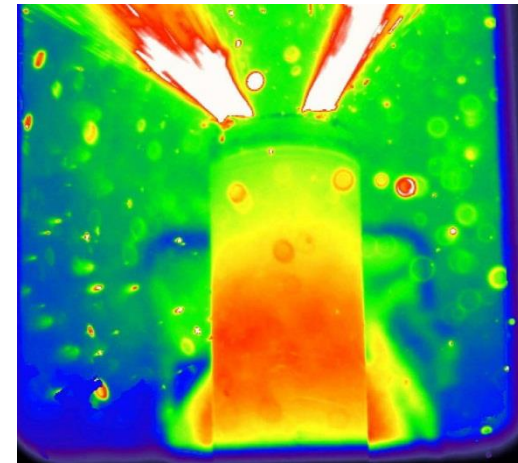


# Scientific example: Energy and environment

## Lithium-ion battery failure



*Post-mortem tomography of batteries after thermal runaway (yellow = copper)*



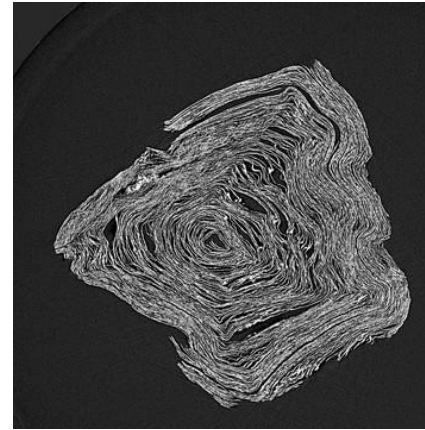
*Thermal imaging of a battery undergoing thermal runaway*

# Scientific example: Cultural heritage

## Reading carbonized papyrus scrolls



*Herculaneum papyrus scroll*



(a)



*Section of the papyrus and reconstructed alphabet*



Thank you for your attention