

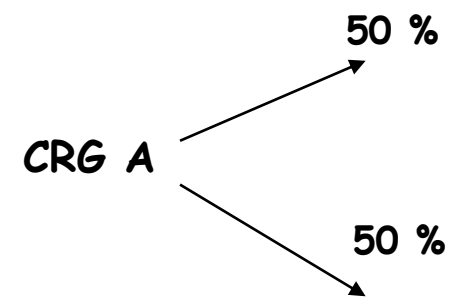


# The High Energy Resolution Backscattering Spectrometer IN13



- Present contract: 2016-2020
- Responsible: F. Natali & J. Peters
- Technician (since sept. 2017): B. Gervasoni

## BEAM TIME ALLOCATION



## STAFF CURRENTLY WORKING ON IN13

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**F. NATALI**  
(CNR-IOM)  
SCIENTIST



**J. PETERS**  
(U.J.F., Grenoble)  
PROFESSOR



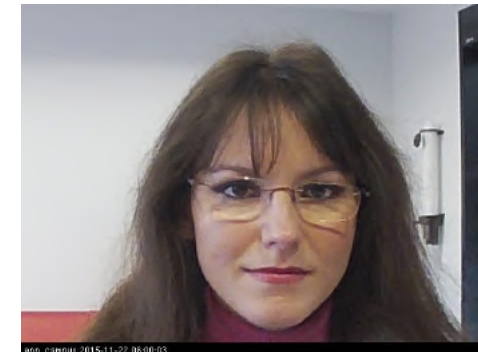
**B. GERVASONI**  
Technician  
(UJA, Grenoble)  
Septembre 2017 -



**D. ZELLER**  
PhD student  
(U.J.A. - ISIS)  
Janvier 2016 -

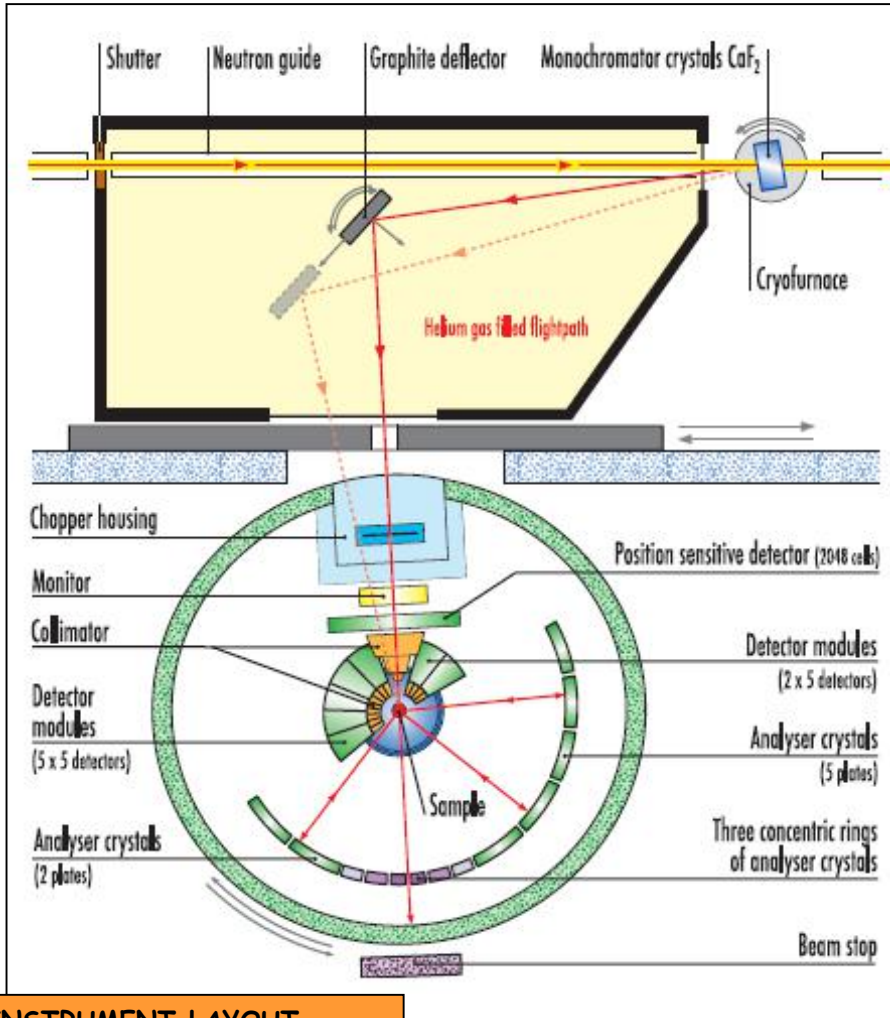


**L. MISURACA**  
PhD student  
(U.J.A.)  
November 2017 -



**I. PIAZZA**  
PhD student  
(ILL & University of Palermo)  
Janvier 2015 -

# TECHNICAL FEATURES



INSTRUMENT LAYOUT

Backscattering spectrometer IN13

$\Delta E \sim (8 \text{ meV FWHM})$  - High Q ( $0.3 < Q < 4.9 \text{ \AA}^{-1}$ )

Unique spectrometer with such a Q range accessible worldwide

**time  $\approx 100 \text{ ps}$**   $\rightarrow$  corresponding to internal dynamics of macromolecules, but not to water diffusion and macro-molecular translations.

- Only 1 reactor cycle available, January-March (48 days)
- 6 experiments performed (2 ILL, 14 days, and 4 CRG, 24 days)
- 14 scientific papers published
- NO days lost!

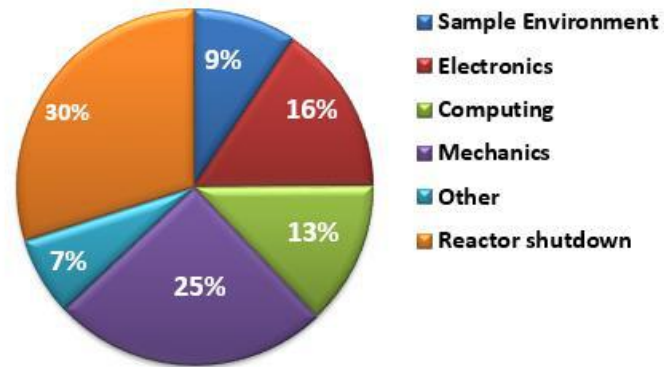
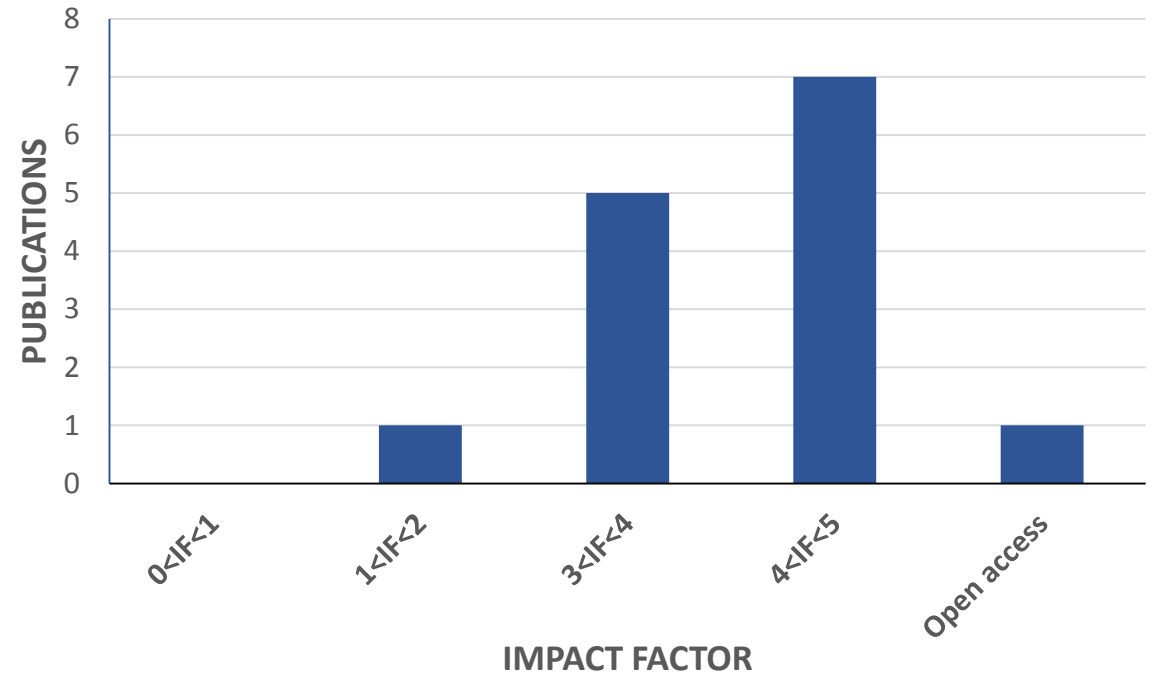
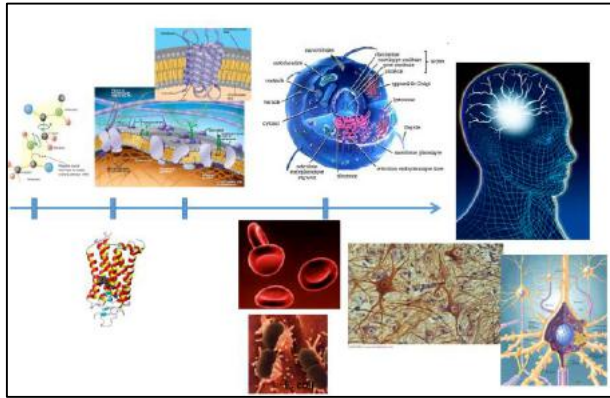


Fig.8: Repartition of the technical problems occurred during 2011-2015 over the different ILL services

2010-2015:  
 Only ~ 16 days were lost over 758 available days (i.e. ~ 2.0%)



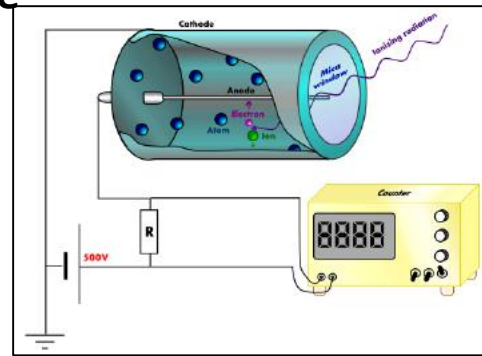
# Fields of investigation



**Biology-Medicine**

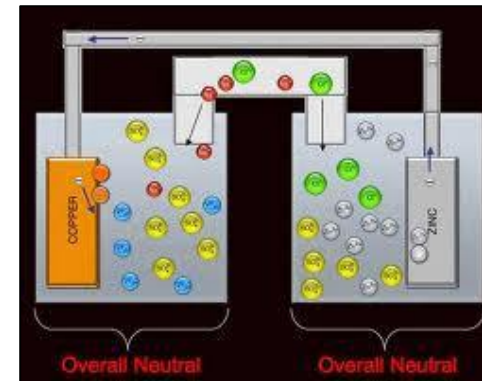


**Liquids**

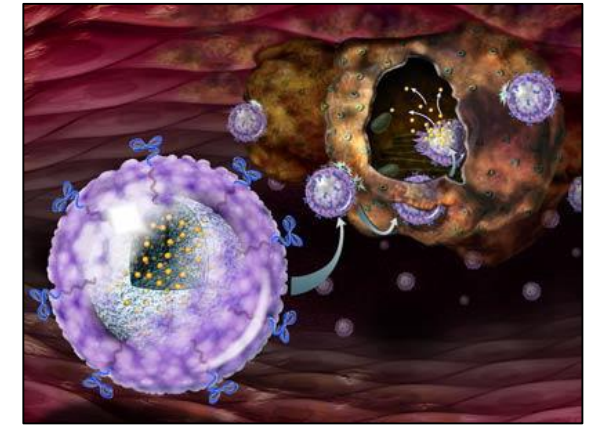


**Detectors**

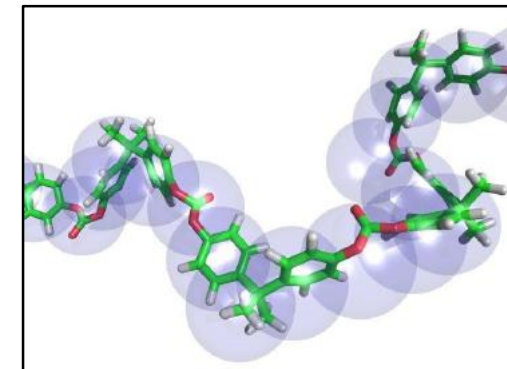
**Cultural heritage**



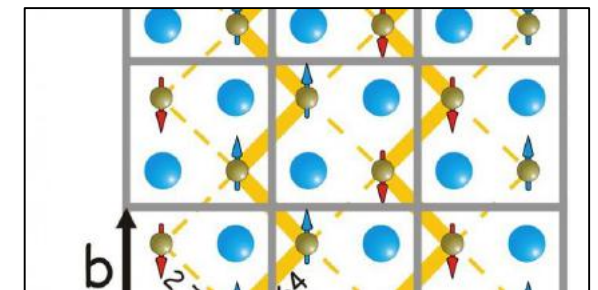
**Energy**



**Pharmaceutics**



**Polymers**



**Magnetism**

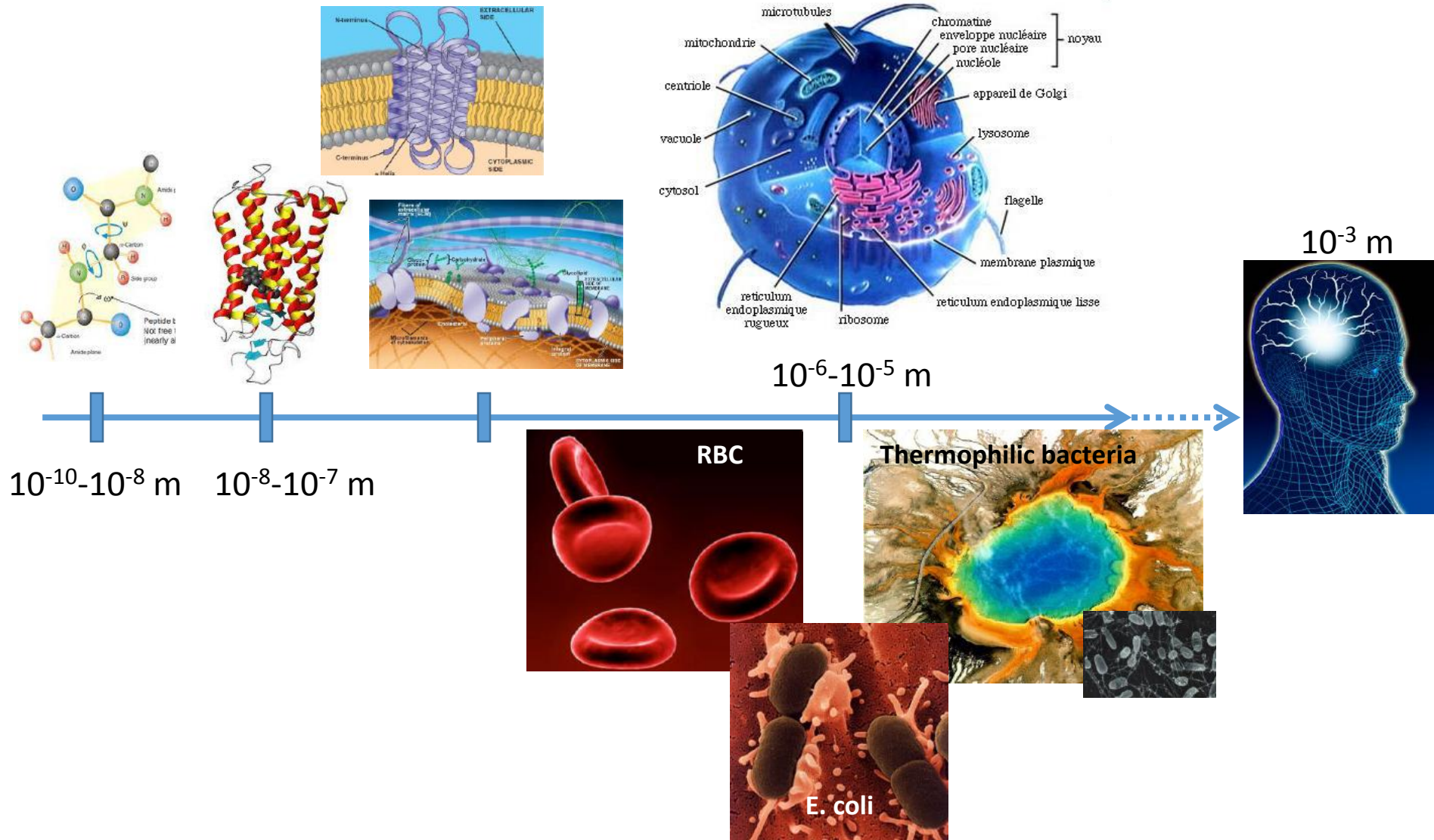
***...and more!***

Study of internal dynamics of biological macromolecules in solution, powder or cell samples  
Applications are found in: biology, medical science, chemistry, physics, cultural heritage, ...



**Software**

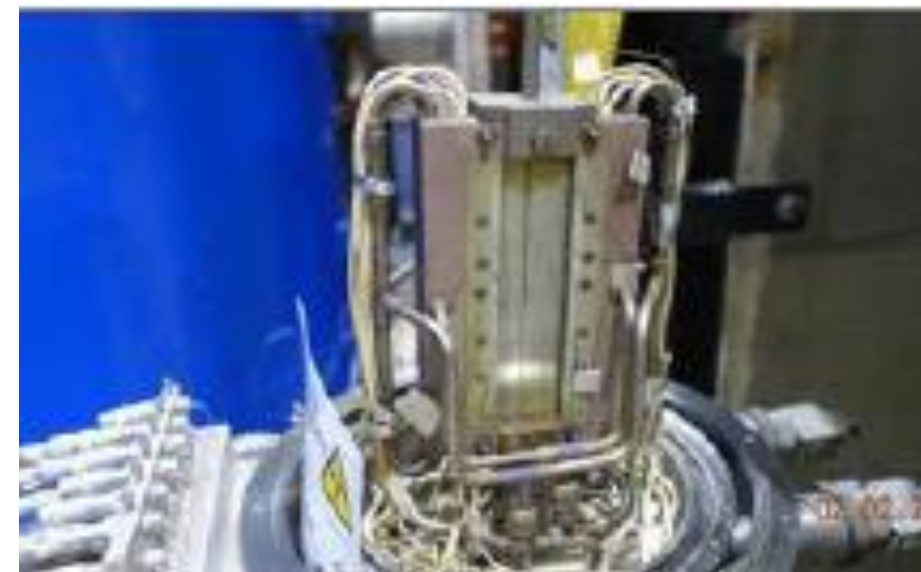
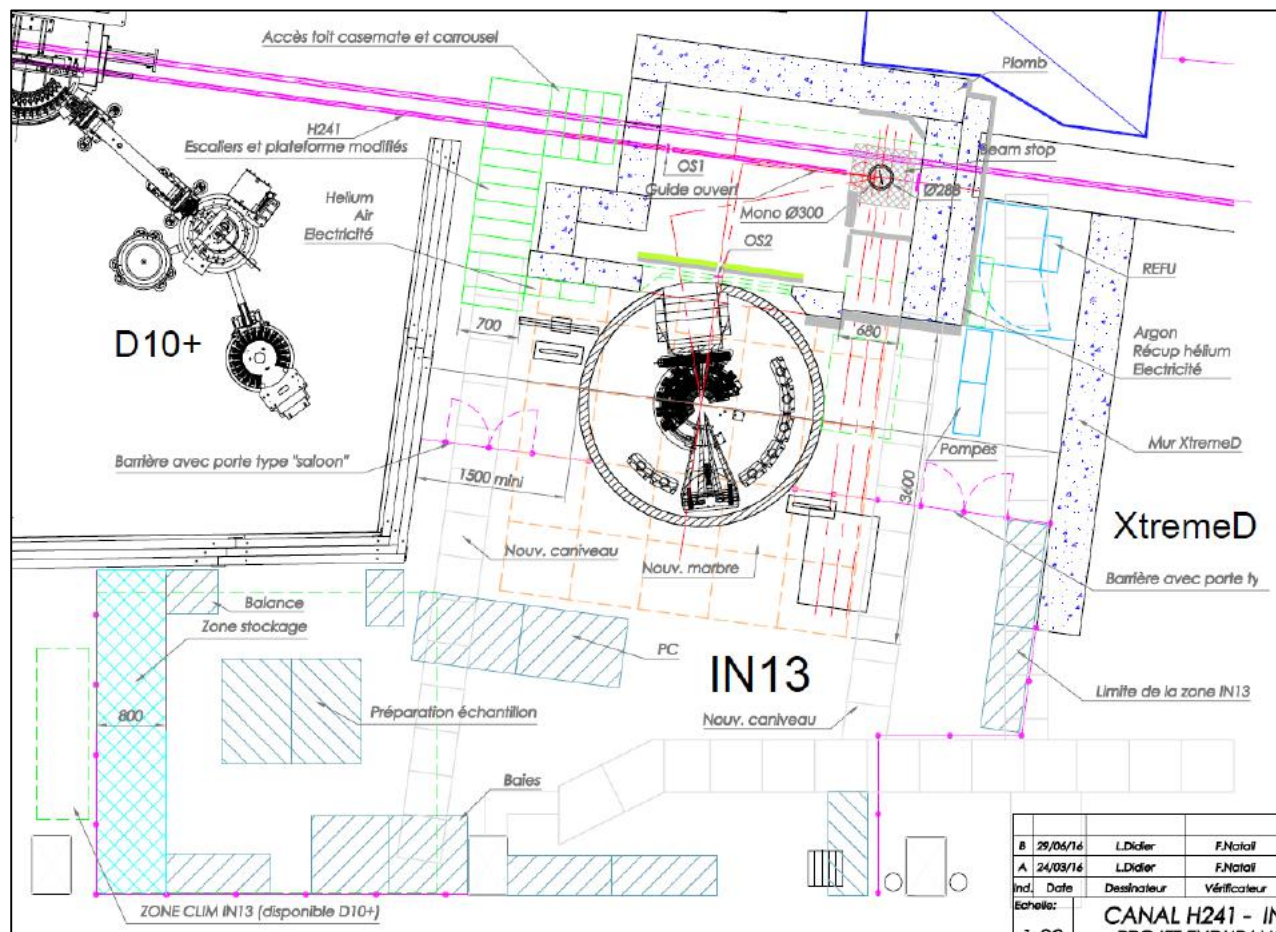
# PROTON DYNAMICS IN BIOLOGY: A SOPHISTICATED SCENARIO REVEALED BY NEUTRON SCATTERING



# IN13 + under the Endurance Program

Sub-project n.1 Relocalisation of IN13 on new H241A guide

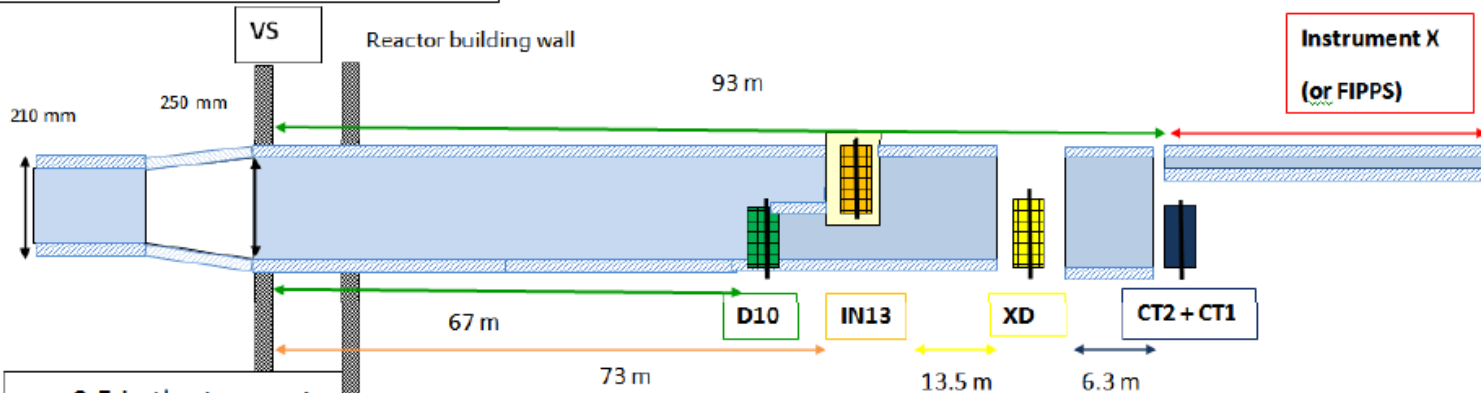
Sub-project n.2 T gradient monochromator



Estimated Budget (Sep. 2017): 343 k€

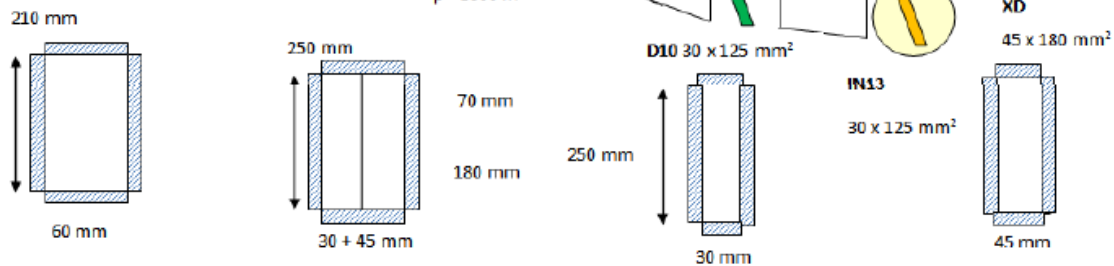
Estimated Budget (Sep. 2017): 401 k€

$m = 3$  for in pile guides



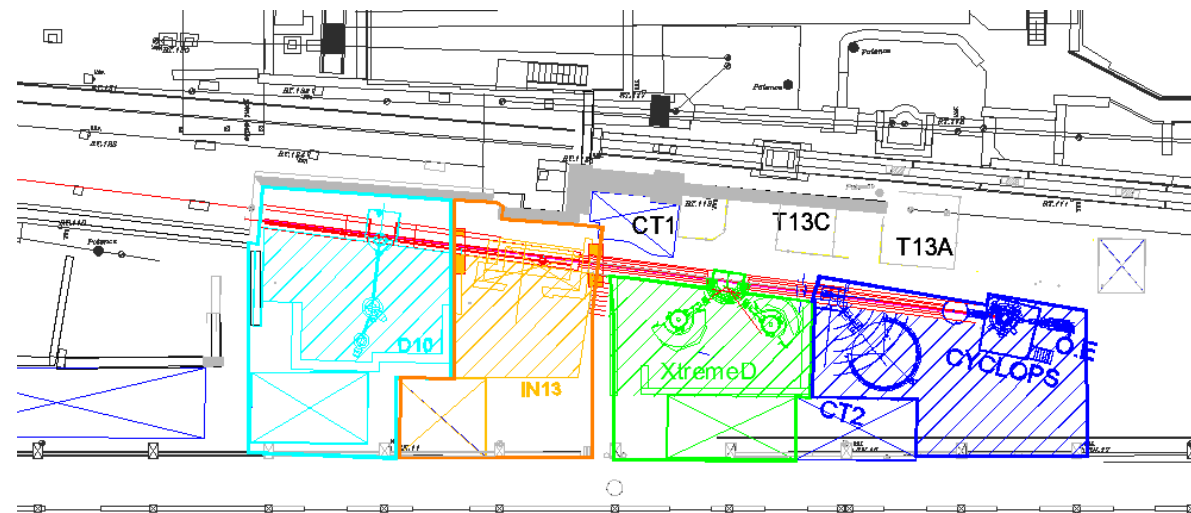
$m = 2.5$  in the trumpet

$m = 2$  for all out of pile guides



Instrument X  
(or FIPPS)

Guide coating	Flux at guide exit $s^{-1}$	Gain factor at sample	Incident Resolution $d\lambda/\lambda$
All sides $m=1$	$2.98 \times 10^9$	1	$1 \times 10^{-4}$
Sides $m=1$ , top/bottom $m=2$	$5.18 \times 10^9$	1.7	$1 \times 10^{-4}$
All sides $m=2$	$8.24 \times 10^9$	2.5	$2 \times 10^{-4}$





# Sub project n. 2

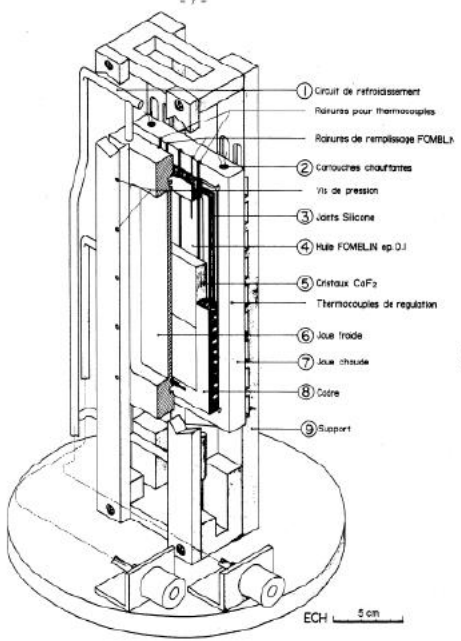
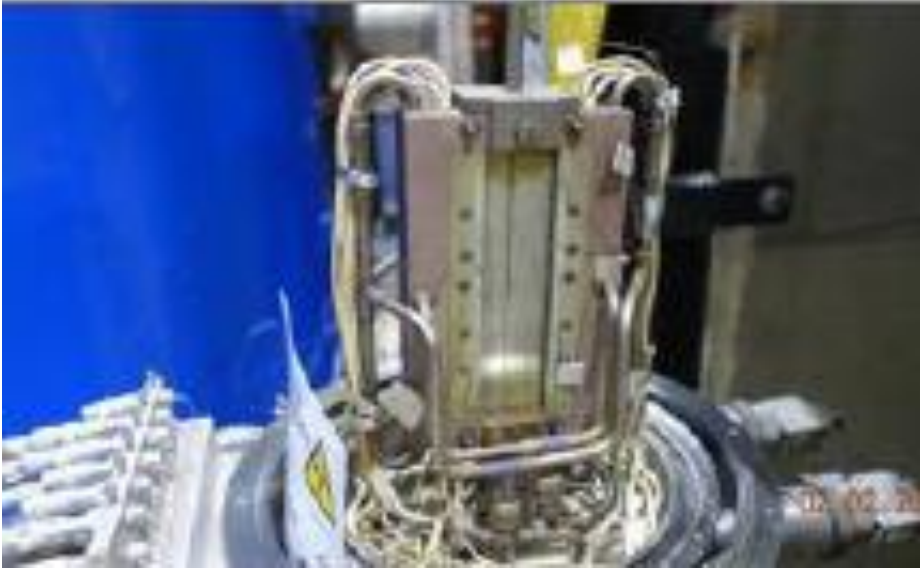


Fig. 10: Technical design of the temperature gradient monochromator realized by Heidemann et al, in 1980.

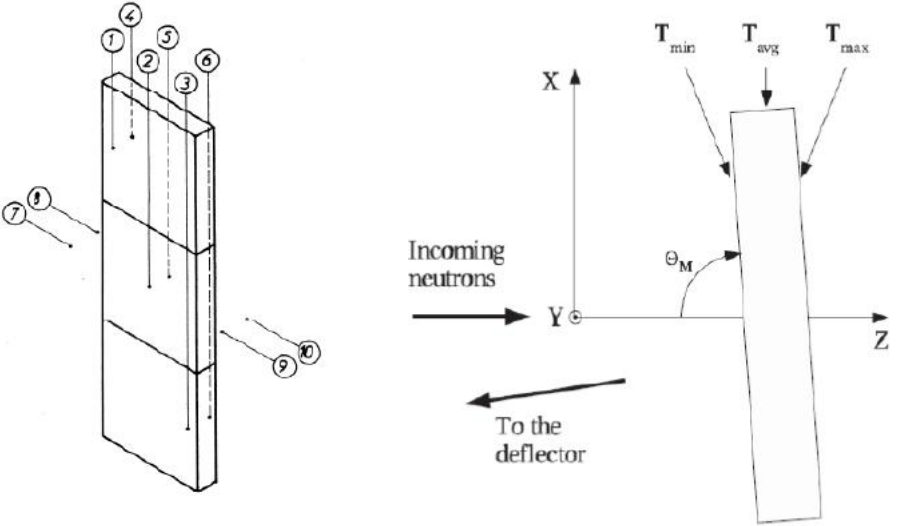


Fig. 11: schematic representation of the local arrangement of the set of thermocouples.

