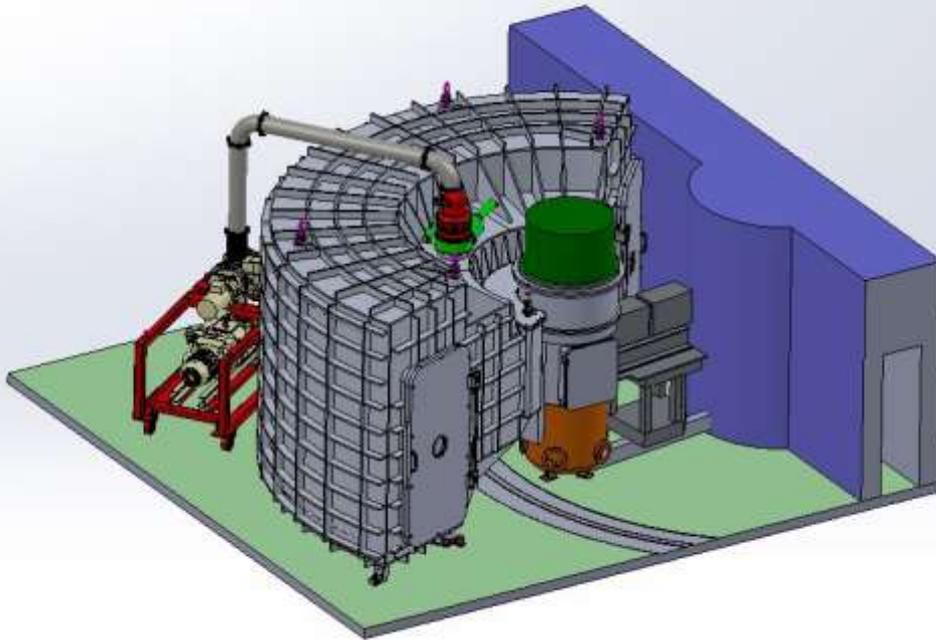


# SHARP: un CRG A à l'ILL

Contrat en fin de rédaction : signature en juin 2017

P. Lavie LLB



## Groupe-LLB-Sharp :

**Responsable :** JMarc Zanotti\*  
**Co-responsable :** Quentin Berrod\*  
**Ingénieur :** Sylvain Rodrigues  
**Support ingénierie :** Pascal Lavie  
**Responsable Technique :** Benoit Homatter\*  
**Soutien Technnique :** Frédéric Legendre  
Fabien Prunes  
et les équipes techniques du LLB

\* : Personnels IRAMIS/LLB en poste à Grenoble.

# Schedule

## September 1<sup>st</sup> 2017- August 31 2023

- September 2017- September 2018:

“Normal” IN6 operations

Operated by LLB personnel (2 Scientists, 1 Technician)

50% French time+ 50% ILL time

- September 2018- August 2019 (ILL long shutdown):

Deconstruction of the IN6 secondary spectrometer + Infrastructure Work

Delivery and refurbishing (Cd coverage, PE protections, electronics) of the new detector box

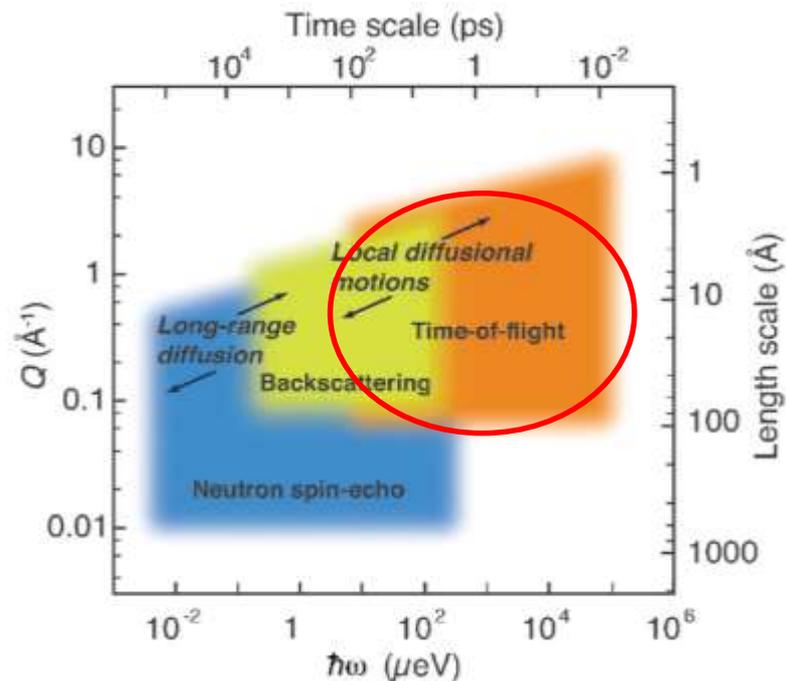
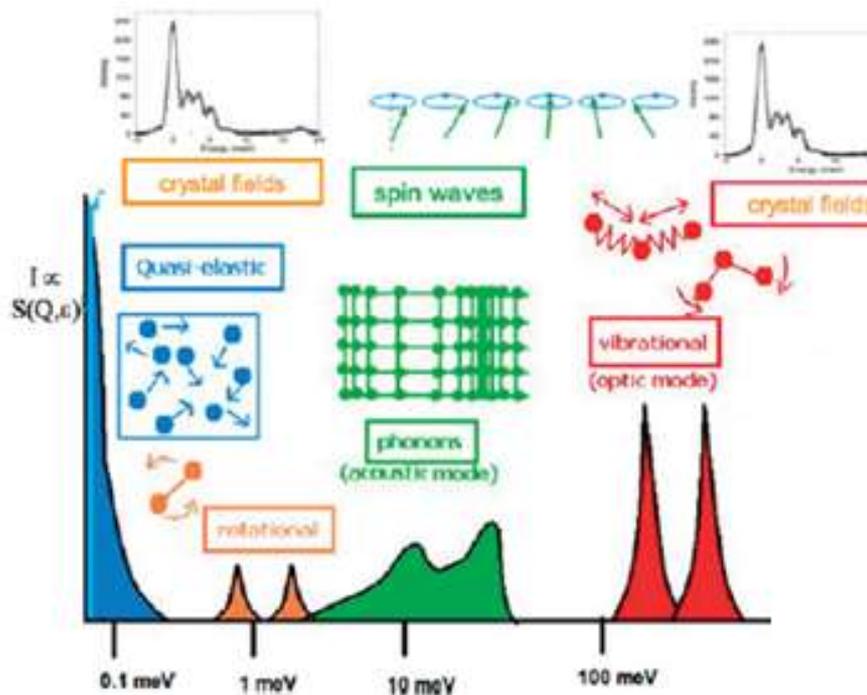
- September 2019 – August 31 2023:

Back to normal operation but due to steric hindrance with D7 SHARP will offer a single incident wavelength 5.1 Å (This is peak of the flux delivered by the guide).

### After September 1<sup>st</sup> 2023, how about a Super-SHARP ?

Depending on the funding success of the phase 2 of the Endurance program, SHARP moved to a new position with dedicated guide.

Then full incident wavelength (2.0 -5.9 Å) coverage can be offered.

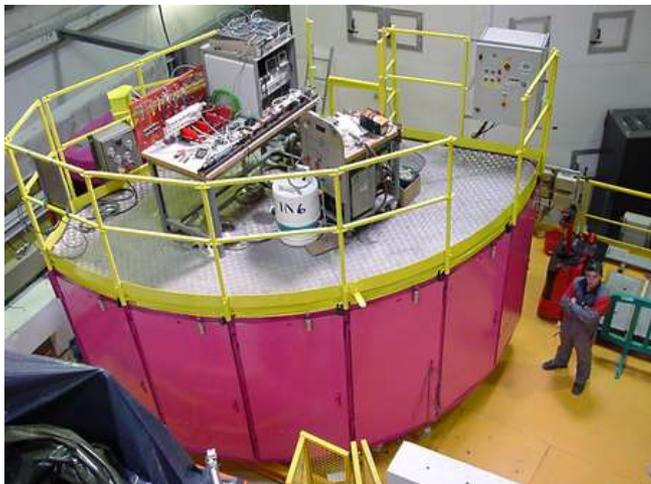


Study of dynamics and relaxation properties in condensed matter.

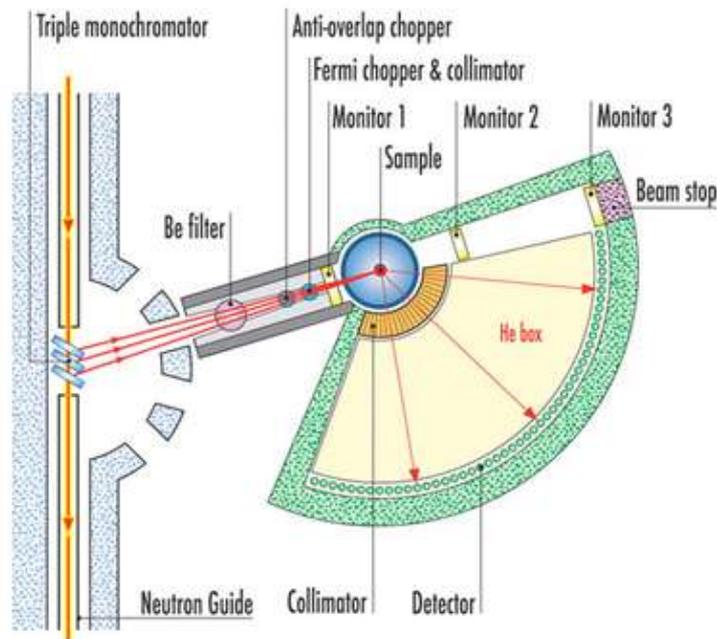
- Vibrational density of states of crystalline and amorphous solids
- Dynamics of soft condensed matter such as polymers, proteins, biological membranes and gels
- Local and long range diffusion of liquids, solutions and confined systems
- Properties of quantum liquids, Fermi and non-Fermi systems
- Phase transitions and quantum critical phenomena in polycrystals and single crystals
- Spin dynamics in high- $T_c$  superconductors
- Properties of crystal field splittings

# IN6: a cold time-of-flight inelastic spectrometer

## High Flux by "time focusing"



A 3 PG monochromator array with horizontal focussing

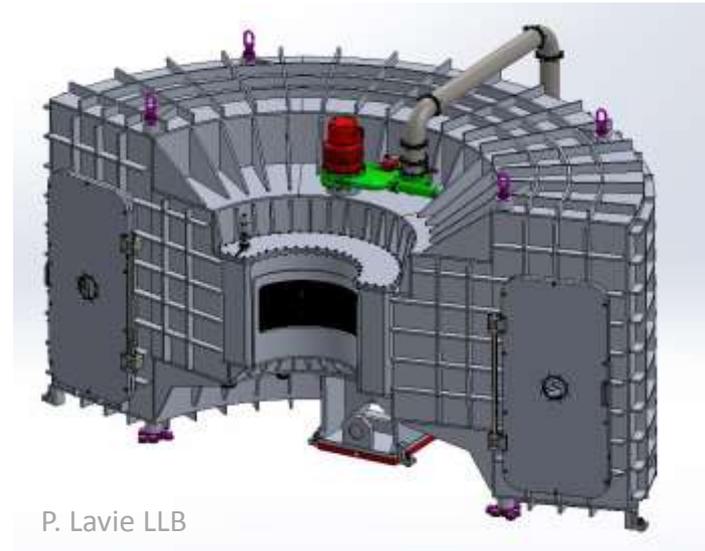
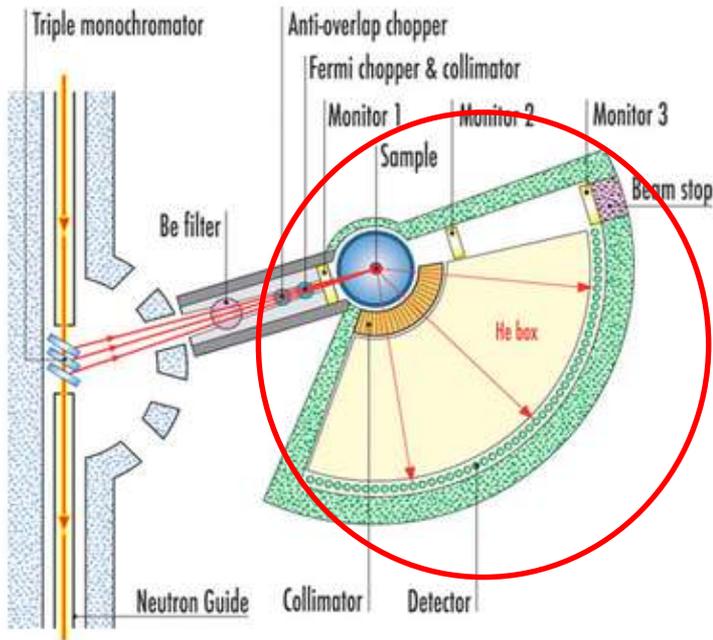


### 4 incident wavelengths

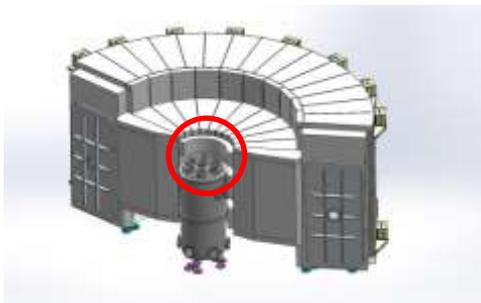
Incident wavelength	Energy Resolution
4.1 Å	170 $\mu\text{eV}$
4.6 Å	120 $\mu\text{eV}$
5.1 Å	70 $\mu\text{eV}$
5.9 Å	50 $\mu\text{eV}$

## A brand new secondary spectrometer:

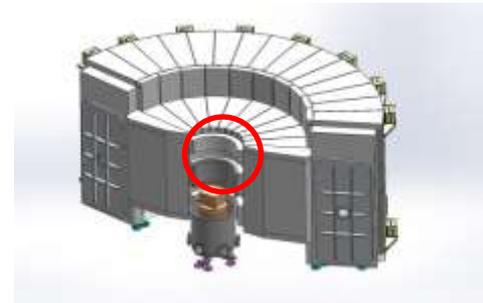
- Full Sample environnement with 2 modes: atmospheric vs under vacuum mode
- ToF chamber (2.5 m) under vacuum



- Under vacuum mode

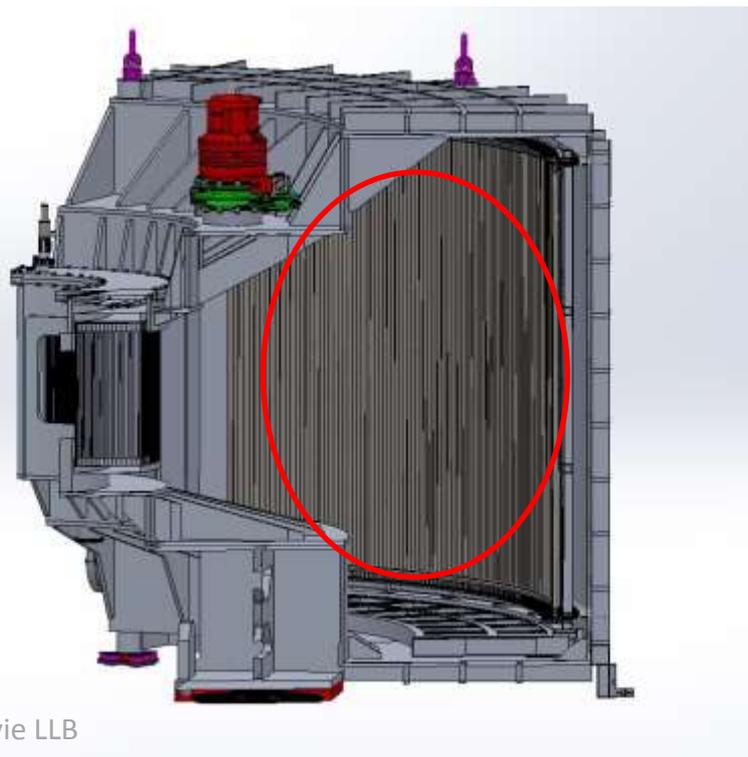


- Atmospheric mode



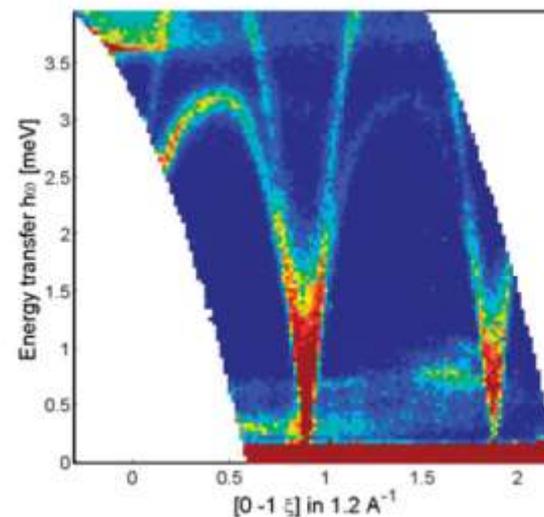
PSD: Position Sensitive Detectors

**1-** Detection coverage / counting rate:  
Gain of a factor 4 compared to IN6



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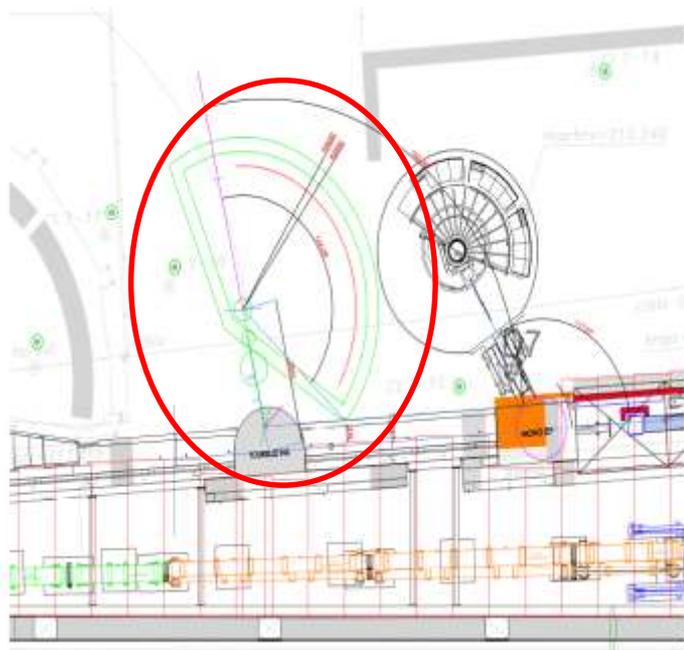
**2-** State of the art PSDs +electronics assembly:  
breathtaking joint Q definition and  
resolution performances.



Magnon dispersion curves of BNFS at  $T = 2 \text{ K}$  [\[1\]](#). This experimental curve as measured on IN5C (ILL, France).

[\[1\]](#) M. Loire, V. Simonet, S. Petit, K. Marty, P. Bordet, P. Lejay, J. Ollivier, M. Enderle, P. Steffens, E. Ressouche, A. Zorko, and R. Ballou, Parity-Broken Chiral Spin Dynamics in  $\text{Ba}_3\text{NbFe}_3\text{Si}_2\text{O}_{14}$ , PRL 106, 207201 (2011).

# Single wavelength 5.1 Å operation until Sharp moving to a new guide position: the best compromise



Sharp detector box & steric hindrance with D7

Wavelength requests in proposals for IN6 from all ILL colleges since 2009:

College	$\lambda = 4.0 \text{ \AA}$	$\lambda = 5.1 \text{ \AA}$	$\lambda = 5.9 \text{ \AA}$
#1: Applied Materials		1	1
#4: Magnetic excitations	8	18	7
#5: Magnetism		2	
#6 : Liquids/Glasses	7	13	4
#7: Spectroscopy Solid-state physics	35	35	2
#8: Biology	1	39	8
#9: Soft Matter		11	2
Dir/Test	4	7	1
<b>Total</b>	<b>53</b>	<b>126 (62%)</b>	<b>25</b>