

ZETA (Neutron-Resonance-Spin Echo)

To do what?

- Measuring to the time of life of the excitations (phonon or magnon) of few meV (ω) with a resolution of $\Delta\omega \sim 10\mu\text{eV}$.
- High resolution Larmor diffraction : ($\Delta d/d \sim 10^{-5}-10^{-6}$)
 - Macroscopic thermal expansion
 - Distribution of lattice parameter

In practice : *the life time of an excitation is given by the width of the excitation.*

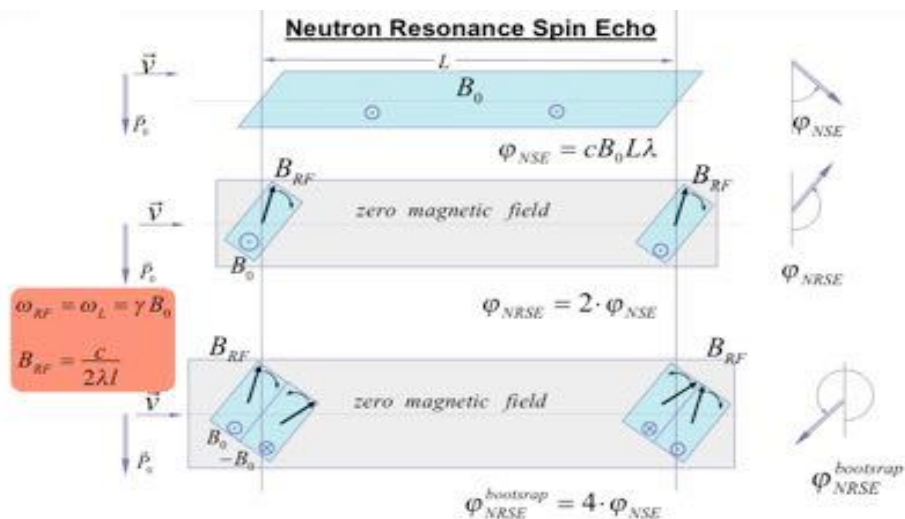
Importance of the life time excitations excitations :

- Optimization of thermoelectric
Width expected $\approx 5-15 \mu\text{eV}$ – thermal triple axis spectrometer resolution $250\mu\text{eV}$
- For HTC, magnetic excitation life time => informations about the interaction magnon-magnon and magnon-phonon unknown for these systems.

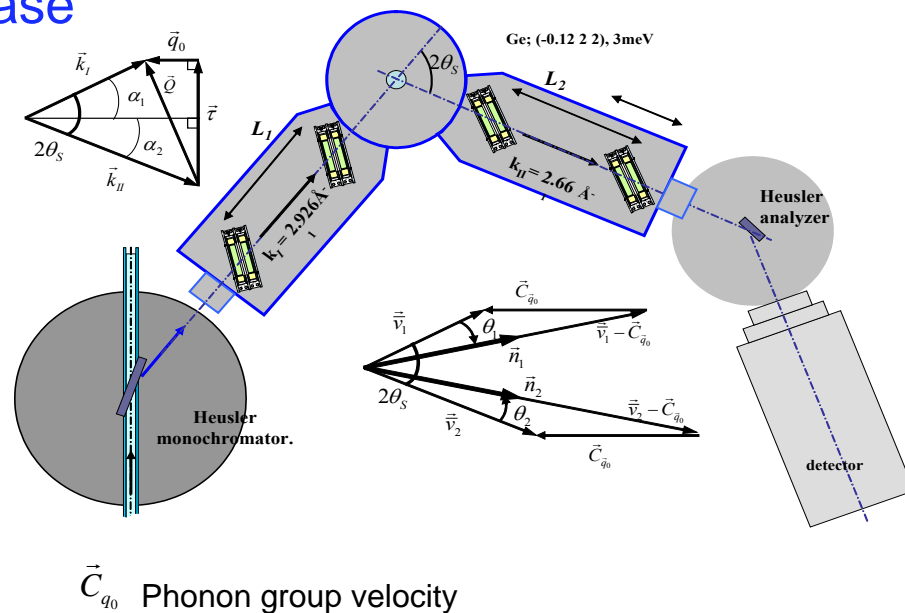
Principe : encoding the polarized neutron phase

$\Phi = \gamma_n B_0 \times t$
With $t = L/v$

NRSE



Other advantage of NRSE, depolarization is of 3rd order instead of 1st order for a solenoid.



During the experiment, only ω_{RF} is changing : the spectromètre stays at the maximum of the intensité and on the unfocused side of the dispersion to reduce ∂q .

Le mur D23-IN22 ou comment pouvoir utiliser ZETA sur IN22 et la 12T sur D23

Frederic BOURDAROT

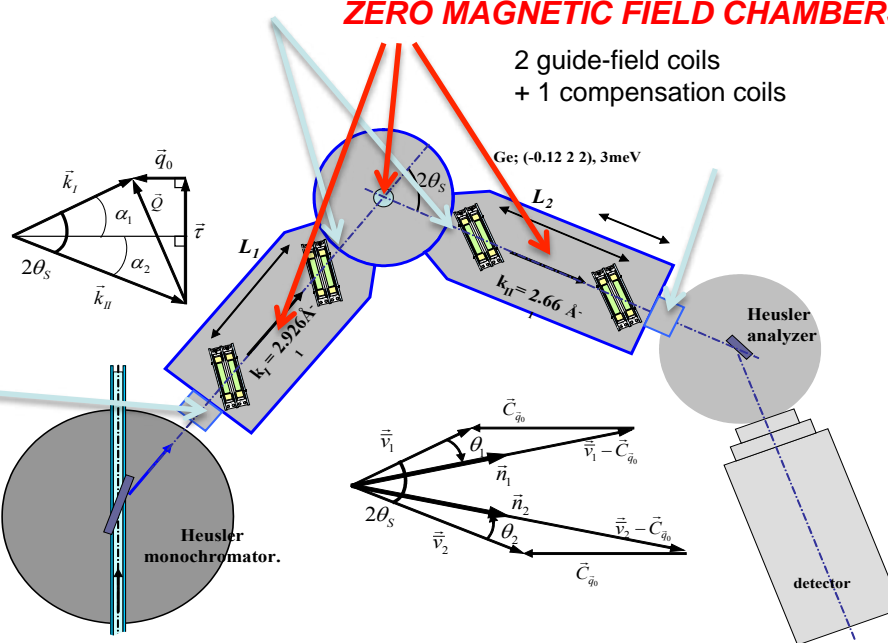
Univ. Grenoble Alpes, CEA, INAC-MEM/MDN, Grenoble, France



2 compensation coils

ZERO MAGNETIC FIELD CHAMBERS

2 guide-field coils
+ 1 compensation coils



2 guide-field coils

+ 8 flippers RF = 16 coils

Total : 23 coils

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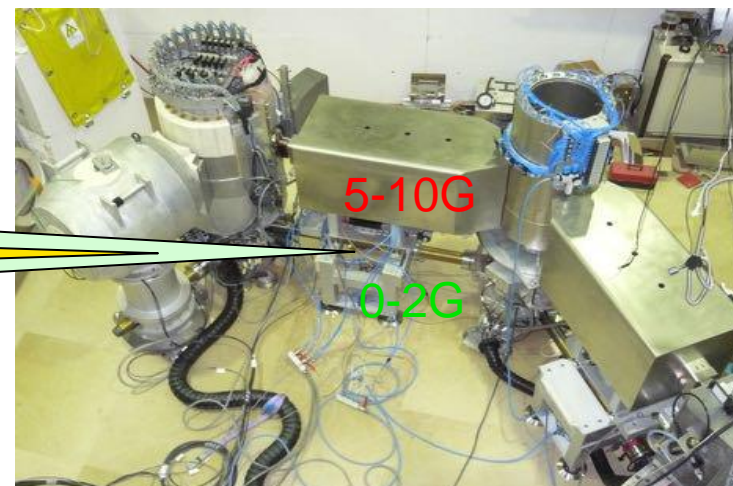
D23



“soft” iron wall

12T=120kG

IN22



Maximum stray field acceptable 3-4G
⇒ the wall has to divide by 3 the stray field.

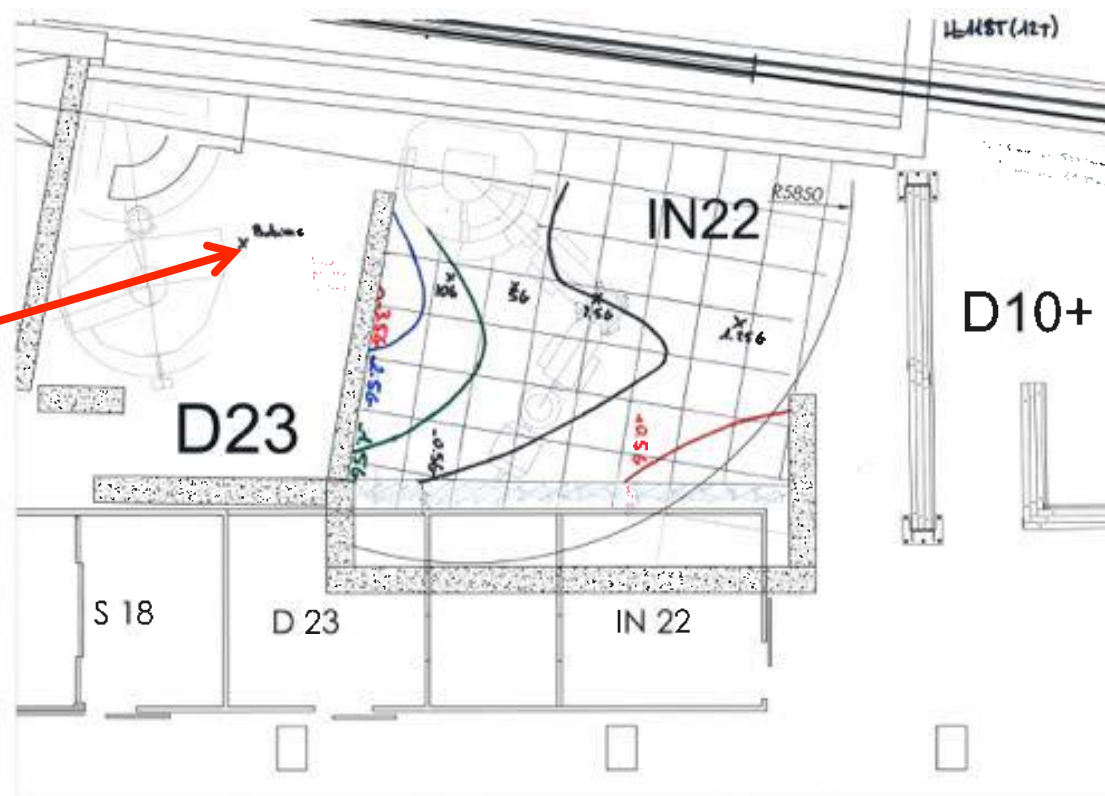
Calculation of F. Thomas : “soft iron” wall of thickness 15mm => Strength on the coil ≈ 30 DaN

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D23



Results :
Agreement between
calculations and
measurements
Reduction of the stray field
sufficient to work with
ZETA on IN22 and the 12T
magnet on D23.

Will be confirmed during
experiment in 2019.

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Next steps for the upgrade of ZETA

RF-flippers need to be in resonance. The resonance is obtained with the help of variable capacitors.

4 new variable capacitors are going to be made by the LLB (S. Klimko)
May 2019

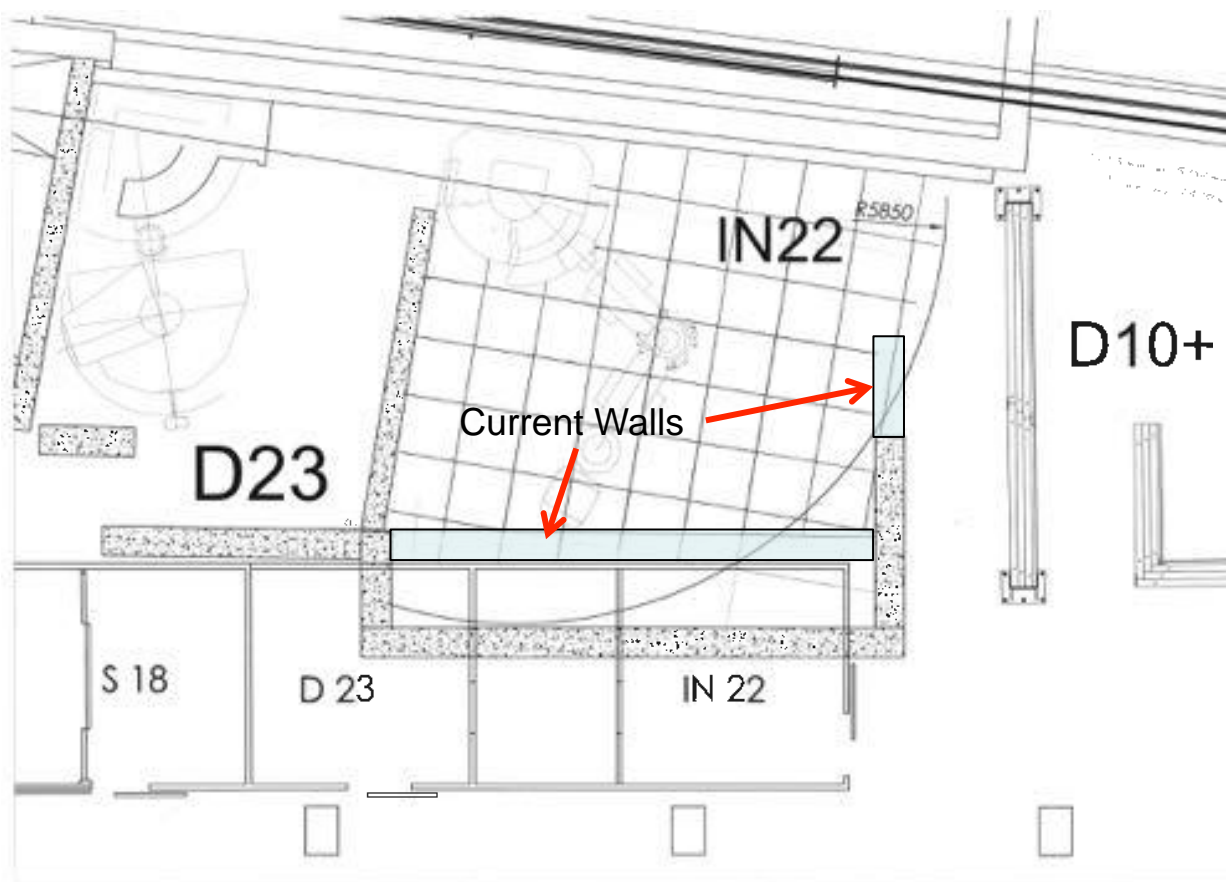


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Next steps for the upgrade of ZETA



New walls end 2020.

ZETA^{PLUS} : 2021

MERCI