Advanced Methods and Techniques JRA

Objectives

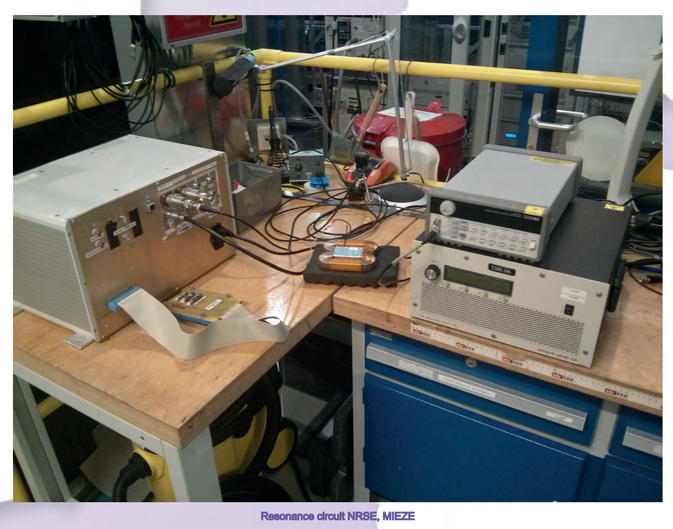
1. To design neutron instruments for dealing with small samples in extreme environments
2. Application of Neutron Spin Echo and MIEZE techniques at spallation sources, especially at the ESS
3. To develop choppers for the ESS instrumentation
4. Polarising all neutrons in a beam

Sub-mm^3 samples for extreme environments

- Software for optimizing the design of multi-channel, neutron focusing guides for sample environments at extreme conditions using artificial intelligence techniques.

Spin Echo with Oscillating Intensity for the ESS

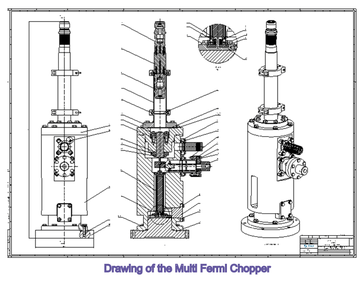
- Desktop setup for testing the design of an electronic circuit performing the modulation of the RF amplitude during a pulse in order to stay in resonance with the static field.



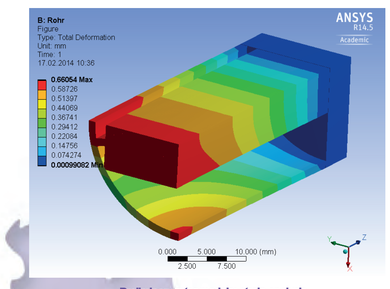
Resonance circuit NRSE, MIEZE

Choppers for the ESS instrumentation

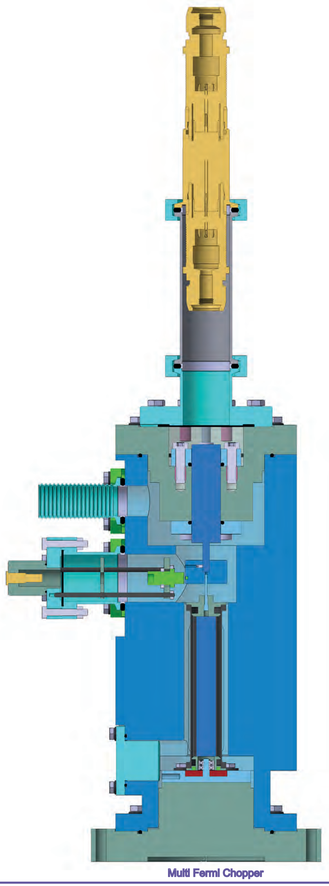
- Single Fermi collimator rotor with Gd-foils in a test housing to perform mechanical and neutron tests up to 1KHz rotation speed.
- Beam-size array of slim rotors that are operated synchronously and eventually with adjustable phases.



Drawing of the Multi Fermi Chopper



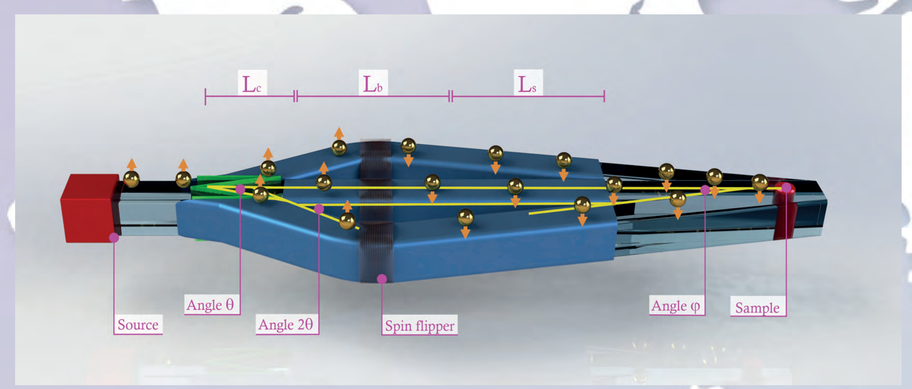
Preliminary rotor models: strain analysis



Multi Fermi Chopper

Polarising all neutrons in a beam

- New SM- cavity design that overcomes existing limitations
  - The neutron beams are separated according to their polarisation
  - One polarization is flipped with a broad band radiofrequency flipper
  - The beams are recombined and focussed to the sample



Schematic drawing of the polarising cavity illustrating the separation and recombination of the neutron beams

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