



Neutron Scattering: The Spin Revolution

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The Spin Revolution

- 1963 - Blume & Maleyev
- 1969 - Moon, Riste & Koehler
- 1972 - Mezei
- 1973 - Alperin demo
- 1989 - Cryopad on IN20

Spherical Polarimetry

I love this job. Have you seen the Lady working with us ?



- 1989 - Cryopad

Spherical Polarimetry



You see Bruce ? After 9PM, we
always make mistakes :-)

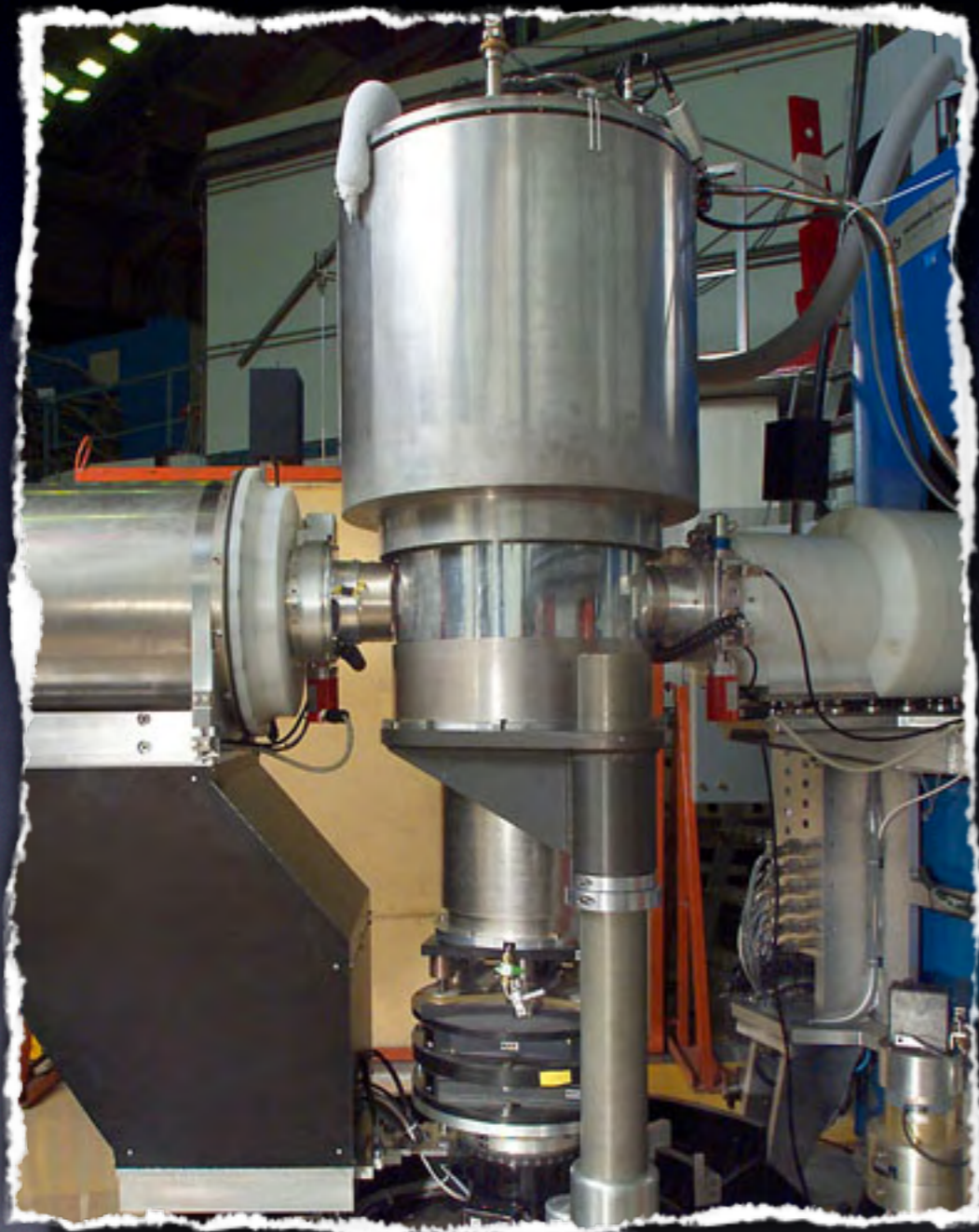
- 1989 - Cryopad
- 1996 - Cryopad-II

Spherical Polarimetry



- 1989 - Cryopad
- 1996 - Cryopad-II
- 2004 - Cryopad-III

Spherical Polarimetry



- 1989 - Cryopad
- 1996 - Cryopad-II
- 2004 - Cryopad-III
- D3, IN22, TAS-I

Spherical Polarimetry



- 1989 - Cryopad
- 1996 - Cryopad-II
- 2004 - Cryopad-III
- D3, IN22, TAS-I

Spherical Polarimetry

Where does this depolarisation come from ?



- 1989 - Cryopad
- 1996 - Cryopad-II
- 2004 - Cryopad-III
- D3, IN22, TAS-I

$n_{\text{EDM}} \approx 2.5 \cdot 10^{-24} \text{ e.cm}$

Spherical Polarimetry



- 1989 - Cryopad
- 1996 - Cryopad-II
- 2004 - Cryopad-III
 - D3, IN22, TAS-I
 - PFI, SPAN, IN15

$2.5 \cdot 10^{-24} \text{ e.cm}$ - Great !
A Cryopad for reaching 10^{-26} e.cm ?

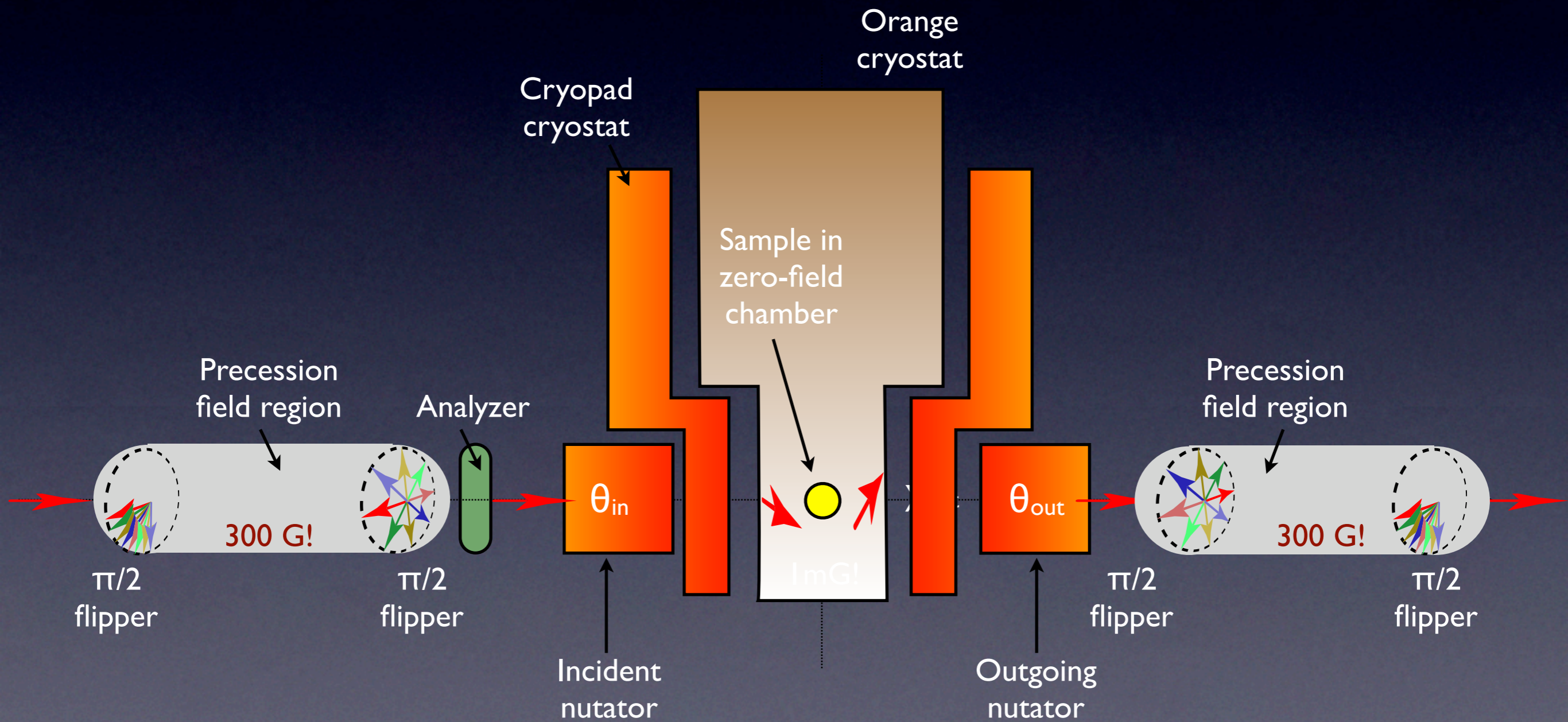
Polarimetric Spin-Echo



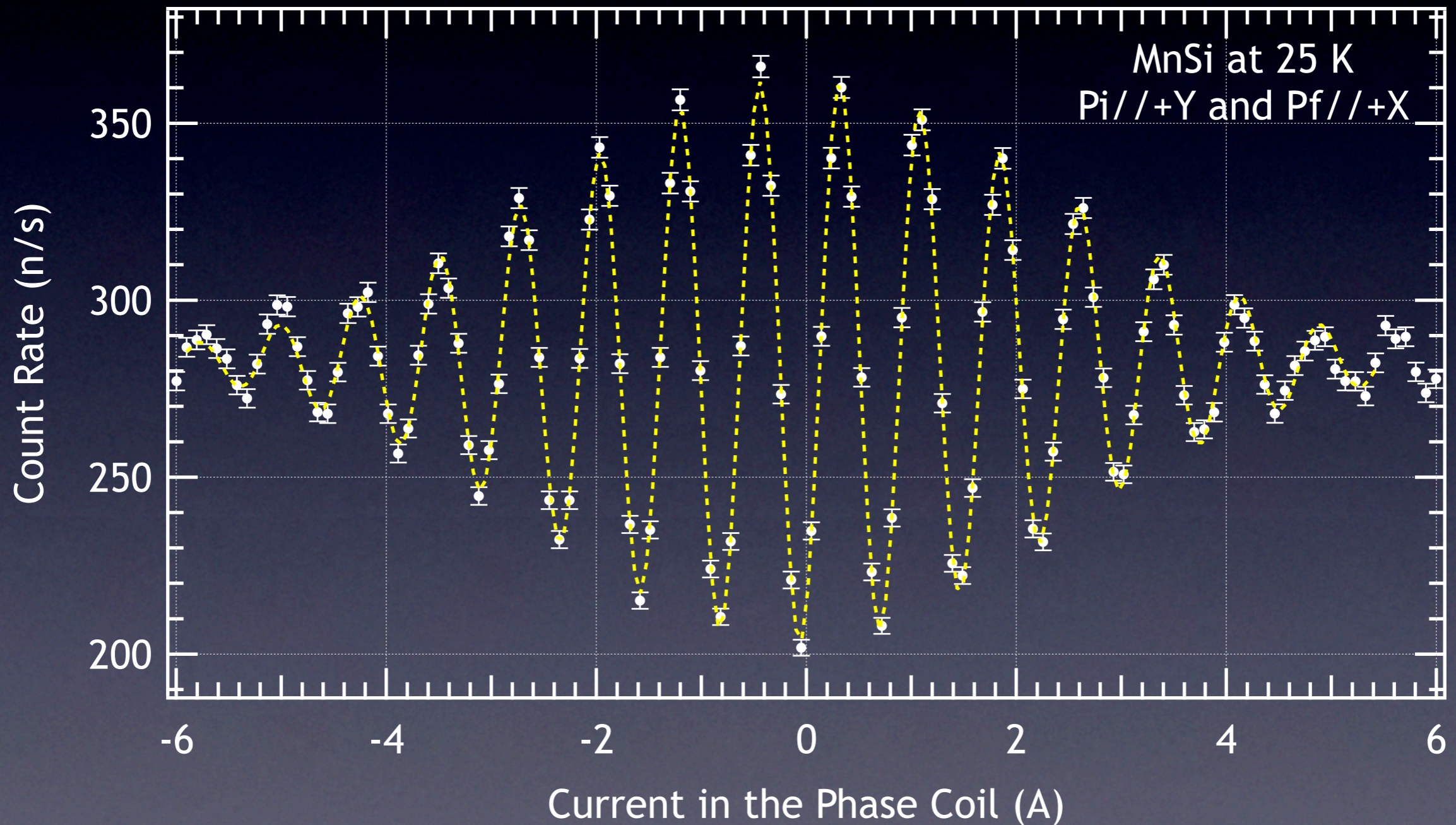
Francis, I also want a Cryopad.

- 1989 - Cryopad
- 1996 - Cryopad-II
- 2004 - Cryopad-III
- D3, IN22, TAS-I
- PFI, SPAN, INI5

Polarimetric Spin-Echo

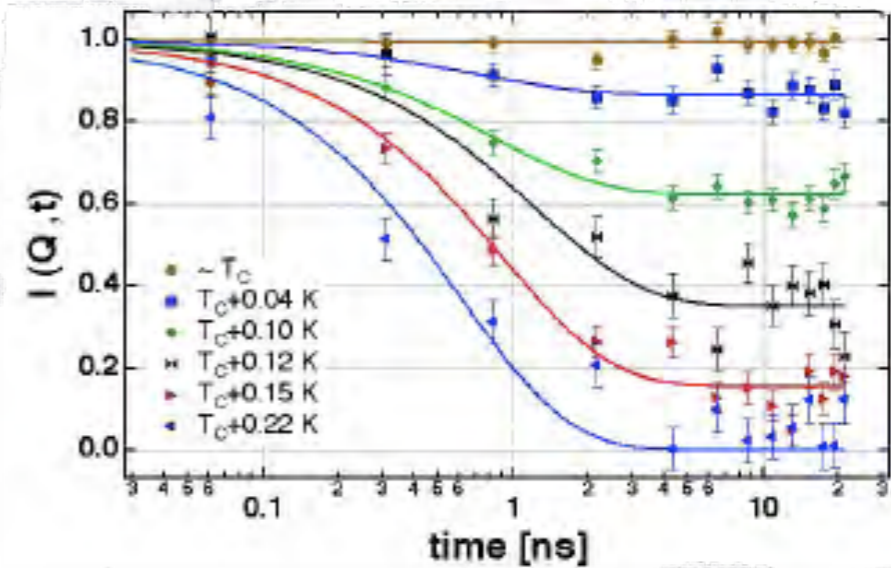
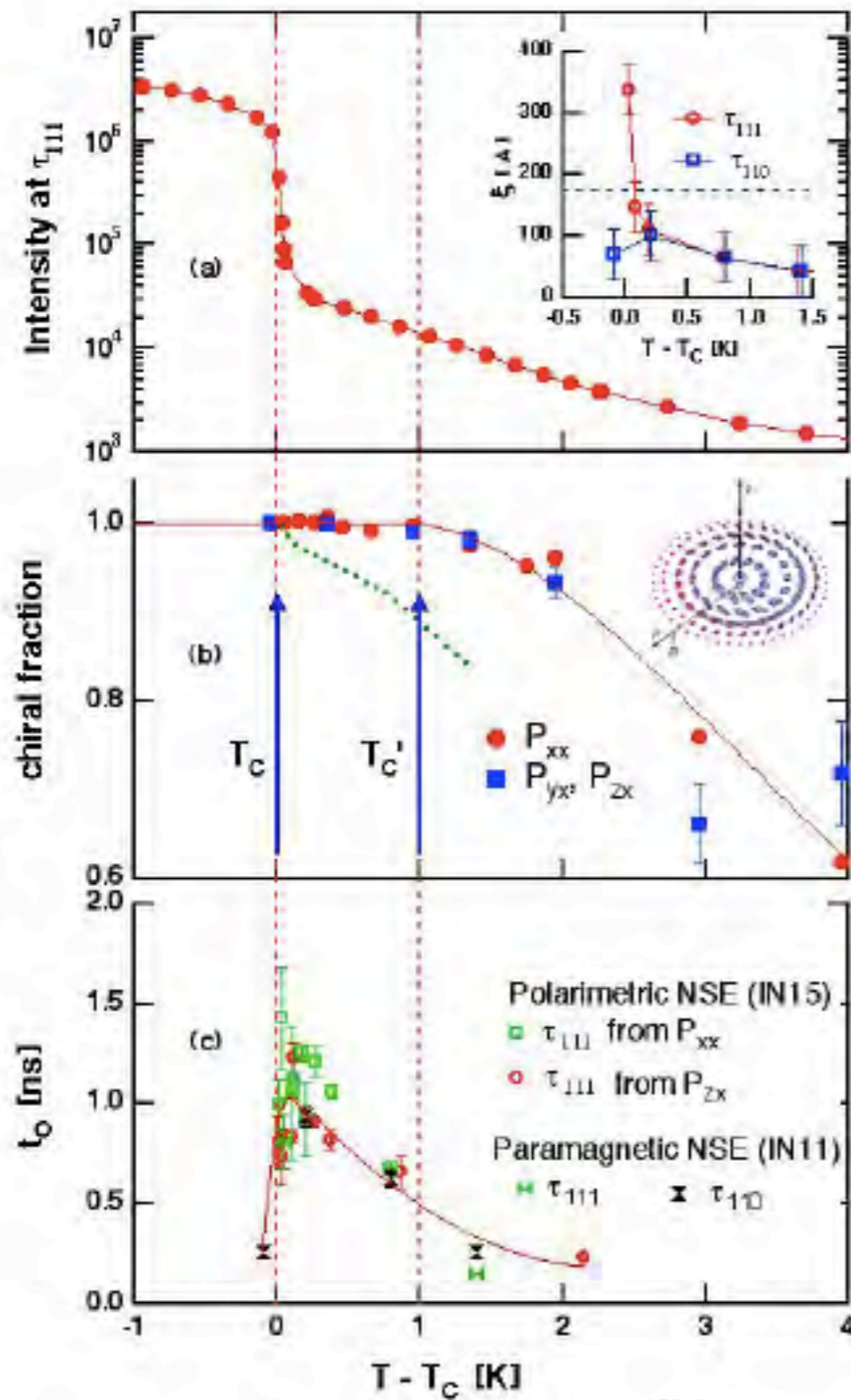


Spin-echo group recorded on the helimagnetic peak of MnSi with perpendicular incident and scattered polarisation vectors

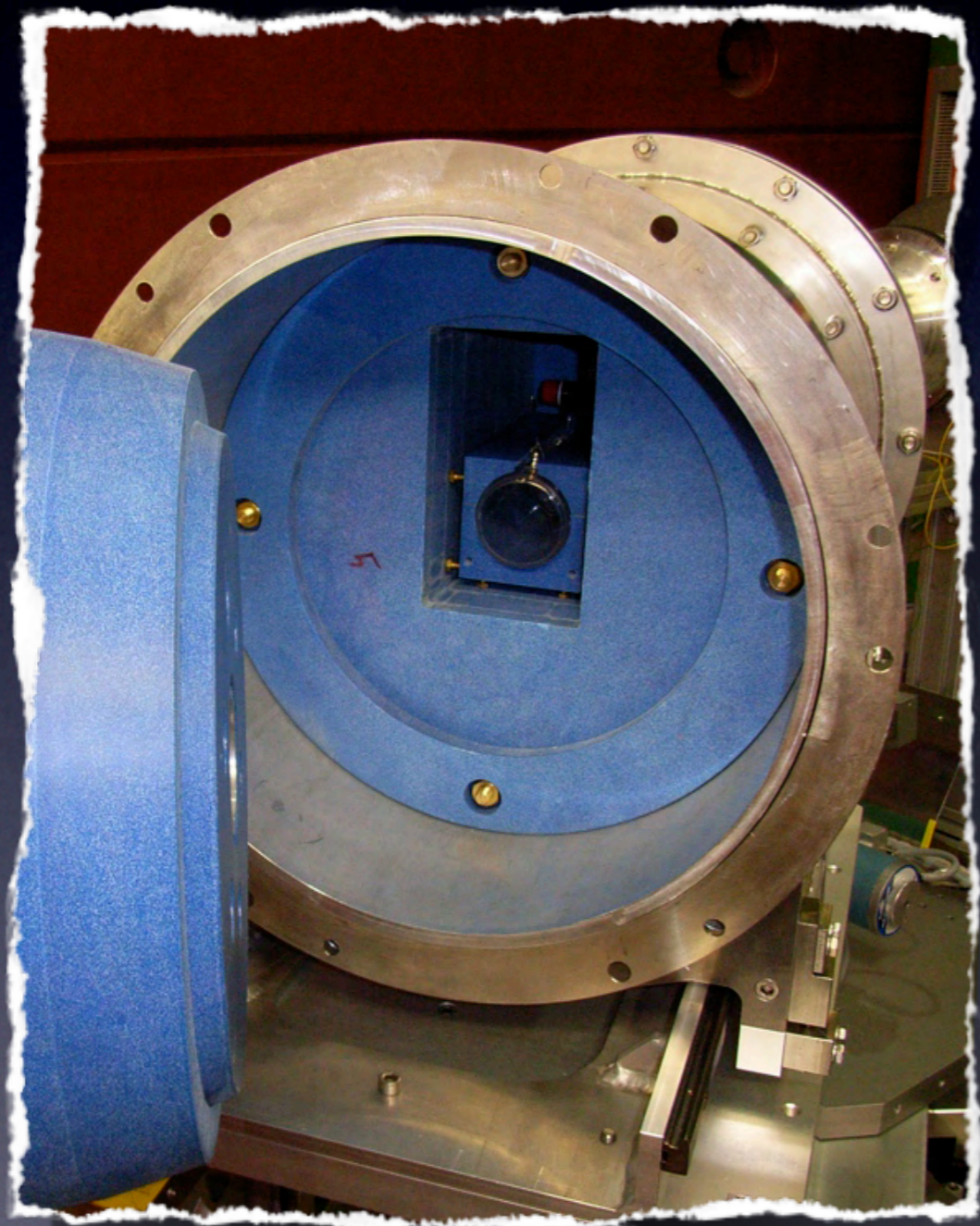


Chiral Paramagnetic Skymion-like phase in MnSi

between T_C and $T_C + 1\text{K}$



Spherical Polarimetry



- 1989 - Cryopad
- 1996 - Cryopad-II
- 2004 - Cryopad-III
 - D3, IN22, TAS-I
 - PFI, SPAN, IN15
- Who's next ?
HeiDi, HCB...

The Spin Revolution

- 1963 - Blume / Maleyev
- 1969 - Moon / Riste / Koehler
- 1972 - Mezei
- 1973 - Alperin demo
- 1989 - Cryopad on IN20

The Spin Revolution

Dear Francis,

...it was not possible to do experiments in which the full vector character of that polarization was measurable.

... but your zero-field polarimeter changed all that.

Martin Blume

The Spin Revolution

- 1963 - Blume / Maleyev
- 1969 - Moon / Riste / Koehler
- 1972 - Mezei
- 1973 - Alperin demo
- 1989 - Tasset *et al.*

The Spin Revolution

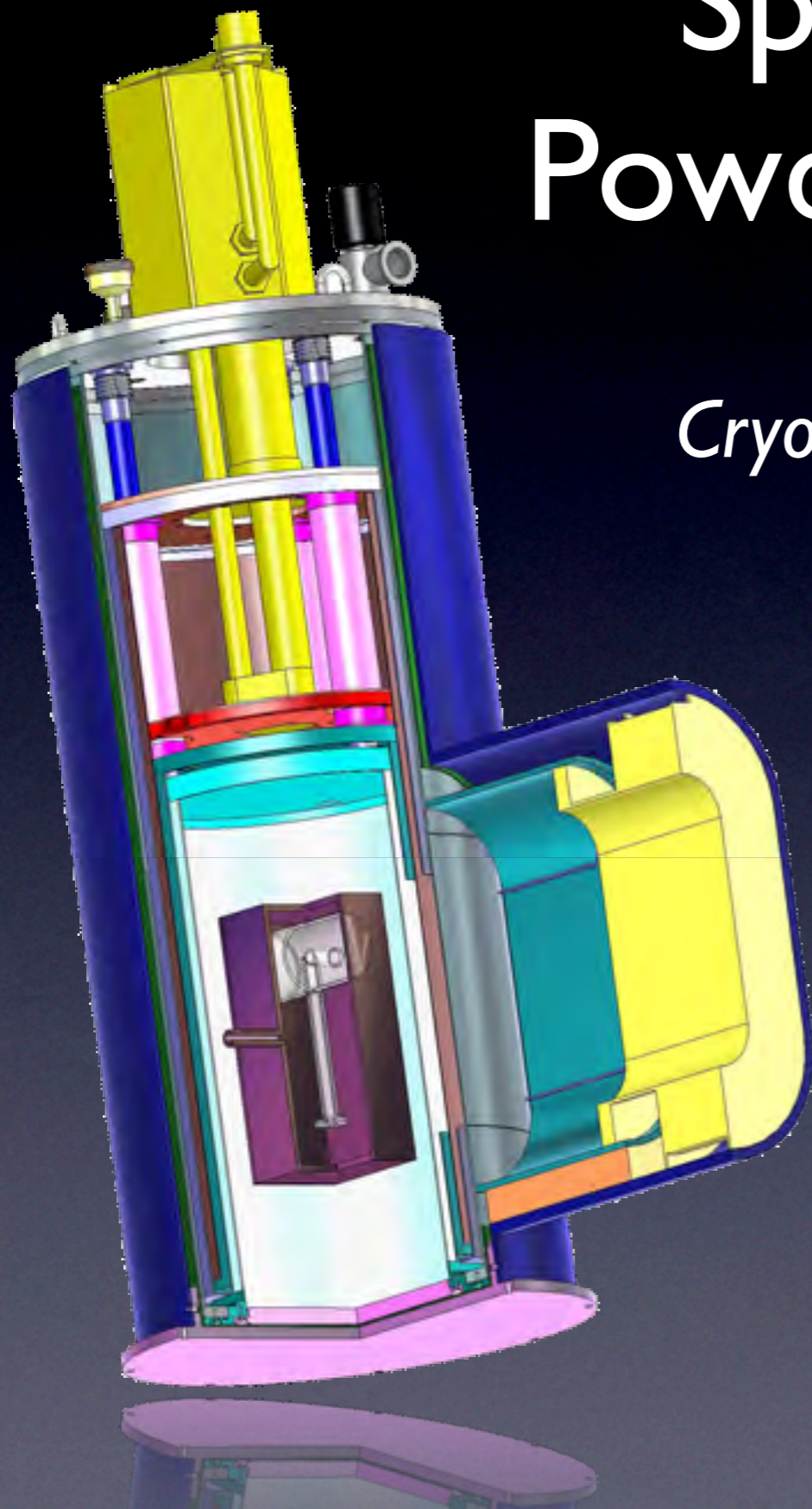
- 1963 - Blume / Maleyev
- 1969 - Moon / Riste / Koehler
- 1972 - Mezei
- 1973 - Alperin demo
- 1989 - Tasset *et al.*
- 1992 - First Spin Filter on D3



80% ^3He polarisation

Spin-Polarised Powder Diffraction

*Cryopol-II: spin filter/flipper
in high stray fields*



99.9% efficient
flipper above
 0.3 \AA in
400 Gauss
stray field

$T_1 \approx 120$ hours
at 1 bar



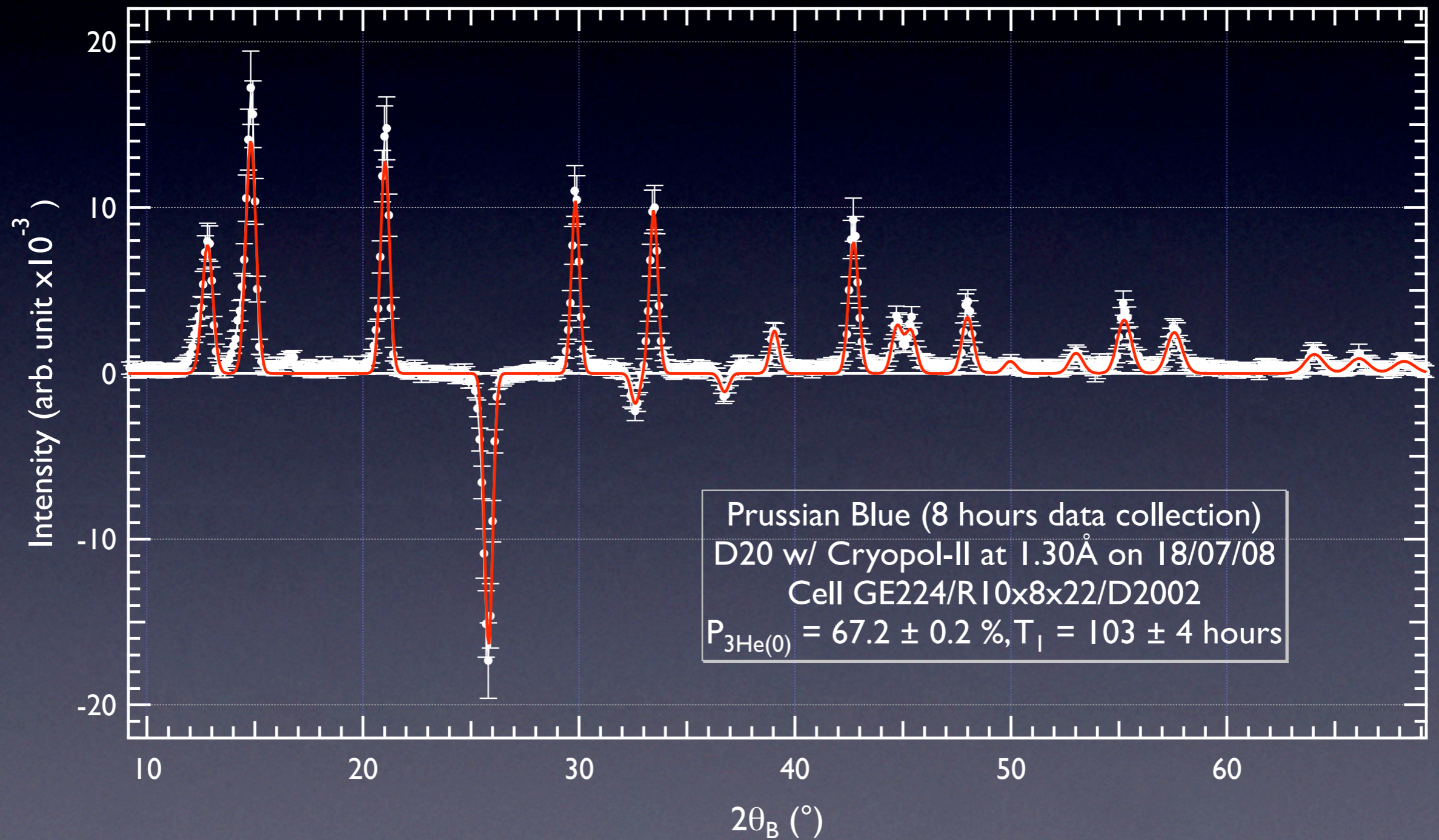

D20

molecular magnets
nanoscale samples
biological systems

...



Difference spectrum collected on D20 for Prussian Blue



The Spin Revolution

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The Spin Revolution

- 1963 - Blume / Maleyev
- 1969 - Moon / Riste / Koehler
- 1972 - Mezei
- 1973 - Alperin demo
- 1989 - Tasset *et al.* (SNP)
- 1992 - Tasset *et al.* (NSF)

On behalf of the ILL
and of the neutron
community,

Thank you very much.

Francis,

Je suis souvent troublé à l'idée qu'une partie de ma propre vie est fondée sur ton travail et j'ai conscience d'avoir une grande dette envers toi. C'est avec beaucoup d'émotion et de sincérité que j'ai organisé ce symposium que tu mérites tant.

Merci