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# SCHOOL OF PHYSICS AND ASTRONOMY



The screenshot shows a website for an event titled "50 Years of Dilution Refrigeration" organized by the IOP Institute of Physics. The page includes a navigation menu with links for Programme, Presentations, Speakers, Sponsors, and Organising Committee. The event details are as follows:

11:00 – 18:00, 16th September 2015, University of Manchester  
**Organised by the History of Physics and Low Temperature Groups of the Institute of Physics**

The principle of cooling below 0.3K by dissolving the isotope  $^3\text{He}$  in liquid  $^4\text{He}$  was proposed by Heinz London in the early 1950s. It was realised in 1964 in Leiden (0.22K), in 1965 in Manchester (0.065K), in 1966 in Dubna near Moscow (0.025K) and in 1967 in Urbana (0.0045K). Since then dilution refrigerators have become the method of choice for continuous cooling to millikelvin temperatures, and hundreds of refrigerators were built and sold world-wide. Presentations by pioneers of the field will cover topics from the early developments in the 60s to further advances in the technology and its use in studies of condensed matter, particle physics and astrophysics.

## WELCOME

IOP History of Physics Group and  
Low Temperature Physics Group

Professor Stephen Watts

16th September 2015

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# SPONSORS

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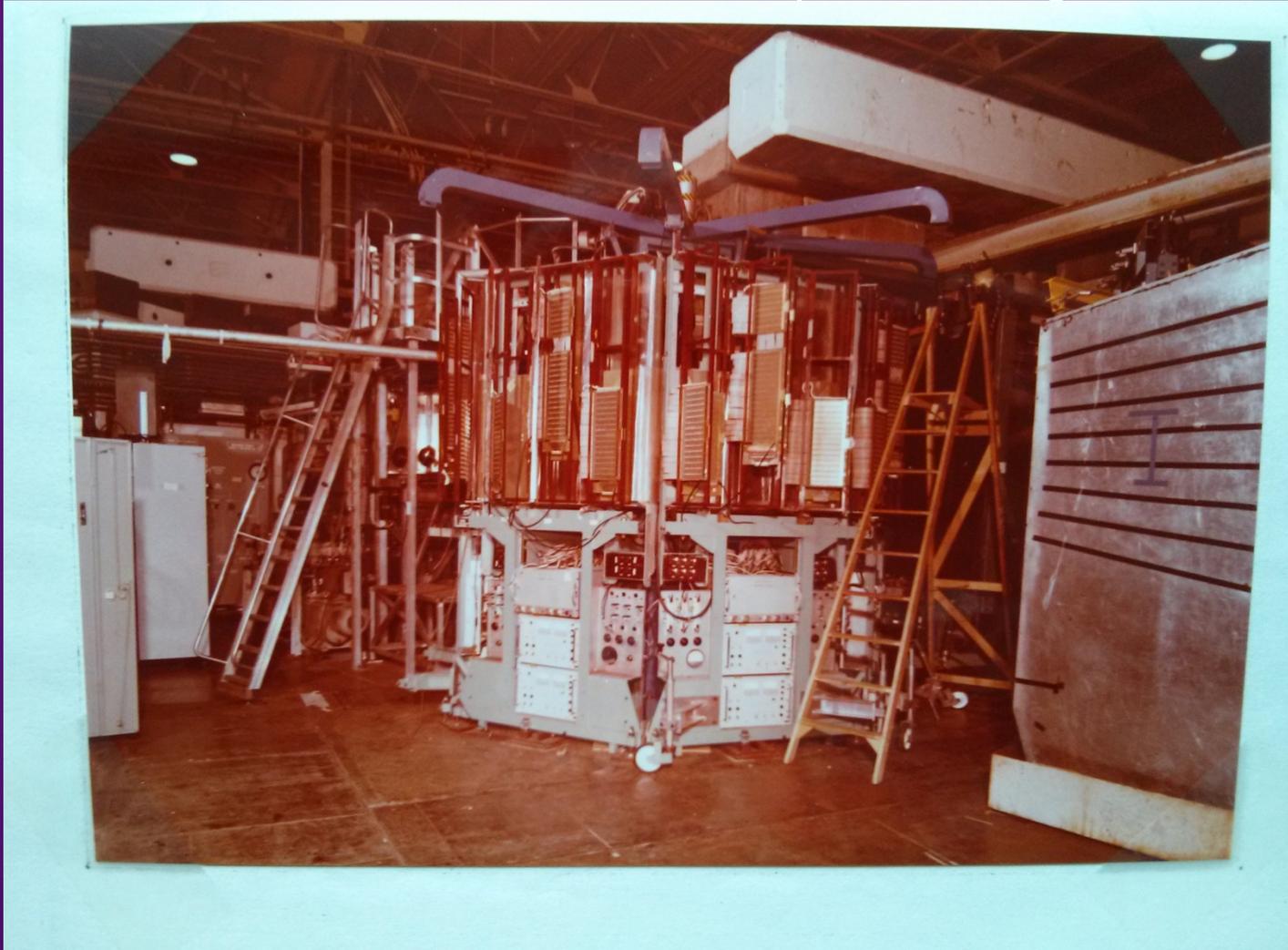
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# K20 Experiment – Rutherford Appleton Laboratory ~ 1976

Polarization in  $K^+ n \Rightarrow K^0 p$  scattering at around 1 GeV



K20 Experiment – RAL ~ 1975

Ten Years after the first dilution fridge  
Polarized Deuteron Target

( Thank you - S.F. Cox and A.S.L. Parsons  
and the Polarized Target Group)



## Polarized Deuteron Target

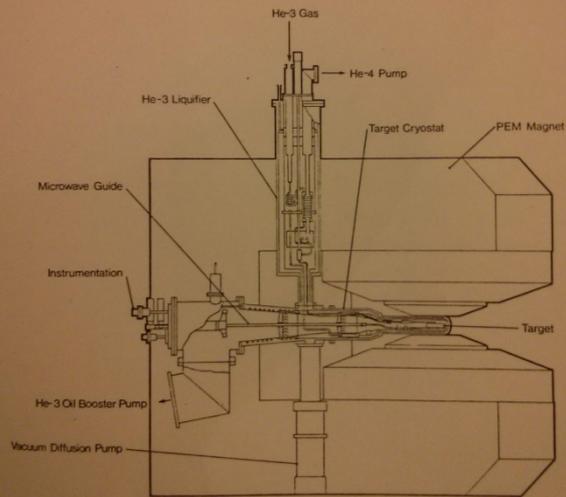


Fig. 2.5

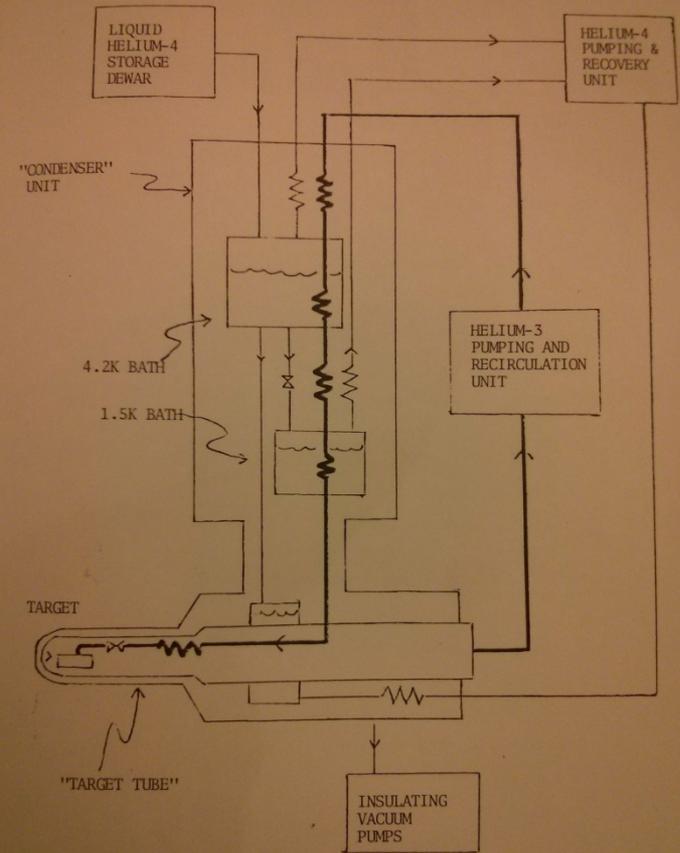
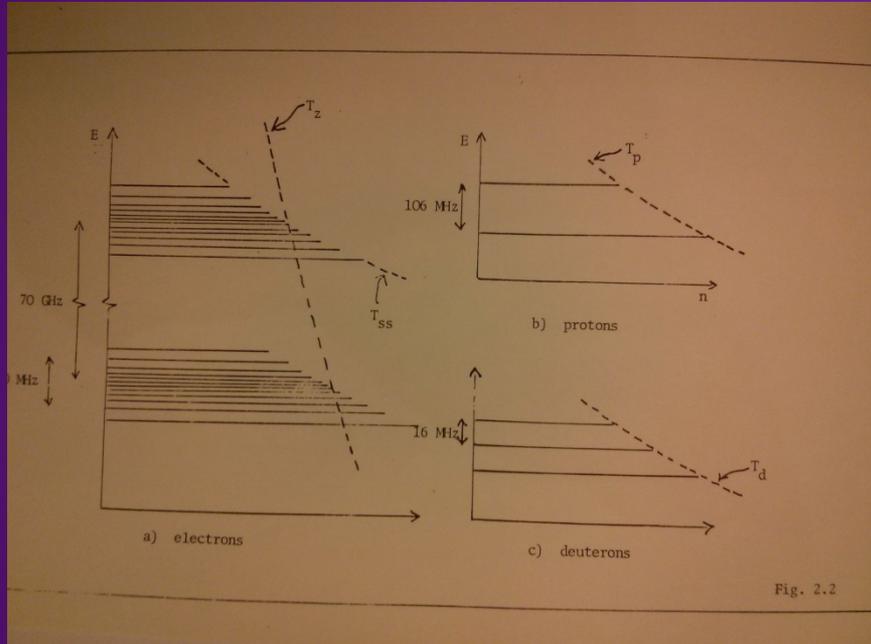
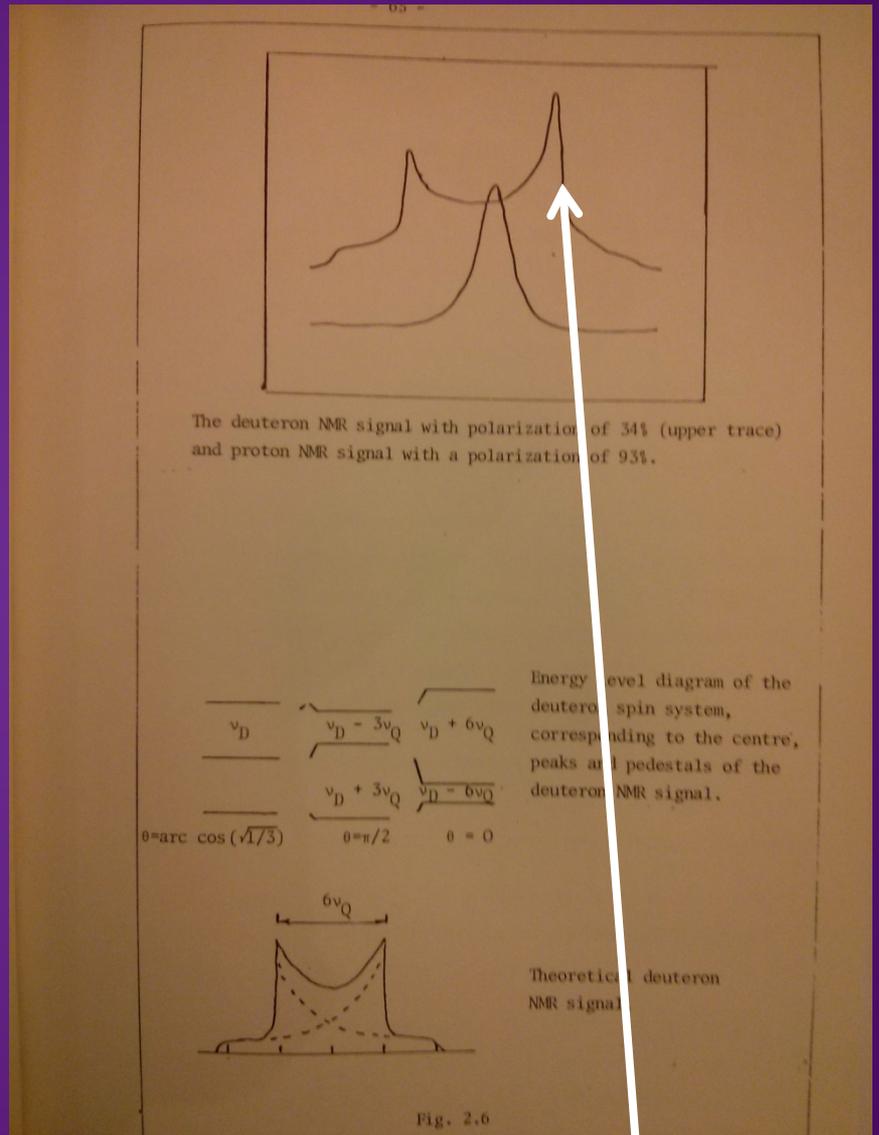


Fig. 2.4 Refrigeration Line Diagram



2.5 Tesla 0.4 Kelvin  
 Electron polarization 99.7%  
 Proton polarisation 0.5%

“Dynamic Polarization” 70 GHz microwave 75 mW  
 Protons 93% Deuterons 36% ( Neutrons  $0.91 \times 36 = 33\%$ )  
 Spin temperature 1.5 milliKelvin  
 Leave the explanation to Prof. Niinikoski.....



The measurement that made me believe in Quantum Mechanics

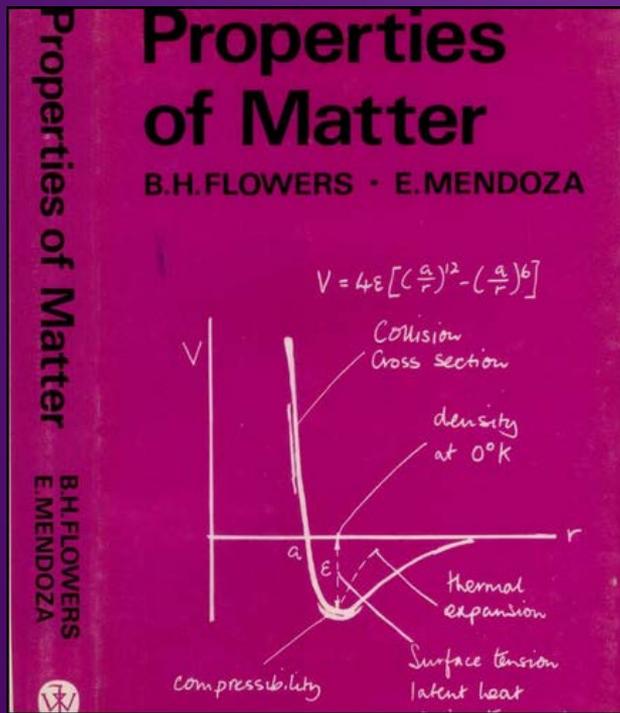
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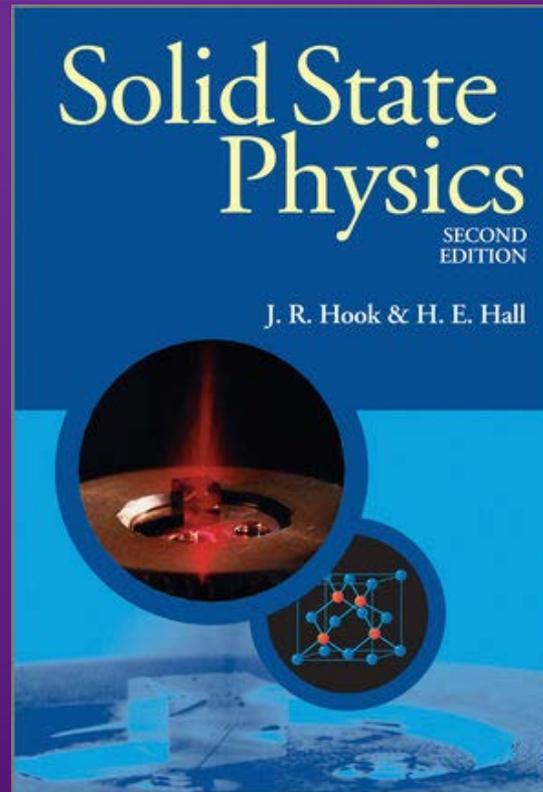


## The Manchester Physics Series

The Manchester Physics Series is a set of textbooks at first degree level, published by Wiley and available through all good book stores



First Manchester Book as  
undergraduate in London



First course as lecturer

Thank You  
Henry Hall

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Thank you for travelling to Manchester for this landmark meeting

Thank you to the Organising Committee

**ENJOY THE MEETING !**