Science with neutron and X-ray beams

The Legacy of Godfrey Stafford – a Celebration

Andrew Harrison – Diamond Light Source

RAL - January 24th 2014

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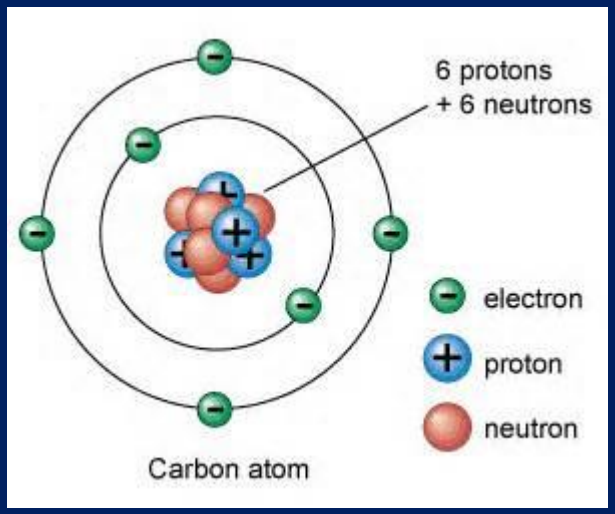
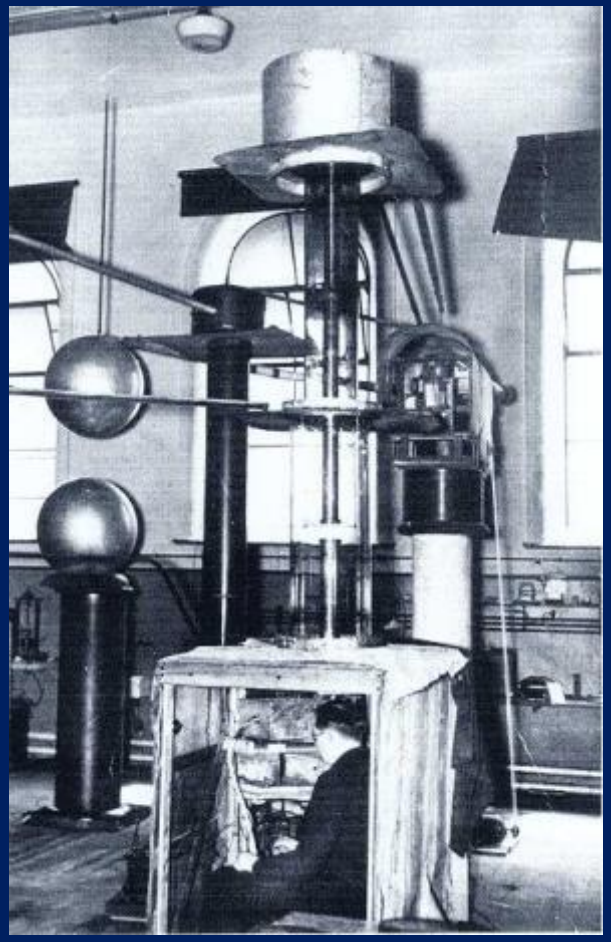
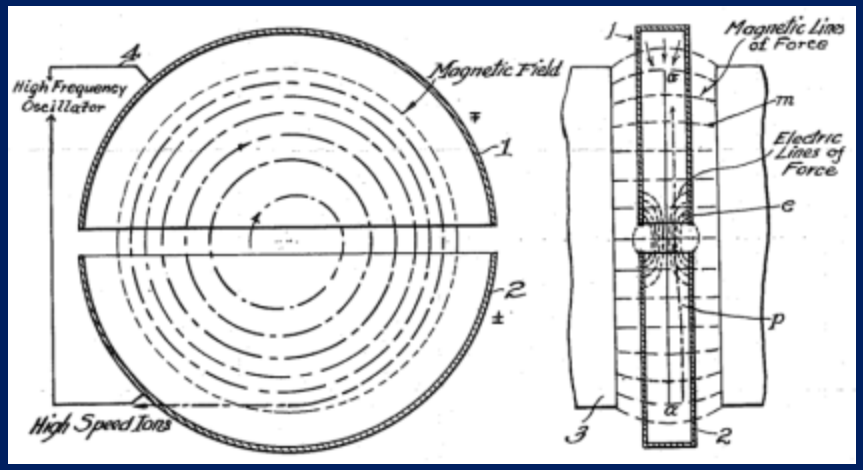
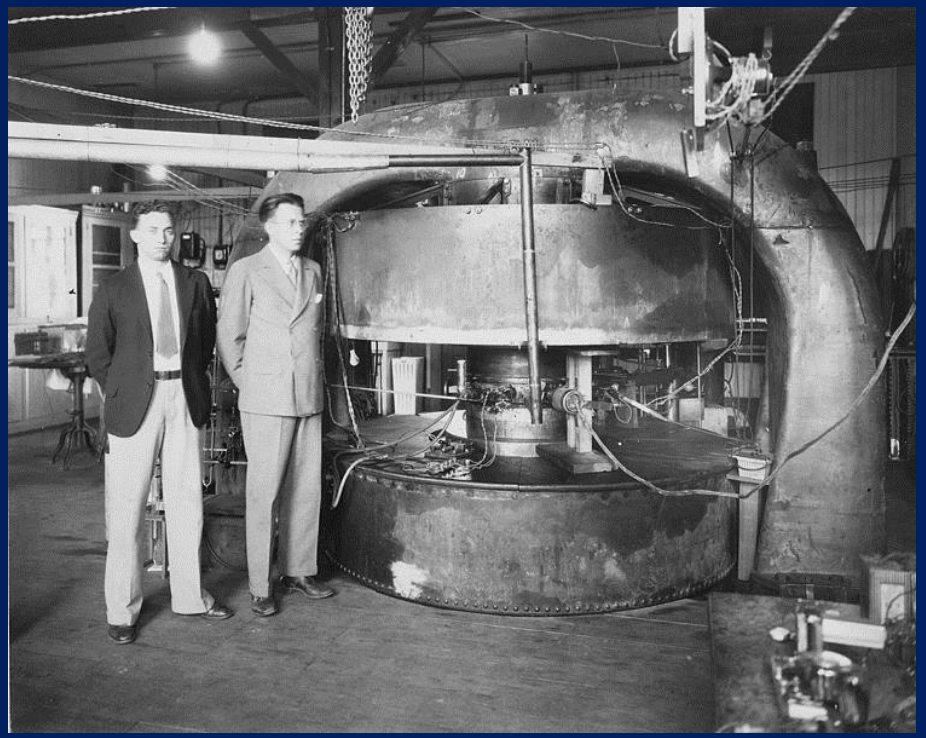
Taking atoms apart



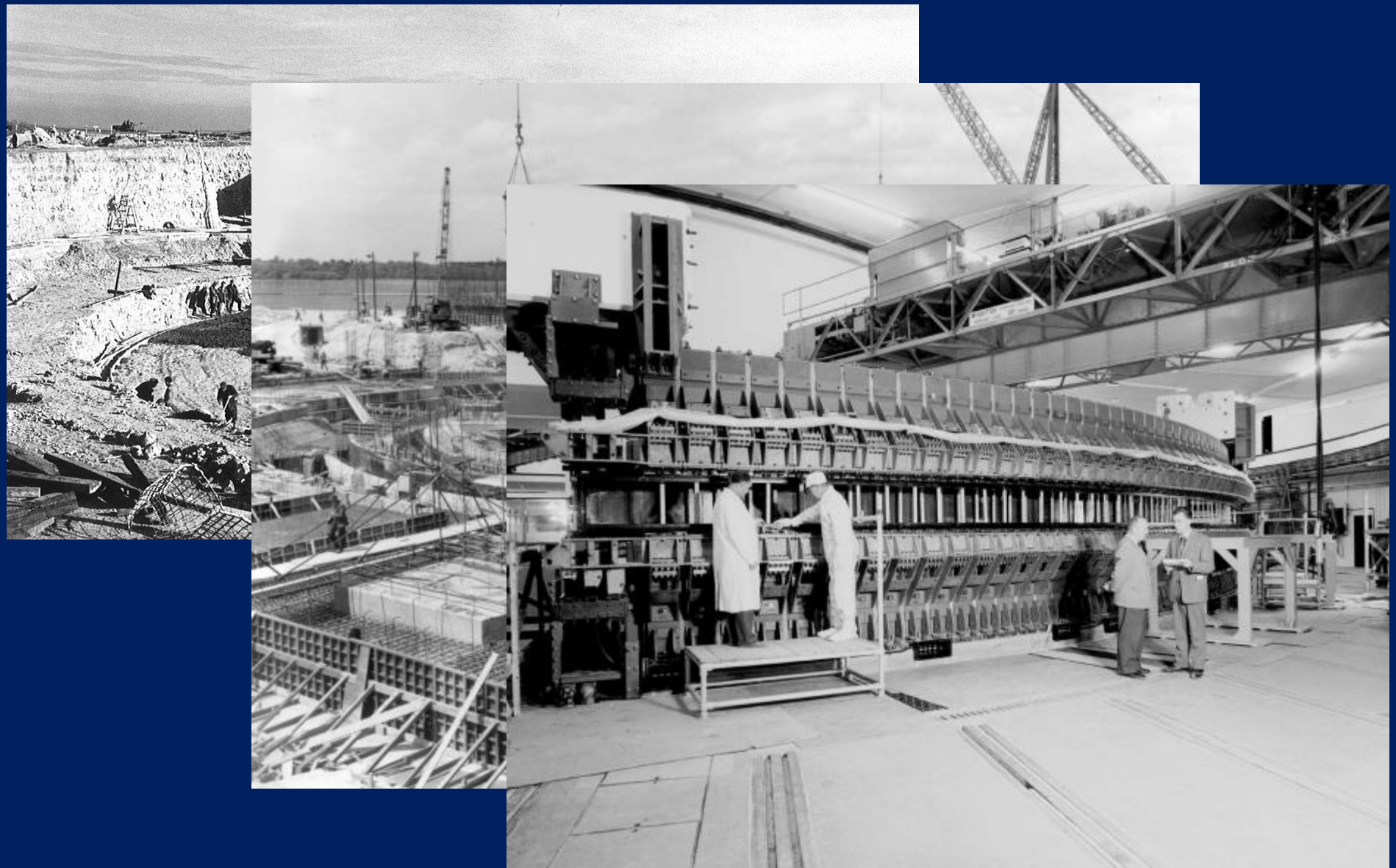


Ever-increasing circles





Ever-increasing circles



Progress in Nuclear Energy Part C, 1961, Vol 3, pp. 287 to 299. Pergamon Press Ltd. Printed in Northern Ireland

THE FEASIBILITY OF A SUPERCONDUCTING PROTON LINEAR ACCELERATOR

A. P. BANFORD and G. H. STAFFORD
Rutherford High Energy Laboratory, National Institute for Research in Nuclear Science, Harwell, Berks

(*Received 9 June 1961*)

Abstract—The use of superconducting resonators for a proton linear accelerator is shown to reduce greatly the radio-frequency power requirements and, in principle, to make a c.w. high intensity machine practicable. Rough estimates of costs do not preclude the proposal on economic grounds. Some of the technical problems involved are also discussed.

1. INTRODUCTION

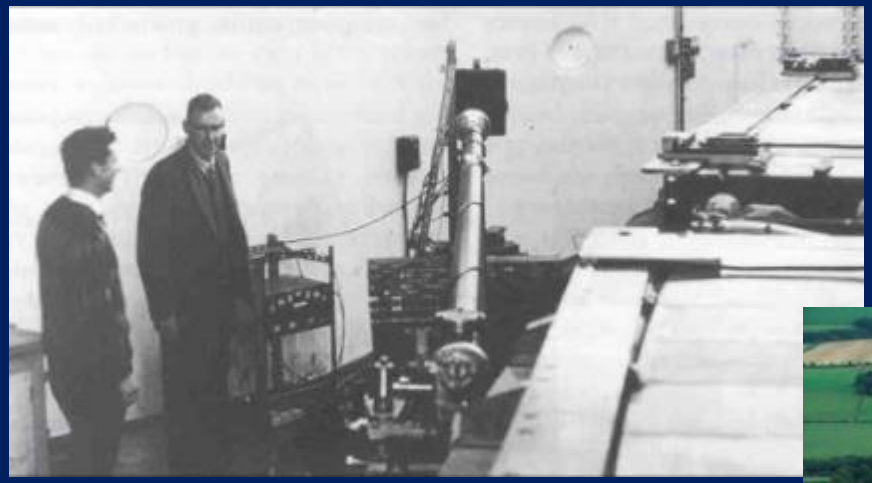
An ideal accelerator for nuclear research would be one with the following characteristics:

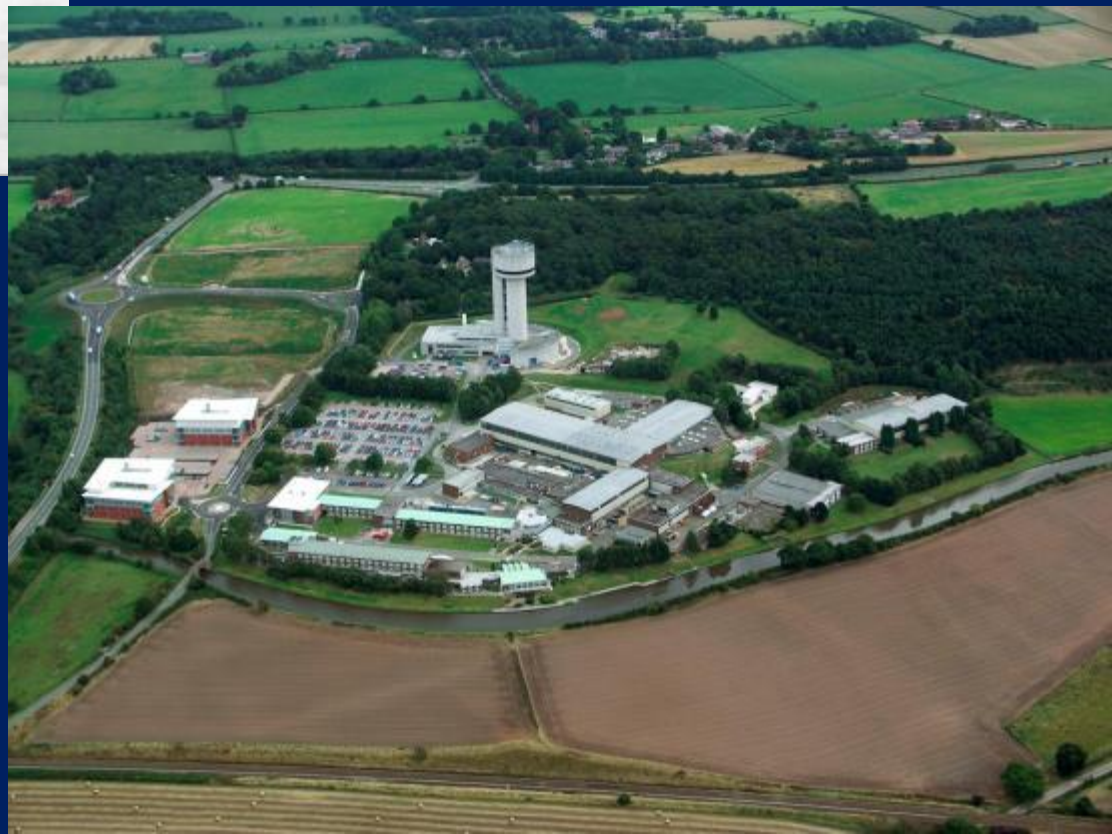
(a) a duty cycle as close to unity as possible
(b) high intensity
(c) high energy resolution
(d) as large a fraction as possible of the accelerated

At radio frequencies in the range of interest for a P.L.A. (i.e. 200–800 Mc/s), the surface resistivity R_s is small but finite. The variations of R_s with temperature and frequency are shown in Fig. 1 for lead ($T_c \approx 7{\cdot}2^{\circ}$K). The form of variation is

$$R_s = R_{s,r} = R_n A(\omega) \phi(t) \qquad (1)$$

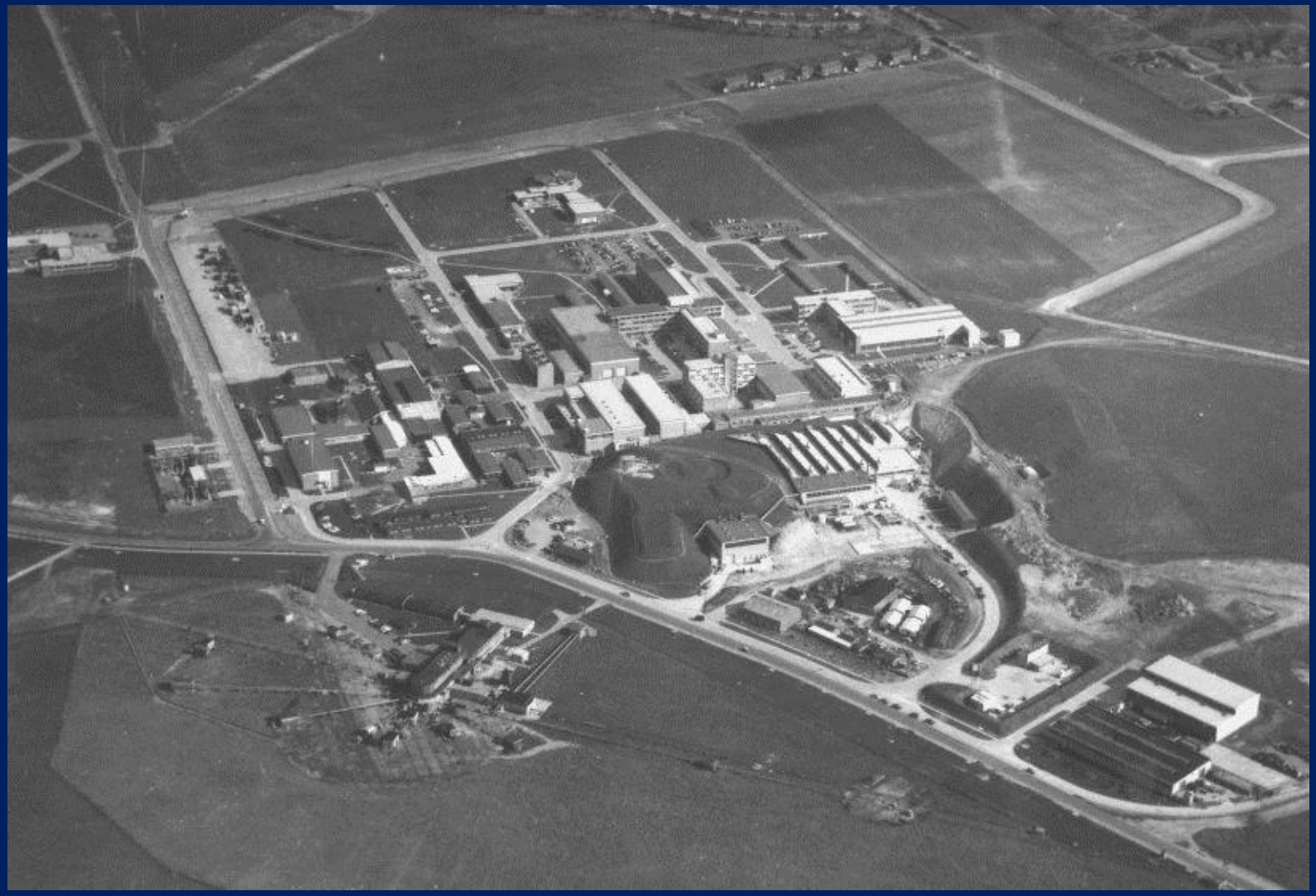
Northern pole





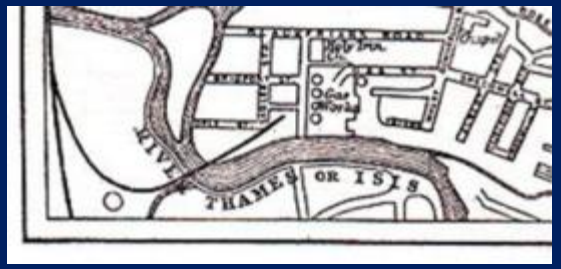
Even further afield

Out of the ashes



Out of the ashes

Out of the ashes



A star is born

From strength to strength

From strength to strength

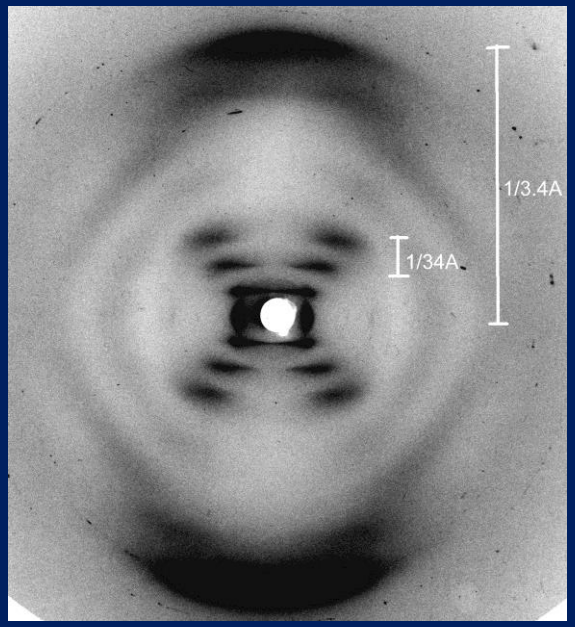
From strength to strength

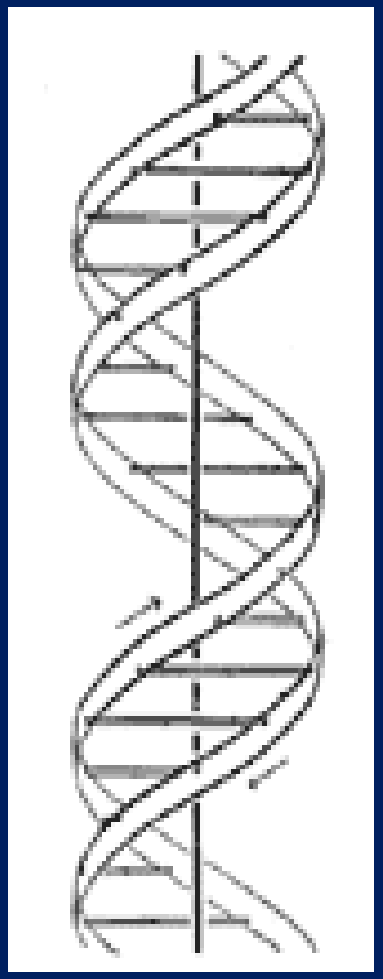
Twinning

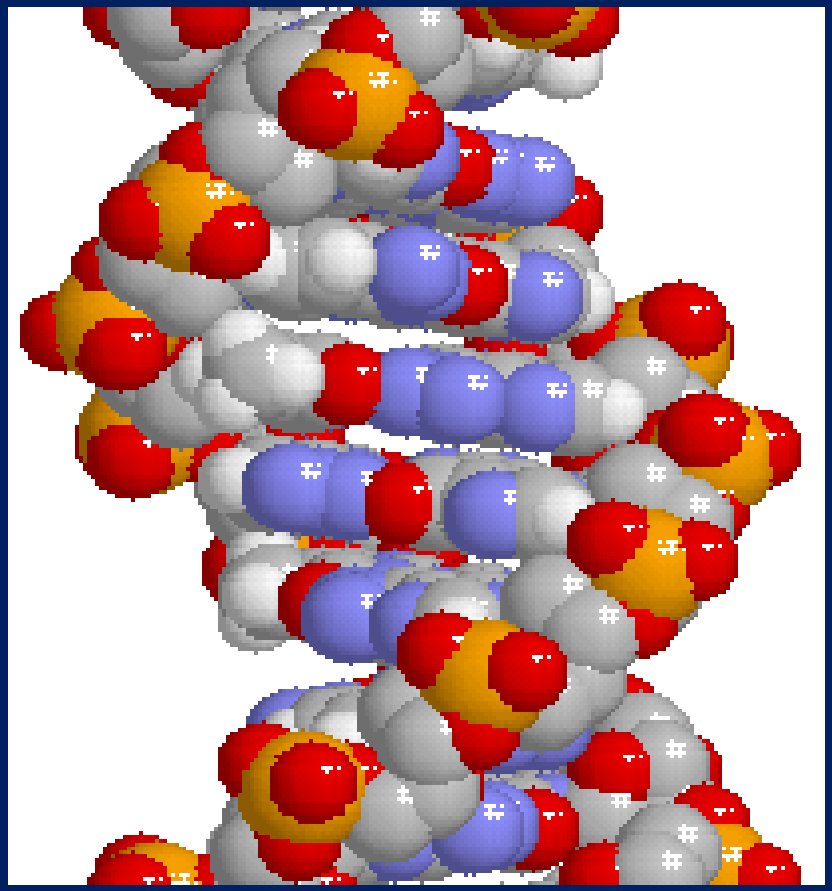
July 2006

Seeing inside matter with X-rays

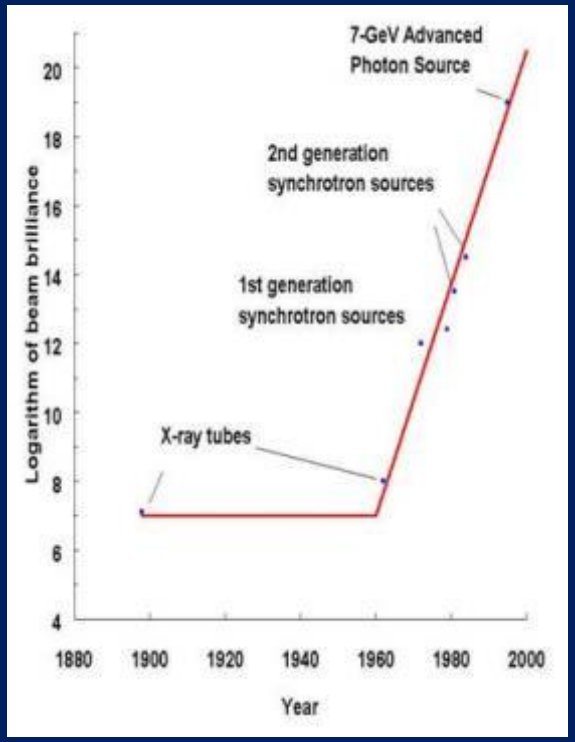
Seeing inside matter with X-rays

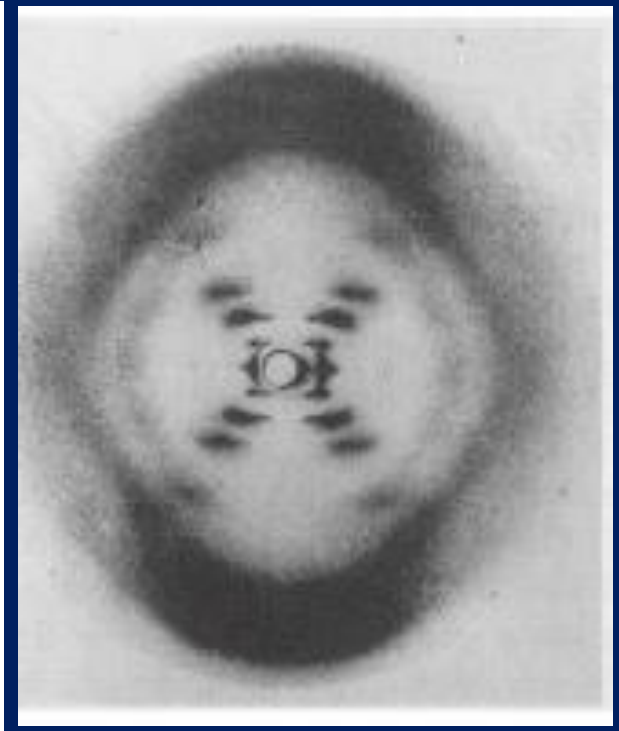


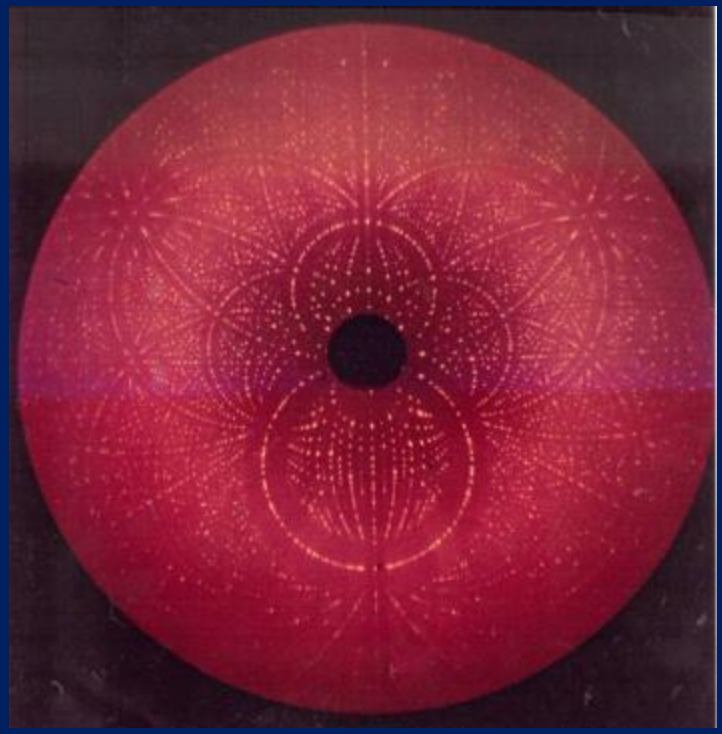




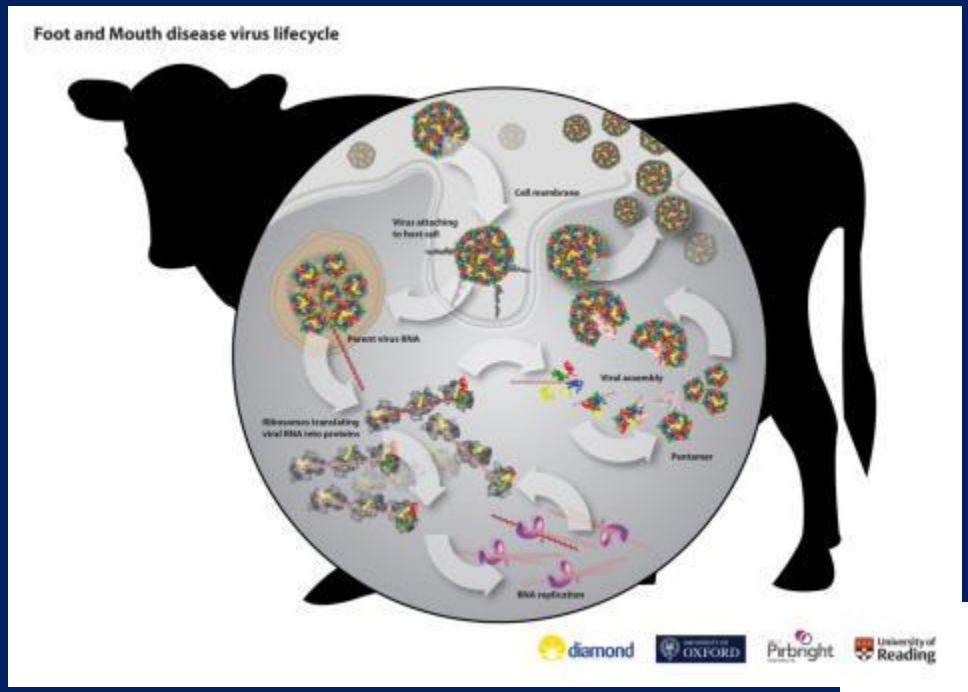
Seeing inside matter with X-rays

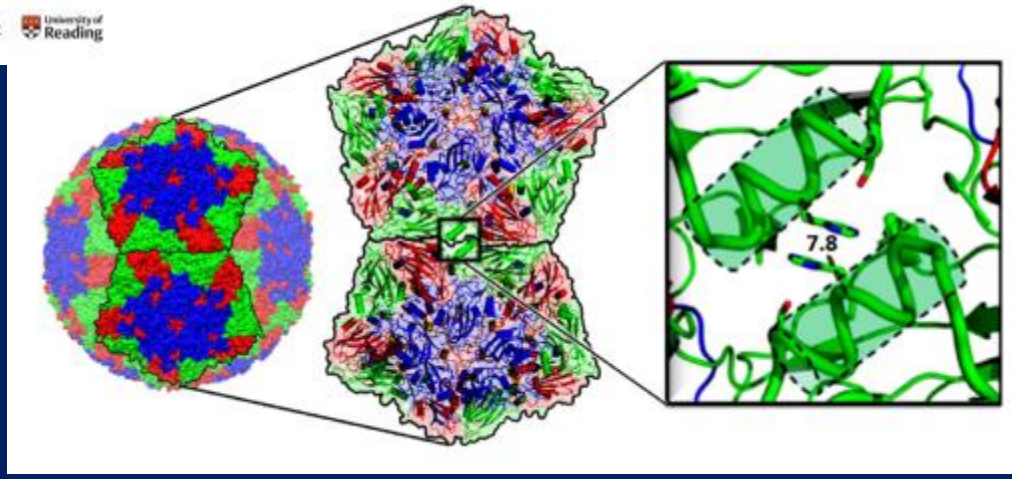


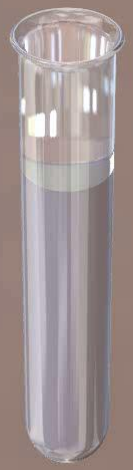




Designing drugs and vaccines







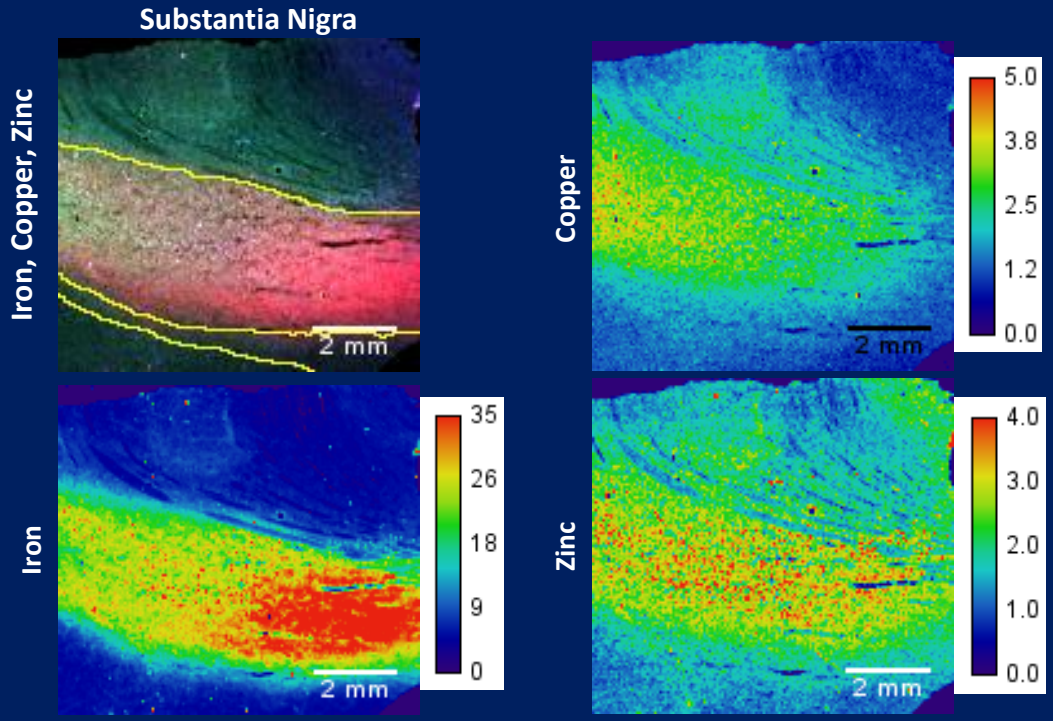
Engineering in action

Running motorbike engine on I12 JEEP

N. Baimpas, Oxford University.
(Radiography & Diffraction)

Nikolaos Baimpas, Michael Drakopoulos, Thomas Connolley, Xu Song, Costas Pandazaras, Alexander Korsunsky, J Synchr. Rad. 20, 316-323 (2013)

Neurodegenerative disease



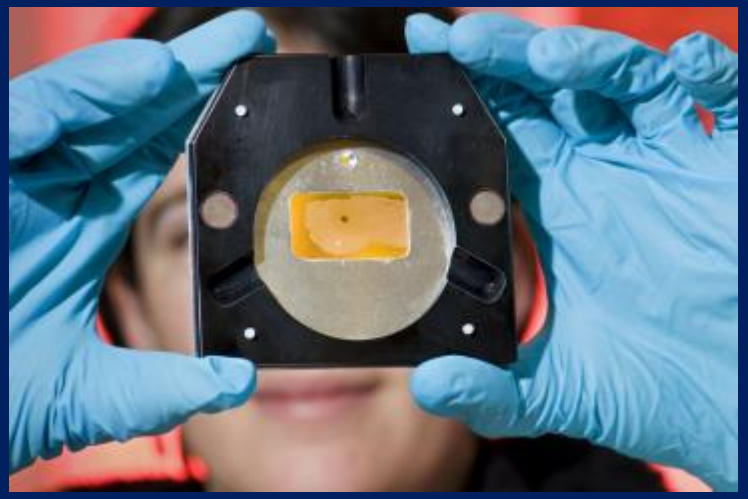
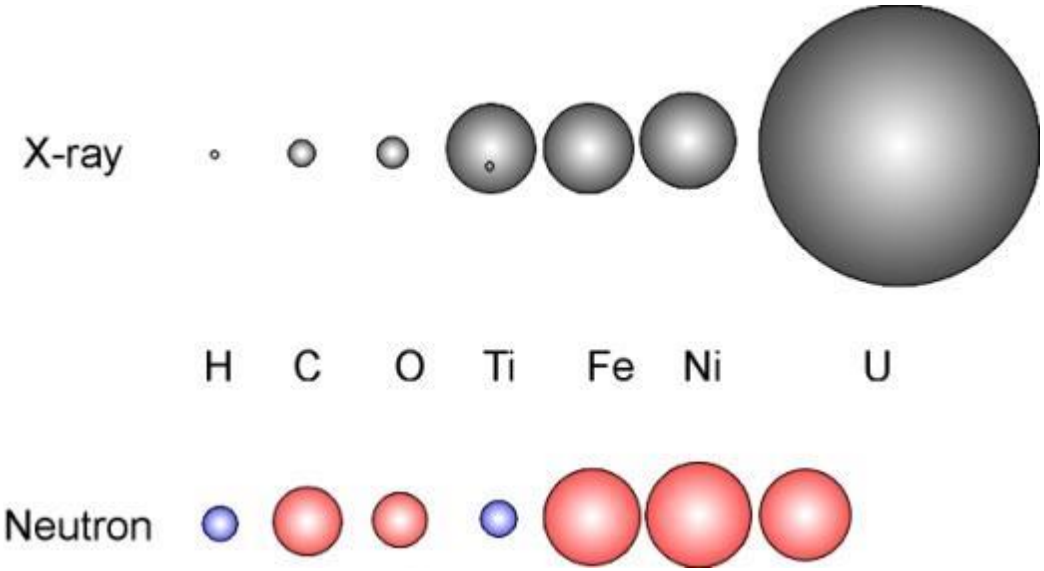
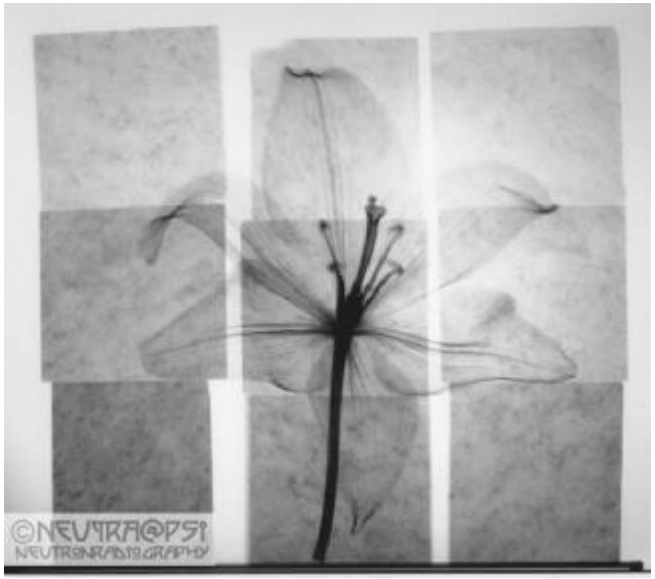


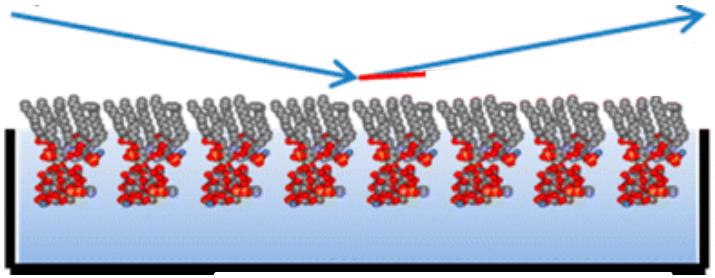
Figure:Iron, copper and zinc distribution in the human substantia nigra, measured by Mary Finnegan (University of Warwick, School of Engineering) at the I18 beamline. PI Joanna Collingwood.

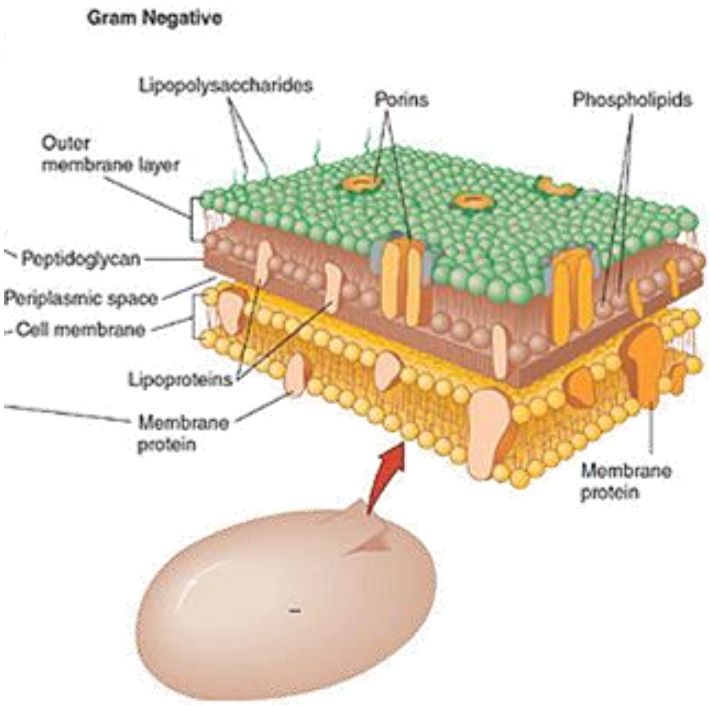
Complementarity of neutrons

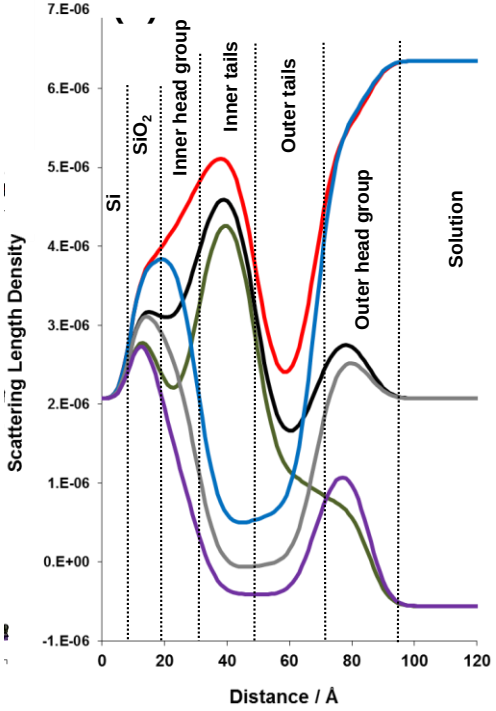




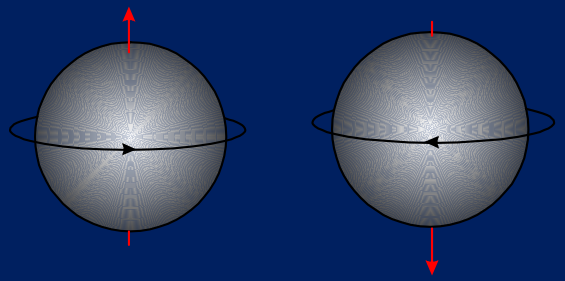
Looking beneath the surface

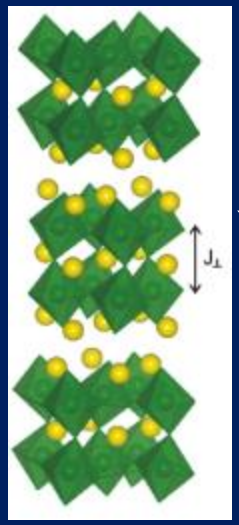


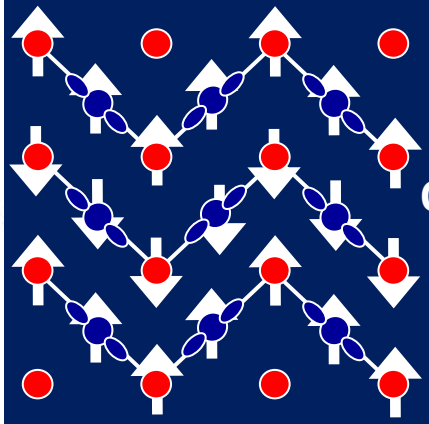


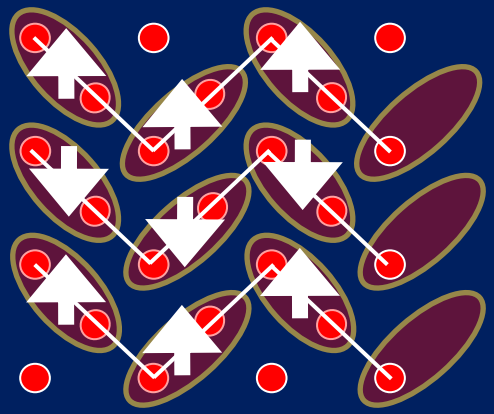


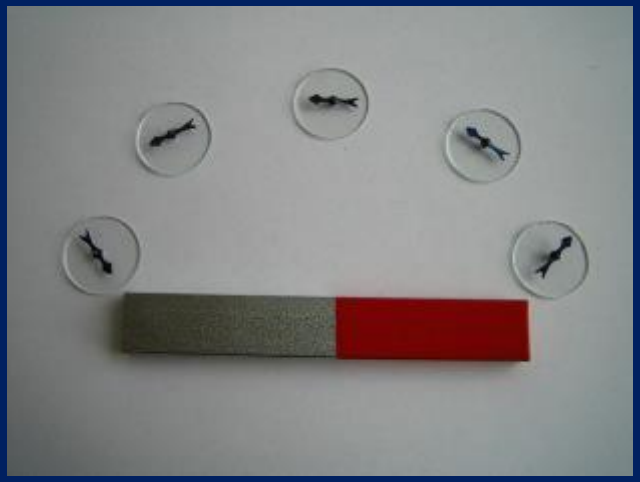
Magnetic nanoprobe









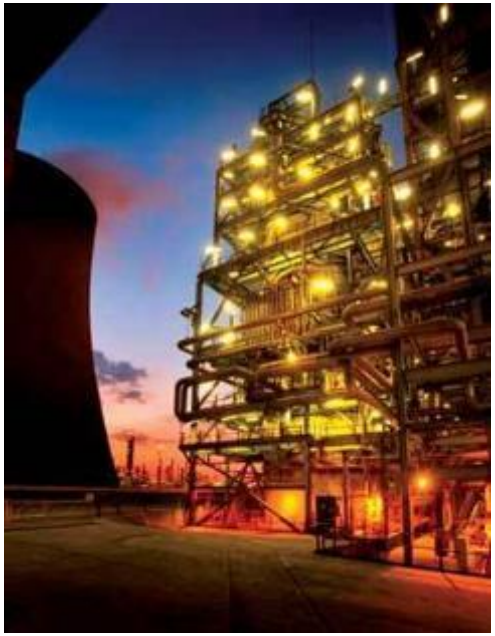


G.E.Johnstone, T.G.Perring et al., *Phys. Rev. Lett.* **109** 237202 (2012)

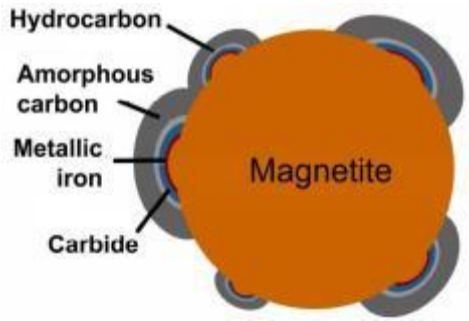
Taking molecular fingerprints

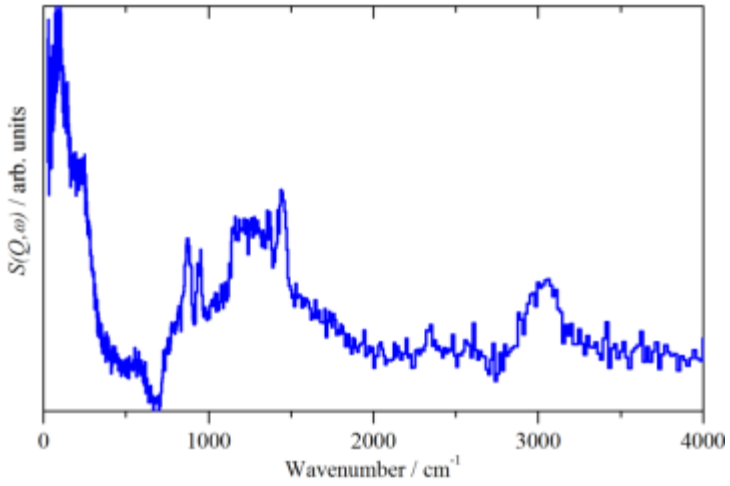
What do you do when the oil runs out ? You make it !

Fischer-Tropsch (FT): $n\mathrm{CO} + (2n + 1)\mathrm{H_2} \xrightarrow{\text{Fe catalyst}} \mathrm{C_nH_{(2n+2)}} + n\mathrm{H_2O}$



Sasol FT reactor at Secunda





UNIVERSITY of

sasol
reaching new frontiers

Complementarity

Science & Technology Facilities Council ISIS

diamond

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

EPSRC
Engineering and Physical Sciences Research Council

The Leverhulme Trust

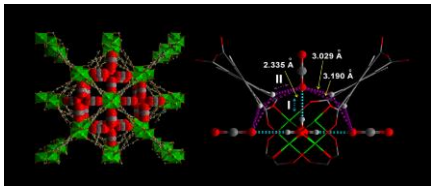
Home > News and Events > Press Releases > STFC > Scientific discovery offers 'green' solution in fight against greenhouse gases

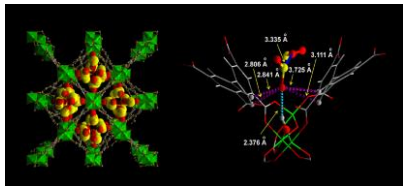
Scientific discovery offers 'green' solution in fight against greenhouse gases

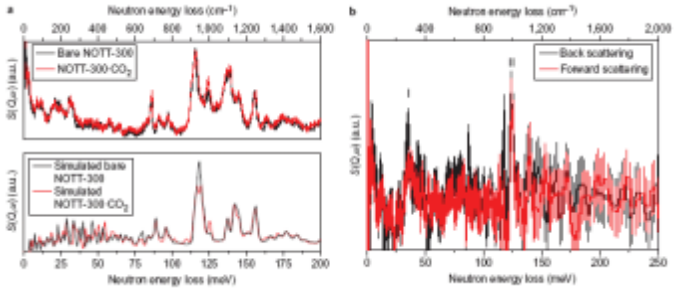
UK researchers have created a low cost, new material that can capture harmful gases, offering an exciting breakthrough in combating atmospheric pollution.

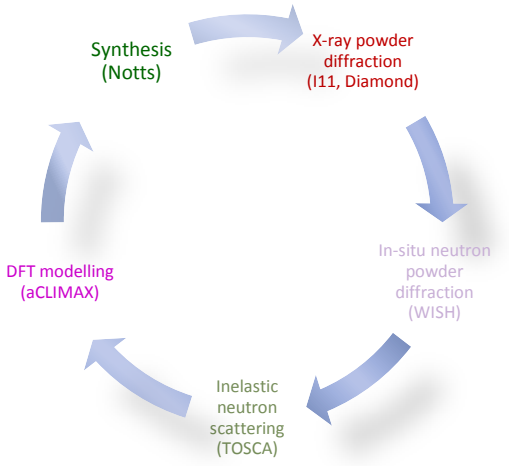
The porous material, dubbed NOTT-300, has the potential to reduce fossil fuel emissions through the cheaper and more efficient capture of polluting gases such as carbon dioxide (CO_2) and sulphur dioxide (SO_2).

The research, published in the scientific journal Nature Chemistry, demonstrates how the exciting properties of NOTT-300 could provide a greener alternative to existing solutions to adsorb CO, which are expensive and use large amounts of energy.









nature chemistry
ARTICLES
PUBLISHED ONLINE: XX XX 2012 | DOI: 10.1038/NCHEM.1457

Selectivity and direct visualization of carbon dioxide and sulfur dioxide in a decorated porous host

Sihai Yang[1]*, Junliang Sun[2], Anibal J. Ramirez-Cuesta[3], Samantha K. Callear[3], William I.F. David[3,4], Daniel Anderson[1], Ruth Newby[1], Alexander J. Blake[1], Julia E. Parker[5], Chiu C. Tang[5] and Martin Schröder[1]*

Godfrey Stafford's Legacy