RAL

DESIGN & DISCOVERY

Open Days July 1990

RUTHERFORD APPLETON LABORATORY

SCIENCE AND ENGINEERING RESEARCH COUNCIL

APPLIED SUPERCONDUCTIVITY

SUPERCONDUCTIVITY - ZERO ELECTRICAL RESISTANCE AT LOW TEMPERATURE

APPLIED SUPERCONDUCTIVITY - EXPLOITATION OF SUPERCONDUCTIVITY IN ELECTROMAGNETIC APPLICATIONS

The Rutherford Appleton Laboratory has been involved in Applied Superconductivity for some 25 years. The main thrust of the work has been in the development of practical superconducting wires and cable based conductors and their application in a wide range of magnets.

Throughout the development of Applied Superconductivity at RAL there have been strong links to High Energy Physics. In the late 1960s and early 1970s the development of filamentary conductors and 'Rutherford Cable' provided the basis of conductors for all superconducting accelerator magnets. The development of prototype accelerator magnets contributed to the technology required to build the World's first superconducting accelerator, the Fermilab Tevatron. In the last 5-10 years the major contribution has been the design and construction of two of the World's largest superconducting solenoids for experiments in CERN (DELPHI) and DESY (H1).

The Applied Superconductivity programme has required the continued development of a core of base technology covering: superconductor testing, low temperature materials, magnet design techniques, cryogenic and electrical engineering.

High Temperature superconductors (Tc>77K) were discovered in 1987 and offer enormous technological potential for the future. However, the technical problems involved in producing practical magnet conductors from these ceramic materials are formidable and will require long term development.

It is clear that within the 1990s the applications of low temperature superconductors will continue to grow. In High Energy Physics two enormous superconducting accelerators are planned, LHC (Large Hadron Collider) at CERN and SSC (Superconducting Super Collider) in the USA. The exploitation of superconductivity in medical applications eg NMR imaging will continue to demand new techniques. Superconductivity remains an essential factor in future plans for fusion technology and energy storage.

The ongoing programme of work in Applied Superconductity at RAL is directed towards providing state of the art technology in conductor fabrication, testing and evaluation, magnet design and fabrication techniques.

The 1990s will also see a continued

expansion of the exploitation and application of superconductivity by industry. RAL can continue to provide an important link between basic technological development and industrial application.

Expertise is available in the following fields related to Applied Superconductivity.

Conductors - Design
Testing
Evaluation

Magnet Systems - Magnetic Design
Cryogenic Systems
Electrical & Control Technology
Materials

Contact: P T M Clee
D E Baynham) Cryogenics and
) Applied
C R Walters) Superconductivity
) Group

Rutherford Appleton Laboratory
Chilton, Didcot, Oxon. OX11 0QX

Telephone: Abingdon (0235) 821900 Ext 6649
Telephone: Abingdon (0235) 821900 Ext 5374
Telephone: Abingdon (0235) 821900 Ext 5323