i) Detailed information specifically relating to the section on superconductivity.

- **Some of this information will be needed for the tutorial work.**

Appendix p 1.

- For full copy of the overheads of 4, one hour lectures on superconducting technology, presented by Dr. Martin Wilson at the Cockcroft Institute, see:

- http://www.cockcroft.ac.uk/education/academic0506.html

- identified as:

- Dr. M Wilson:

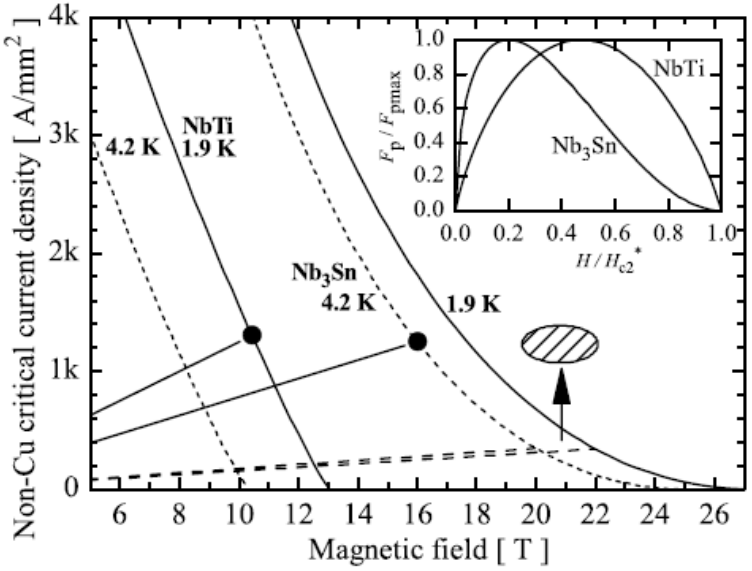
Session 1 , Session 2 , Session 3 , Session 4

Appendix p2

- **Types of super-conductor:**
- **Type 1** – pure metals such as Pb, Sn, Hg when 'cold';
- demonstrate full Meissner effect;
- low $B_{critical}$;
- go 'normal' at higher fields;
- not suitable for magnets; very good for s.c. rf;
- **Type 2** – alloys such as NbTi, Nb_3Sn;
- magnetic flux penetrates s.c. material;
- individual pockets of flux permeate small 'normal' regions in the material - 'fluxoids';
- fine for magnets.

•For fuller explanation of types of s.c., see Martin Wilson's lecture 1.

Appendix p 3.



This is the graph of the critical values of flux density and current density shown on slide for NbTi and Nb_3Sb at 4.2 and 1.9 K, as shown on slide 78.

Data for Nb_3Sn at 1.9 T will be needed for the tutorial based project activities. It is recommended that the diagram is printed out at A4 size, to enable students to obtain accurate data of the critical current densities J_c, corresponding to the total flux densities BMOD in all parts of the coils, as predicted by OPERA 2D.

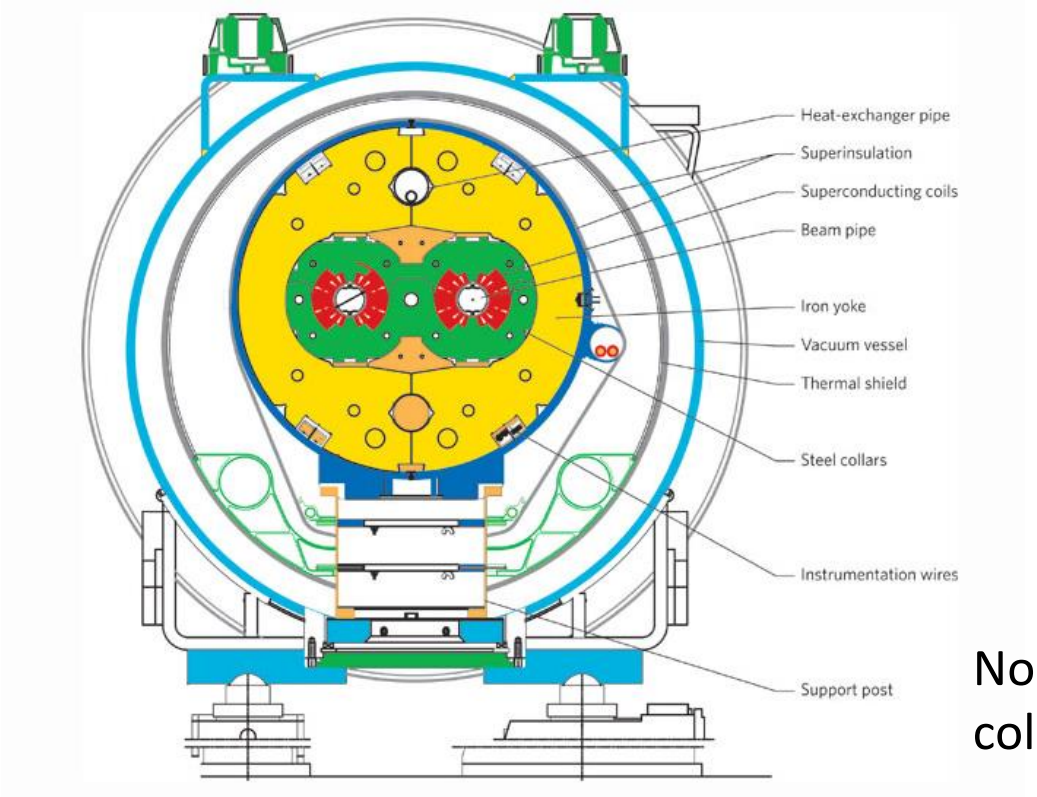
Appendix p 4.

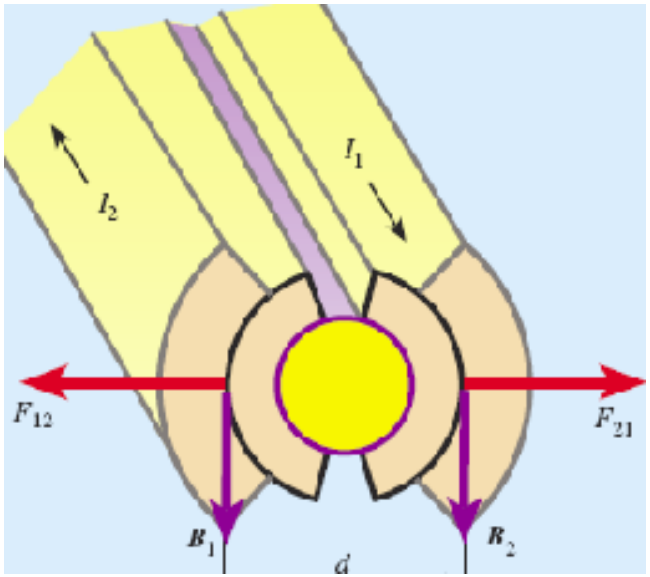
- Composition of s.c. coils:

- coils are formed from ‘cables’:
- (in the LHC dipoles160 per coil);
- the cables are made up from ‘strands’:
- (36 strands 0.825 mm diameter per LHC cable);
- the strands are made up of ‘filaments’:
- (6,500 filaments per LHC strand).

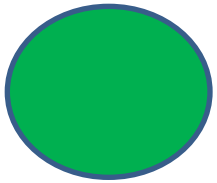
Appendix p 5.

LHC forces.





Non-magnetic collars, green:



restrain bursting forces of 2.10^6 N/m.