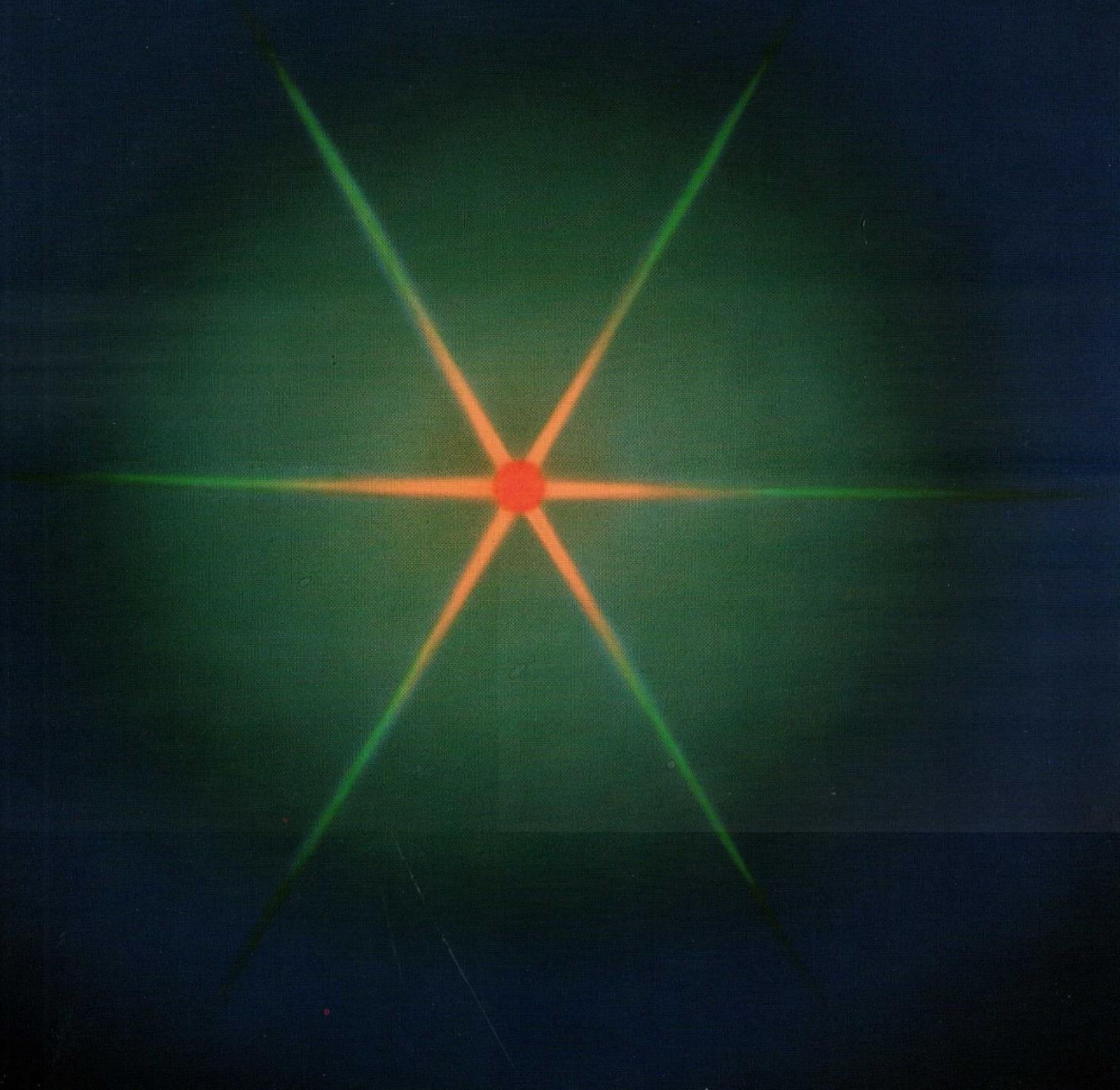


HARWELL

accelerator services



Summary of principal particle beams

Accelerator	Typical Beam Properties				
	Ion type	E _{min}	E _{max}	Maximum current	
Synchrocyclotron	Protons		160 MeV	Internal beam 5μA	
	Deuterons		85 MeV	External beam 260nA	
	He ³		222 MeV	Under modification 1μA	
	He ⁴		170 MeV	Under modification 3nA	
Variable Energy Cyclotron	Protons	5 MeV	53 MeV	Tens of microamps external Nanoamp to tens of microamps external depending on the ion and the energy	
	Deuterons Helium Boron Oxygen Carbon Nitrogen Argon	} $\frac{84(\text{Charge})^2}{\text{Mass}}$			
45 MeV Electron Accelerator (Neutron Booster)	Neon Chromium Iron Nickel Zirconium Molybdenum				
	Electrons	5 MeV	55 MeV	1 amp (Pulsed)	
Tandem Generator	Neutrons	10 meV	10 MeV	(5 x 10 ¹³ Neutrons/sec)	
	Protons	Deuterons	2 MeV	14 MeV	8μA
	Helium	Lithium	5 MeV	19 MeV	2.5μA
	Oxygen Sulphur	Fluorine Chlorine Carbon	10 MeV	40 MeV	0.5μA – 2μA
Van de Graaff	Metals e.g. Aluminium Nickel	Iron Zirconium	20 MeV	40 MeV	0.1μA – 1.0μA*
	Protons Helium Nitrogen Argon Metals e.g. Iron Nickel	Deuterons 3 and 4 Oxygen Carbon Boron Tellurium	0.7 MeV	6.0 MeV	> 50μA 20μA 2.5μA
I.B.I.S.	Protons Helium	Deuterons 3 and 4	0.7 MeV	3.4 MeV	100μA 50μA
2 MeV Van de Graaff	Electrons		0.9 MeV	2.0 MeV	40μA
	Protons		0.9 MeV	2.0 MeV	20μA
Cockcroft-Walton	Any solid element Gases		10 keV	450 keV	1μA – 20μA
400 keV Van de Graaff	Electrons		50 keV	400 keV	100μA
	Protons		50 keV	400 keV	150μA
E.M. Separators and Ion Implantation facilities	Positive ions of any element		5 keV	200 keV	1mA

*Current equivalent of 10¹² particles per second of charge state 5+

Irradiation with these beams can often be carried out under ultra-vacuum conditions or at high pressures, and at temperatures varying from liquid helium up to several hundred degrees centigrade.

How to reach Harwell



HARWELL

Accelerator Services

Terms of business

- Because of the wide range of services offered by Harwell, considerable flexibility is possible, with the client's needs as the foremost consideration.
- Confidential initial discussion of client's problems by telephone, by post, or by an invited visit to Harwell, is free and without obligation.
- Further advice is normally provided on a consultancy basis, at agreed rates. This can be extended to assistance with interpretation of the results of experimental work.
- If experimental work is to be undertaken by Harwell, the charges and programme will be agreed with the client beforehand. Provision will normally be made for checking and reviewing progress at suitable stages, and for controlling expenditure within agreed limits.
- Arrangements can be made for the client's own staff to carry out experimental work at Harwell, using local facilities supplemented if necessary with his own equipment. Scientific, technical and engineering assistance, and computer services, are also available on agreed terms.
- Strict confidence is observed in regard to all work carried out for outside clients.

Enquiries should be addressed in the first instance to:—

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