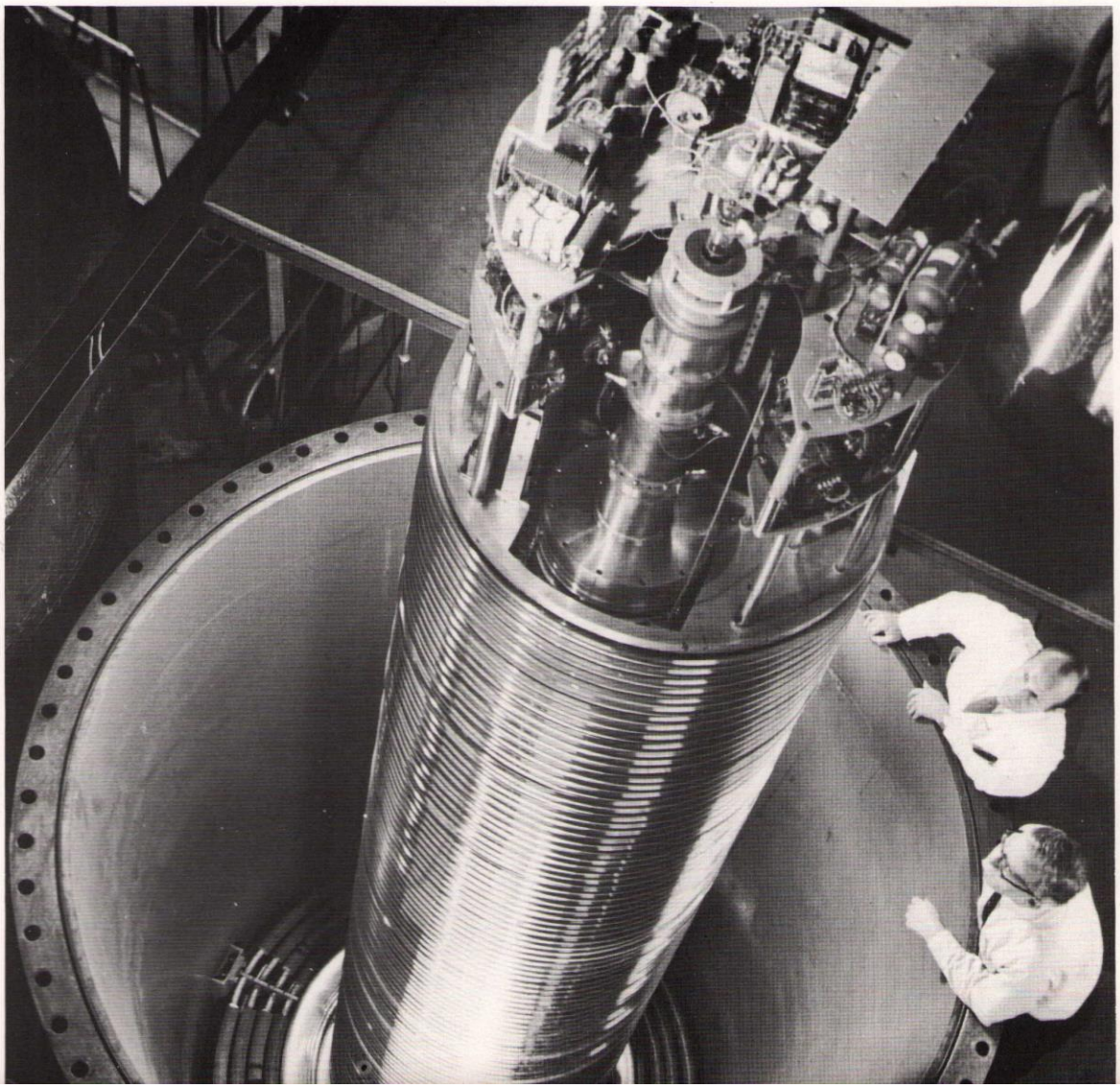
Ion beams on the 6 MV Van de Graaff

Ion beams of a large variety of solid and gaseous elements ranging in mass from Hydrogen to Bismuth can be accelerated on the 6 MV Van de Graaff.



For some years, beams of a wide variety of metallic and other elements have been available at Harwell at energies up to 400 keV from accelerators such as the Cockcroft-Walton. Now such beams are available at energies up to 6 MeV by the installation of a sputtering type metal ion source on the 6 MV Van de Graaff. Beam current varies with the sputtering properties of the material but generally lies in the range 1—10 μA. Elements accelerated to date include boron, aluminium, iron, copper, tellurium, and bismuth but others can be made available on request.

Beam spot size is typically 2—3 mm diameter but uniform irradiations over larger areas can be achieved by beam sweeping. The target facilities available vary with the mass and energy of the required ion beam due to the very high magnetic fields required to bend the heaviest ions. The product of the mass, A, in Atomic Mass Units e.g. for Boron A = 10, and the energy E in MeV is a measure of the bending power of the available magnets. For ions with Mass X Energy less than 48 MeV. AMU, elaborate and extensive target facilities are available. Rather less elaborate arrangements are available up to 600 MeV.AMU.

The accelerator is also equipped to produce gaseous ions. Ion beams of H, He, C, N, O, Ne, A, Xe have all been accelerated with currents up to 100 μA. In many cases, double charged ions, having twice the energy are also produced with currents typically of $\sim 1\,\mu$A.

These facilities may be used for research in ion implantation and ion channelling in semiconductors and other materials. They also permit radiation damage studies using 'self bombardment' e.g. bombarding Fe with Fe ions, thus avoiding complications due to foreign atoms. 'Beam foil spectroscopy' and other atomic physics investigations as well as radiobiology are also topics which can be studied using these ion beams.

Enquiries regarding the use of this accelerator should be made to

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