COLUMBUS – A Simple Ion Source

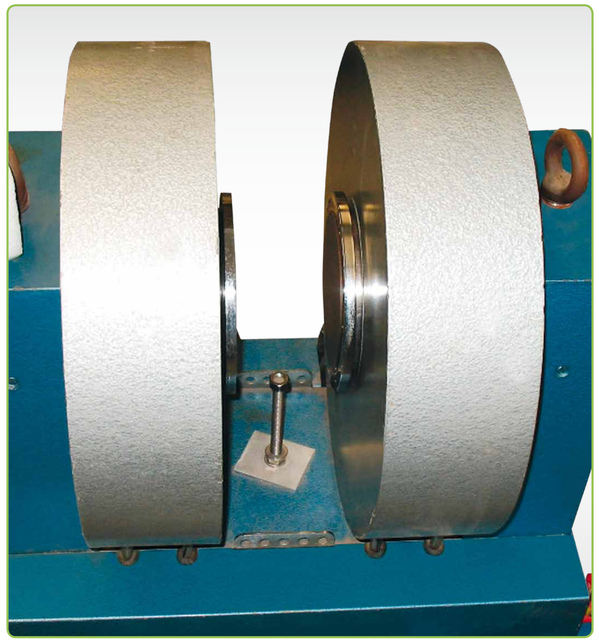
The Electromagnet

The most important detail of a working cyclotron is a uniform magnetic field delivered by a Bruker BE15 magnet.

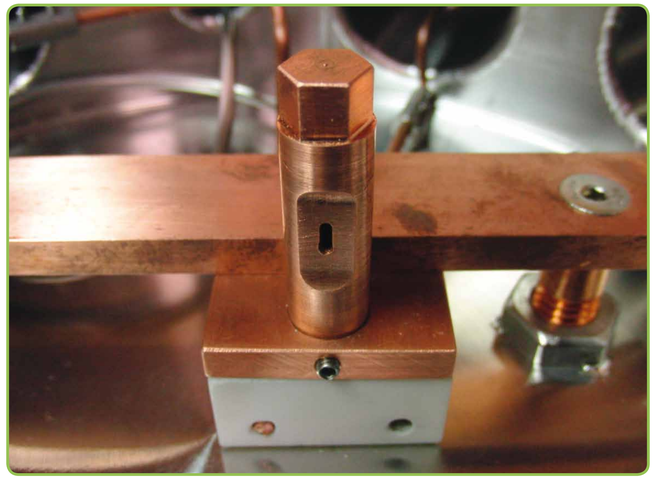
The poles have a diameter of 150 mm (~ 6 inches). The gap between the poles is continously adjustable from 50 to 120 mm (~ 2 - 5 inches).

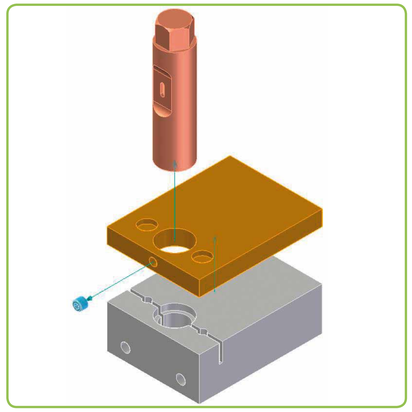
According to the size of the gap, flux densities above 2 Tesla can be generated.

The power supply provides up to 30 A DC depending of the voltage.



The Ion Source





The ion source supplies the cyclotron with charged particles in our case with protons accelerated by an electric field.

The protons are produced by impact ionisation. Electrons emitted from a glowing tungsten filament are accelerated by a DC voltage of 100 ... 200 V. They are forced on a helical orbit by the uniform magnetic field. On their path they ionisize the hydrogen gas in the housing block of the filament and the chimney above.

The complete ion source is stuck under the Dummy-Dee so it can be moved to find the best position.

The hydrogen gas is held in a so - called Hydro-Stick, a small container with 10 liter of hydrogen gas at a pressure of 10 bar. After reducing the pressure to 0,3 bar the hydrogen gas is fed into the housing block by a mass-flow-controller which allows an exact dosing of the amount of hydrogen.

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