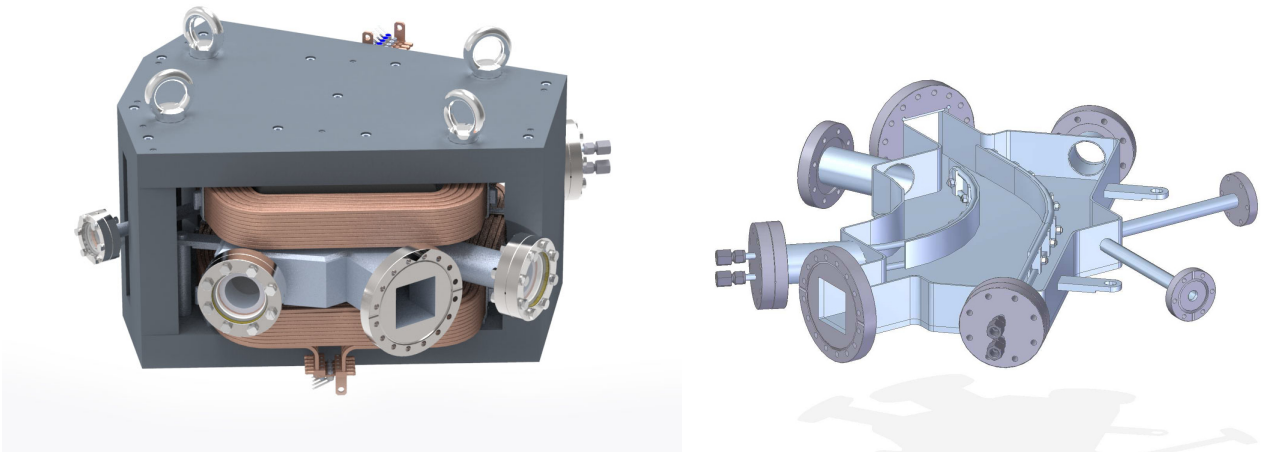
# High-Current Analysis Magnet

## - A 90° Bending Magnet for High-Current Applications-



Analysis Magnet - Entire Assembly and Vacuum Chamber from Inside

This analysis magnet is a double focussing dipole magnet designed to bend ion beams by 90° for charge-to-mass ratio analysis of the ion beam components. The compact design is tailored for high-current medium-emittance beams such as $\mathrm{mA}$ currents from high-power electron cyclotron resonance (ECR) ion sources.

In detail, the vacuum chamber of the magnet has a minimal inner width of $6\,\mathrm{cm}$ by $6\,\mathrm{cm}$ allowing for broad beams to pass without losses. The ion travel distance inside the magnet was minimized by using a magnet bending radius of only $250\,\mathrm{mm}$ in order to keep space charge effects small but still achieve a reasonable solution for mass-to-charge analysis.

The special design of the vacuum chamber includes water-cooled copper plates alongside the ideal ion trajectory where ion beam components are dumped which are separated from the ion species of choice bent at exactly 90°. The copper plates are designed to dissipate heat from ion beams of up to $300\,\mathrm{W}$. They can easily be removed and exchanged when worn-out.

## Scope of Delivery

- magnet yoke
- water cooled coils incl. connectors for attachment of water hoses
- vacuum chamber incl. water cooled copper plates for high-current ion beam power absorption



European Union
Europe funds Saxony.
EFRE
European Regional Development Fund

## Optional Equipment

- power supplies for operation of the magnet incl. tailored cables
- support stand for the magnet incl. space to build in the magnet power supplies
- electrical insulation to allow setting the vacuum chamber (as part of a customer beam line) on high voltage while magnet and power supplies remain on ground potential
- water flow meter to guarantee sufficient water cooling
- hall probe set to measure magnetic induction between the poles

## Technical Parameters

| Magnet Parameters | |
|---|---|
| bending radius of charged particle beam | 250 mm |
| bending angle $\alpha$ | 90° |
| pole shoe angles at beam entry / exit $\beta$ | 33° |
| pole shoe gap | 80 mm |
| shape of pole shoe edges at beam entry / exit | approx. Rogowsky |
| max. coil current for long-term operation | 170 A |
| max. magnetic induction at ion trajectory | 500 mT |
| effective magnetic length | 394 mm |
| **General Parameters** | |
| dimensions (length x width x height) | 480 mm x 530 mm x 320 mm |
| weight | 370 kg (820 lbs) |
| magnet yoke shape | H-type |
| coil material | water cooled hollow conductor |
| number of turns | 180 (2 coils, 90 turns each) |
| beam dump elements | water cooled copper plates |
| beamline flanges | typically DN 100 CF, other flange types available |
| beam dump insertion flanges | DN 63 CF |
| alignment windows | DN 35 CF |
| **Infrastructural Requirements** | |
| vacuum conditions for operation | from $1 \cdot 10^{-10}$ mbar up to atmospheric pressure |
| magnet and beam dump cooling type | water cooling, 1.5 l / min at 3 bar each |
| proposed power supply | 60 V / 200 A |

## Contact

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