

# High Performance Chopper Systems Permanent Magnetic Bearing (PMB) Technology

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## Non contacting, wear-free, maintenance-free: Permanent magnetic suspension for choppers

A flexible long term operation of high speed choppers relies on maintenance free non contacting magnetic bearings. Axial passive and radial active magnetic bearings provide maximum flexibility if rotor exchange of the chopper is required in order to shape different neutron pulse profiles.

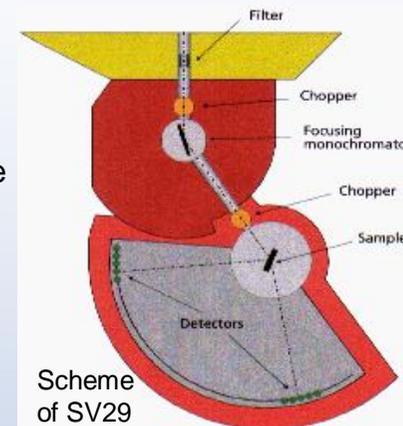
The axial passive bearing concept allows the exchange of the rotor without dismantling the stator assemblies: by opening the lid of the chopper housing including the integrated upper bearing the rotor can be removed easily within 30 minutes.

Our DSP controlled drive system allows precise rotational speed and phase control (deviation <math>< 0.03^\circ</math>).

Left: Axial passive bearing of a Fermi-type neutron chopper; A: radial actuator coil assembly, D: drive motor, K: neutron channel, M: permanent magnet, R: ferromagnetic collar, S: radial position sensor, W: rotor shaft

Right: Two Fermi choppers for SV29 at FZJ (Germany), rotor mass 19 kg and 28 kg, magnetic bearing and drive system for 21,000 rpm.

SV29 is a hybrid time focusing time-of-flight spectrometer for thermal neutrons. It gives access to energy transfers of up to 50 meV at momentum transfers around  $5\text{\AA}^{-1}$ . Geometrical focusing in the vertical and horizontal direction via a single monochromator matrix of  $15 \times 5$  pyrolytic graphite crystals optimizes the flux at the sample. A pulse of monochromatic neutrons is obtained by a flexible system of two phase-controlled choppers. The secondary spectrometer consists of a sample area and the flight path with detectors.



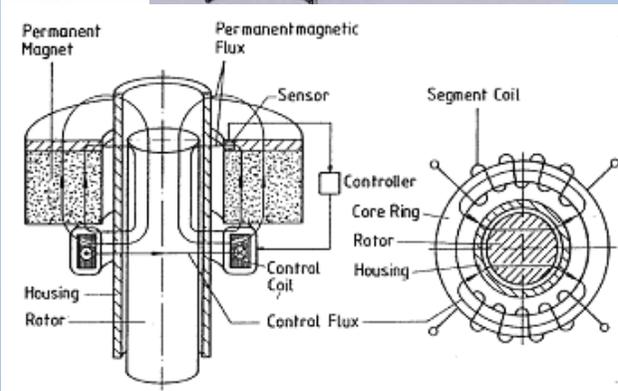
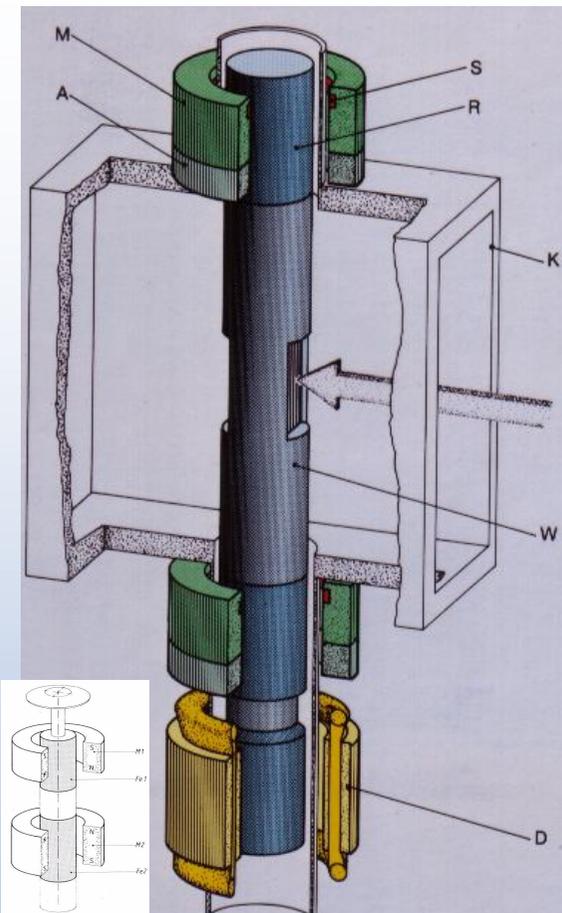
Scheme of SV29



SV29-chopper, rotor mass 28 kg



Test rig for the SV29 choppers



Above: Exchange of Fermi rotors at ISIS (UK): 7 kg; 36,000 rpm