

## Technical Information



### 9.4T preclinical PET/MRI scanner

Magnex/Bruker

**Location address:**

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### Description

This 9.4T/31cm actively shielded ultra-wide horizontal bore magnet, installed in 2005, was the first of its kind in continental Europe.

In 2024, the scanner was upgraded with cutting-edge MR electronics, multichannel radio frequency transmission and reception capabilities, stronger imaging and shimming gradients, cryogenic radiofrequency coils providing an unmatched boost in sensitivity, and a PET insert. The scanner is complemented with a full suite of animal physiology support for anesthesia and surgical preparation, as well as bench experiments.

This ultra-high field preclinical MR-PET setup, unique in Switzerland, enables concomitant in vivo MR-PET examinations for simultaneous, complementary and multi-contrast information on organ structure, function and metabolism, supporting the main research areas of the **CIBM Pre-Clinical Imaging EPFL Metabolic Imaging Section**:

- mapping of steady-state brain metabolism in vivo and its regional vulnerability in neurological diseases using MR Spectroscopy and whole-brain accelerated MR Spectroscopic Imaging
- dynamic mapping of brain glucose metabolism in neurological diseases using MR Spectroscopy and Positron Emission Tomography
- dynamic whole-brain energy metabolic imaging of neurological diseases using phosphorous, deuterium MR Spectroscopy and whole-brain accelerated MR Spectroscopic Imaging
- in vivo brain microstructural changes in neurological diseases using MR Diffusion Weighted Spectroscopy, MR Diffusion Weighted Imaging and Microscopy
- high resolution MR Imaging and volumetry

## Specifications

### Magnet

- Magnex Scientific 9.4 Tesla / 310 mm bore
- Cryostat length: 1900 mm
- Cryostat diameter: 2380 mm
- Cryostat weight (excluding cryogen): 12000 kg
- Nominal operating current: 181 A
- Energy stored: 13.6 MJ

### Console

- Bruker BioSpec with AVANCE NEO electronics.
- Four parallel transmit/receive  $^1\text{H}/^{19}\text{F}$  RF channels, each with a 500 W RF power amplifier.
- One broadband RF channel with a 1000 W RF power amplifier.
- Four broadband parallel receive-only channels.
- High power gradient amplifiers (Two IECO GPA-400-350 per channel).
- Gradient set: B-GA20S HP, 200/303 mm inner/outer diameter, 300 mT/m strength and 1040 T/m/s slew rate.
- Gradient insert: B-GA12S HP, 114/198 mm inner/outer diameter, 660 mT/m strength and 4570 T/m/s slew rate.

### Radio frequency coils

- $^1\text{H}$  CryoProbe 4-channel receive-only array for rat head (20-30 K coil and 77 K preamplifiers)
- $^1\text{H}$  CryoProbe 2-channel transmit-receive array for mouse head (20-30 K coil and 77 K preamplifiers)
- $^1\text{H}$  86/112 mm quadrature birdcage coil
- $^1\text{H}$  86/112 mm quadrature birdcage coil optimized for PET/MR
- $^1\text{H}$  154/198 mm quadrature birdcage coil
- Wide range of custom-designed, surface and volume, single-tuned  $^1\text{H}$  and  $^1\text{H}$ -X double-resonance coils for mice, rats and ex-vivo samples.

### PET insert

- Bruker PET Insert Si 198 (2 rings)
- 112/198 mm inner/outer diameter
- FOV: 80 mm transaxial, 99 mm axial
- Spatial resolution  $\leq 0.8$  mm

## Software

- Bruker ParaVision 360

## Additional related infrastructure

- Animal preparation and surgery room. Behavioral room in CIBM PCI EPFL animal facility.
- Physiology support for rodent experiments.