TESS expert PHYWE

Magnetic Resonance Imaging (MRI)

Compact MRT for medical education

Teaching Magnetic Resonance Imaging

Magnetic Resonance Imaging (MRI) is one of the most applied methods in clinical diagnostics and the number of medical examinations is still drastically growing.

Typically, MRI is used to provide an unprecedented contrast between different soft tissues of the body and thus is most often applied in imaging the brain, the muscles, and inner organs. Importantly, MRI does not use ionization radiation and thus is identified as being completely harmless from this point of view.

The experimentation set for medical MR-imaging focuses on the understanding of the observed signals and images in the context of medical diagnostics. The combination of theory and practice leads to a fascinating learning experience and puts the MR-technology in a didactically valuable learning environment.

Features

Realistic and practise oriented nuclear magnetic resonance (NMR) training

Clear, logical and concise setup

6 detailed experimental courses with more than 15 experiments

Literature tailored precisely to the experiments

Easy to connect and immediately operative (USB 2.0)

Realtime control of experimental parameters

High resolution MR-imaging (2D, 3D)

Med

MRI relies on the basic principles of nuclear magnetic resonance (NMR). Nuclear spins align themselves under the influence of an external magnetic field with a preference of the parallel spin orientation. Theses spins are in precession about the external magnetic field at Larmor frequency and change their preferred direction when a High Frequency-pulse at Larmor frequency is impressed upon the system. Realignment of the nuclear spins depends on the surrounding material and is linked to two characteristic times, i.e. the spin-lattice relaxation time T1 and the spin-spin relaxation time T2. These times are used to determine the gray values of an MR-image.

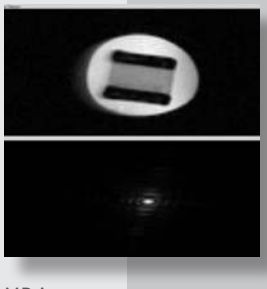
Documented experiments:

Basic Principles in Nuclear Magnetic Resonance (NMR)
Relaxation Times in Nuclear Magnetic Resonance
Spatial Encoding in Nuclear Magnetic Resonance
Magnetic Resonance Imaging (MRI) I
Magnetic Resonance Imaging (MRI) II

Compact MRT

Sample chamber

Software measure MRT


MR image

Products

Compact MRT

Control unit:
Gradient amplifier and transmitter and receiver unit, Power supply 12 V DC, 2 A,
Power supply unit (ext.) 100-240 VAC, 50/60 Hz, 2 A,
Dimensions 27 cm x 9.5 cm x 14 cm, Weight 2.3 kg

Magnet unit:
high-end gradient system for 2D and 3D images, System frequency 22 MHz,
Field intensity 500 mT, Field homogenity < 100 ppm, Sample diameter max. 10 mm
Dimensions 27 cm x 25 cm x 14 cm, Weight 17.5 kg

Software:
Languages German/English, Data formats DICOM, JPEG, CSV, TXT

Sample set:
5 different samples (water, oil, structure), 1 empty sample tube

+ Carrying case and flight box for safe transport,
+ Soundbox for a realistic MR-noise,
+ Data carrier incl. training software,
+ Handbook with comprehensive descriptions of the experiments,
structured implementation plan,
exercises,
analyses with many figures,
operating manual,
software manual

Compact MRT **09500-99**

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