

**Modules:**

physics700 **Elective Advanced Lectures**  
physics720 **Applied Physics**

**Course:**

# **Physics in Medicine: Fundamentals of Medical Imaging (A)**

**Course No.:** physics773

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+1	6	ST

**Requirements:****Preparation:**

Lectures Experimental Physics I-III (physik111-physik311) respectively

**Form of Testing and Examination:**

Requirements for the examination (written or oral): successful work with the exercises

**Length of Course:**

1 semester

**Aims of the Course:**

Understanding of the principles of physics of modern imaging techniques in medicine

**Contents of the Course:**

Introduction to physical imaging methods and medical imaging; Physical fundamentals of transmission computer tomography (Röntgen-CT), positron emission computer tomography (PET), magnetic resonance imaging (MRI) and functional MRI  
detectors, instrumentation, data acquisition, tracer, image reconstruction, BOLD effect; applications: analysis of structure and function.  
Neuromagnetic (MEG) and Neuroelectrical (EEG) Imaging; Basics of neuroelectromagnetic activity, source models  
instrumentation, detectors, SQUIDs; signal analysis, source imaging, inverse problems, applications

**Recommended Literature:**

- K. Lehnertz: Scriptum zur Vorlesung
- S. Webb; The Physics of Medical Imaging (Adam Hilger, Bristol 1988)
- O. Dössel; Bildgebende Verfahren in der Medizin (Springer, Heidelberg 2000)
- W. Buckel; Supraleitung (Wiley-VCH Weinheim 6. Aufl. 2004)
- E. Niedermeyer/F. H. Lopes da Silva; Electroencephalography (Urban & Schwarzenberg, 1982)