Module description

Module title					Abbreviation
Basic Imaging Reconstruction and Processing					11-IRP-Int-201-m01
Module coordinator				Module offered by	
Managing Director of the Institute of Ap			plied Physics Faculty of Physics and Astronomy		
ECTS Method of grading		Only after succ. compl. of module(s)			
6	nume	rical grade			
Duration		Module level	Other prerequisites		
1 semester		graduate			
Contents					
This training course uses the fundamentals of modern signal processing and imaging concepts, which are intro- duced in the corresponding lecture. Starting with the different categories of signals and transferring them to ima- ging applications, the students can test Fourier transform properties first hand by developing Matlab or Python code. Image convolution and de-convolution techniques are addressed in particular with respect to image pro- cessing tasks in modern physics (e.g. denoising). The Radon-Transform, which takes an outstanding im-portance in the field of computed tomography is demonstrated by the three-dimensional image reconstruction from real CT data whereby different sources of error can be tested. The theoretical part on discrete signals and their Fouri- er transform properties as well as different ways of image compression will also be further developed during this course.					
Intended learning outcomes					
Students who attended the course are firm with the theoretical concepts of signal processing in particular with respect to imaging applications. They are able to devise a strategy /toolchain for basic and advanced imaging problems, such as image reconstruction, denoising, Fourier analysis and frequency decomposition. By using Matlab or Python they are able to calculate appropriate figures of merit from scientific images, such as SNR. Courses (type, number of weekly contact hours, language – if other than German)					
V (3) + R (1) Module taught in: English					
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)					
a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English					
Allocation of places					
Additional information					
Workload					
180 h					
Teaching cycle					
Teaching cycle: every year, after announcement					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					

SI 83

LOED

Master's degree (1 major) Physics International (2020) exchange program Physics (2023)

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