



# Lectures on X-ray micro-computed tomography

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**Seminars organised within the framework of the DR**o**PIT Project**

**Monday (03.06.19), 13:00-16:00, Laboratorio di microtomografia, via Galvani 2**

**Thursday (06.06.19), 9:00-13:00, Room C 3.02**

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## Abstracts

### Part 1: Practical seminar on Micro-CT (03.06.19) – Prof. Santini

The purpose of this “practical” seminar is to provide to the students, interested in the use of X-rays in the visualization of complex systems, a possibility to understand the peculiarity of a Micro-CT facility. An introduction to the X-ray measurement techniques and to Micro-CT fundamentals will be given directly in the laboratory, next to the operating instrumentation and therefore being able to compare the concepts learned by the theoretical foundations with the (too) many difficulties of the experimental research activities with prototypal instrumentation: a compromise between functionality and state-of-the-art operation. A practical example will guide in describing the whole (long) *fil-rouge* that connects the needs to study experimentally a thermo-fluid-dynamic phenomenon and the limits that the instrumentation imposes.

### Part 2: Reconstructing X-ray images (06.06.19) – Prof. Sijbers

Since its discovery in 1895, applications of X-ray imaging have only increased since it allows to visualize the inside of objects in a non-invasive way. In this lecture series, the generation of X-rays are discussed as well as their interaction with matter. Next, the basic principles of X-ray imaging are presented as well as how 2D, 3D and even 4D images can be obtained from a set of acquired X-ray radiographs.

On the one hand, X-rays are known to be harmful for biological tissues, which is why there is an ongoing effort to lower the X-ray dose (e.g. by decreasing the number of acquired radiographs). On the other hand, X-ray imaging can be very time consuming on a micro-scale. The acquisition time can be reduced substantially, also by decreasing the number of acquired radiographs. However, the quality of reconstructed X-ray images is directly related to the number of acquired radiographs. Techniques will be discussed to maintain image quality of reconstructed X-ray images even when only a limited set of radiographs have been acquired.

Finally, the topic of X-ray phase contrast imaging is touched upon, an emerging X-ray technique which allows to generate images with complementary contrast to conventional attenuation based X-ray imaging.

<https://www.project.uni-stuttgart.de/dropit/>

**Ph.D. students of ISA and TIM Doctorates are specially invited**

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