Selected research topics in Biomedical Engineering:
Medically Relevant Experiments with Synchrotron Radiation
Wednesday, December 02, 2020, 16:00-17:00, via zoom

From X-ray physics to biomedical imaging

Julia Herzen

Biomedical Imaging Physics, Department of Physics & Munich School of BioEngineering, Technical University of Munich, Germany

Abstract. Since the discovery of X-rays in 1895, X-ray imaging has become an indispensable technique in research as well as in diagnostic and industrial imaging. Over the last few decades, phase-contrast X-ray imaging has been developed at brilliant synchrotron radiation sources using the refraction of X-rays to generate phase contrast. This kind of imaging has been demonstrated to provide superior soft-tissue contrast in comparison to conventional attenuation-based X-ray imaging, and several methods have been translated to work at standard laboratory X-ray sources. However, quantitative imaging of soft tissues at micro-/nano-meter resolution still remains challenging - both at brilliant synchrotron radiation sources and laboratory setups. We focus our research on methodological developments for quantitative phase-contrast imaging at highly brilliant and polychromatic X-ray sources, addressing the specific challenges of these techniques including artefacts. The current possibilities of quantitative X-ray imaging will be elucidated by recent results of soft tissue analysis, which includes blood vessels and kidney anatomy on the micrometer scale.

Curriculum. Julia Herzen, now assistant professor for biomedical imaging physics, studied physics at the University of Hamburg (2006) and obtained her doctorate – which included a research stay at the Paul Scherrer Institute (Switzerland, 2008) – from the Helmholtz-Zentrum Geesthacht in 2010. She then worked as a post-doctoral researcher at Technical University in Munich (2010 & 2014) and at the synchrotron radiation source PETRA III (Hamburg, 2012) and held a position as interim professor at Technical University in Dortmund (2015) before her appointment in Munich (2018).