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New directions in X-ray imaging

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In the human body, we encounter very often between the strong absorbing bone structures also weakly absorbing structures like cartilage, which needs to be analyzed at different length-scales to understand it completely. This makes them challenging objects for classical X-ray imaging. Research on cartilage is becoming a major topic for medical imaging. The Center for X-ray Analytics at Empa was created to combine all major analytical X-ray technologies in one common platform and to facilitate the development of new instruments and methods exploiting numerous physical interaction mechanisms to address current and future challenges. This expertise of wide-ranging contrast-mechanisms is combined with developments in data-processing and image analysis as well as instrument improvements through the application of novel detector and source concepts, image reconstruction and artefact correction algorithms. Novel developments like phase-contrast and dark-field X-ray imaging, spectral CT or iterative reconstruction help to improve the sensitivity and the contrast of medical imaging. With such tools it might soon be possible to image challenging objects like cartilage or to segment cancerous and normal tissue. Together with micro-CT and diffraction based analytics they have the potential to advance X-ray techniques also into fields where they are not used today. The Empa Center for X-ray Analytics pushes these technologies in close collaboration with radiologists and equipment manufacturers to explore synergies between laboratory and clinical equipment.

Biography

A Dommann is heading the Department of Materials Meet Life at Empa. He received his PhD in Solid State Physics in 1988 from ETH Zurich in Switzerland. His research concentrates on the surface analysis, bio surface interactions, structuring, coating and characterization of thin films. He is the member of different national and international committees and teaches Biomaterials, Crystallography and MEMS technology at different Swiss Universities and has published more than 130 papers. He is the member of the Swiss Academy of Engineering Science (SATW) and an Adjunct Professor at the University of Berne, Switzerland.

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