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Latest technical developments at UGCT: an overview

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ABSTRACT

Within the Ghent University Centre for X-ray Tomography (UGCT), the Radiation Physics (RP) research group of the Department of Physics and Astronomy is continuously working to improve the technique of laboratory-based high-resolution X-ray tomography or µCT. This is achieved by performing research covering the complete workflow of µCT: physics and instrumentation, data acquisition, data reconstruction and data analysis.
Since the previous UGCT seminar in 2010, many new developments have been made. On the hardware side, several new µCT systems have been developed. The high-energy setup HECTOR has become fully operational (Masschaele *et al.*, 2013) and can now be considered to be the UGCT "workhorse". The innovative rotating-gantry EMCT system can now perform continuous scans at a speed of 12 seconds per scan (Dierick *et al.*, 2014; Bultreys *et al.*, in press) while the original dual-head system, constructed in 2006, has been thoroughly upgraded. Finally, in close collaboration with the X-ray Microspectroscopy and Imaging research group (XMI, led by Prof. L. Vincze) the unique HERAKLES system which combines X-ray tomography with 3D X-ray fluorescence imaging has been developed. HERAKLES is in its final stage of construction and has already demonstrated its potential (see poster of B Laforce). Additionally, an innovative hyperspectral detector has been used for the first time in transmission imaging (Boone *et al.*, 2014), and several add-on modules have been installed.
On the software side, based on the X-ray physics a new tool has been developed for the simulation of realistic X-ray projections serving the optimization of CT scanning and dual-energy methods (Dhaene *et al.*, 2015), several new methods for iterative reconstruction have been implemented (Brabant *et al.*, 2012; Brabant *et al.*, 2014), and X-ray phase contrast has been further investigated (Boone *et al.*, 2012).
During this presentation, we will elaborate on these developments, which are the result of the research performed at the Radiation Physics group, and show some applied results.

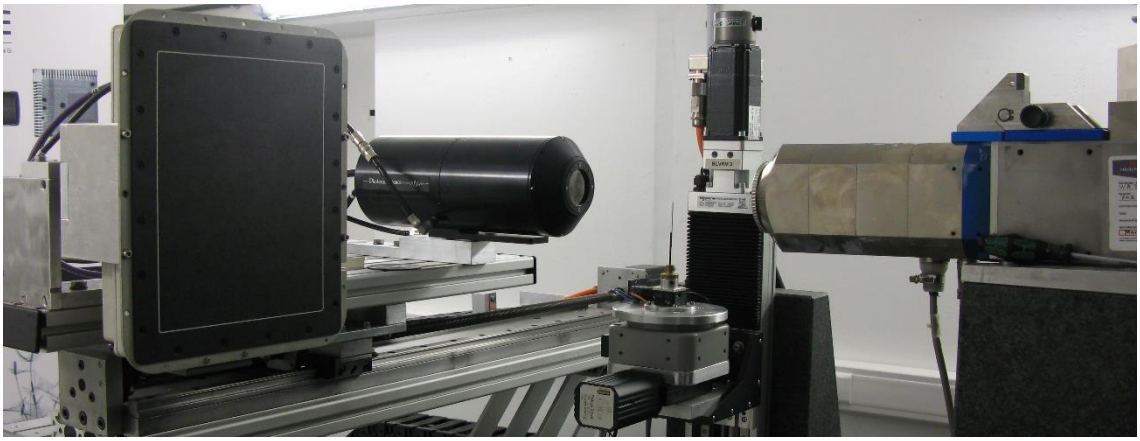

Figure 1: the MEDUSA high resolution scanner at UGCT

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