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A quadruple multi-camera neutron computed tomography system at MLZ

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Most neutron imaging systems can accommodate large samples of 15 -30 cm size, but recent interest is more focused on small cm-sized samples. With a small field of view for a camera-based detection system, the neutron flux per pixel decreases, and measurement time increases.
There were approaches to split a large field of view into smaller fields for individual CT measurements using a cogwheel-based adapter for the rotation stage [PSI] or using individual micro rotation stages [MLZ], but this leaves a smaller amount of camera pixels per tomography field, while many applications require the highest possible resolution even or especially for very small samples.
An alternative approach is followed at MLZ, using a multiple camera system with multiple rotation stages to make better use of the full size of the original neutron beam. With four cameras, only two rotation stages are required where samples are stacked in an aluminum tube with cutouts above each other. Cameras are stacked with two on top of each other, and two stacks beside each other.
A small, but high quality cooled CMOS camera is employed, each camera box contains lead shielding only in front and behind the camera for easy stacking, and sideways, joint shielding is built up with lead bricks and PE plates for the whole setup of four camera boxes.
The camera box and the mirror and scintillation screen holder are designed as separate parts so scintillation screen holders for variable size can be adapted.
The first prototype is already working, four more camera boxes are currently in production and will be completed by the time of the conference.
The talk will describe the system in detail.

[PSI] P. Trtik, F. Geiger, J. Hovind, U. Lang, E. Lehmann, P. Vontobel, S. Peetermans, *Rotation axis demultiplexer enabling simultaneous computed tomography of multiple samples*, Published online 2016 Apr 18. doi: 10.1016/j.mex.2016.04.005.
[MLZ] B. Schillinger, D. Bausenwein, *Quadruple Axis Neutron Computed Tomography*, Physics Procedia Vol. 88, 2017, pp. 196-199

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