ESRF	**Experiment title: Investigation of the osteocyte network in healing mouse bone by synchrotron microCT**	**Experiment number**: SC-4593
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Shifts: 3 shifts	**Local contact(s)**: Dr. Lukas Helfen	*Received at ESRF:*

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Report:

We are currently preparing a publication on the detailed correlation between the bone mineral characteristics and the osteocyte network architecture in healing bone. This manuscript also includes synchrotron SAXS/WAXS data from experiment SC-4512 (High resolution SAXS/WAXS investigations of mineral nanoparticles in fractured bone and correlations with the osteocyte cell network).

Current working title of the manuscript:
Heterogeneity of the osteocyte lacuno-canalicular network architecture and material characteristics across different tissue types in healing bone

Planned authors:
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Preliminary abstract:
We examined potential correlations between the topology of the osteocyte lacuno-canalicular network (OLCN) and structural characteristics of the extra cellular matrix (ECM) in all tissue types in healing bone. We applied a correlative multi-method approach to quantify the OLCN architecture and ECM characteristics within the same volume of healing femoral bone in a

mouse osteotomy model. Synchrotron high-resolution x-ray scattering was employed to determine mineral particle size and orientations in relation to the OLCN architecture which was quantified in 3D by confocal laser scanning microscopy and synchrotron-based microcomputed tomography. This approach allowed us to visualize and quantify structural characteristics of cortex, cartilage and callus as well as a more detailed description of bone types within the callus. Lacunae in callus bone are in general larger and less elongated compared to cortical lamellar bone, while the mineral particles in the callus are thinner and less organized. Within the callus we also find correlations between mineral particle characteristics depend and the OLCN which may indicate an osteocytic influence on the mineralization during fracture healing.