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**Hörsaal für Physik**

## **“STRUCTURAL ADAPTATION OF BONE”**

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The structural adaptation of living bone is made possible by a continuous renewal process known as bone remodeling. This process is at least partly mechanically controlled. It is thought that deposition occurs preferentially at locations of higher mechanical strains, and resorption where the local load is reduced. Responsible for the mechanical regulation seem to be the osteocytes, which are cells that form a network like structure within the bone matrix.

The presentation wants to focus on two recent studies performed to learn about the mechanical control of bone remodeling. First, using in vivo microcomputed tomography the amount and specific site of remodeled bone can be determined in living small animals. In combination with Finite Element modeling, a correlation between local mechanical strain at a specific site and its probability to undergo remodeling can be performed and studied how this correlation changes with age. Second, we used a combination of staining and confocal laser scanning microscopy to visualize the osteocyte lacuno-canalicular network (OLCN), i.e. the porous structure which houses the osteocytes. The 3-dimensional images were used to analyze the topology of the network. In addition, synchrotron small angle X-ray scattering was used to determine whether the mineral nanostructure of bone is changed in the vicinity of the cells.