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Hörsaal für Physik

"Structural adaptation and healing of bone - computer simulations on different length scales"

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The structure of living bone and its composing material is constantly changing due to processes executed by different specialized cells. The stiffness of the bone material is changed by incorporation of mineral particles, the bone material is continuously renewed in a remodelling process and, after fracture, bone is able to heal. In these processes the behaviour of cells is partly controlled by mechanical stimuli. How mechanical stimulation regulates in detail cell behaviour is very challenging to study in animal experiments. Computer experiments are an alternative approach to test our understanding of the mechanobiological control of processes in bone. In a phenomenological computer model different hypotheses of cell reaction can be implemented, and the resulting consequences on the bone structure and its time evolution can then be compared with experiments.