Physikalisches Kolloquium **Physics Colloquium**

Einladung **Invitation**

Monday, 29 June 2026

Lecture Hall O25/H2, at 16:15
Coffee and cookies will be served in front of the lecture hall from 16:00

Recent Advances in 3D Deep Learning on Biomedical Data

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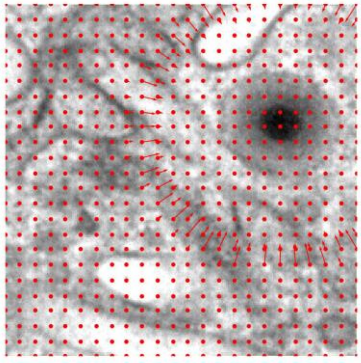
In this talk, I will discuss our recent advances in 3D deep learning for biomedical data, addressing the unique challenges posed by the diverse structures inherent to different datasets. The presented approaches leverage novel learning techniques suited for both structured and unstructured datasets. While for structured data, modern off-the-shelf CNN architectures can be adapted, unstructured datasets require a reformulation of the learning process. As use cases for structured data analysis, I will present our recent work on the deep learning-based analysis of electron microscopy (EM). I will show how neural radiance field representations can be adapted and how weakly supervised image analysis approaches can be exploited. To further, directly enable deep learning on 3D protein structures, I will show how an unstructured reformulation of the learning process can be realized. By using this reformulation, it not only becomes possible to directly classify and segment protein structures, but it also enables contrastive learning on large protein data sets in an unsupervised manner.



Host: Prof. Dr. Jens Michaelis, Institute of Biophysics

Organisation: Prof. Dr. Jens Michaelis, Institute of Biophysics, jens.michaelis@uni-ulm.de, +49-731-50-23050