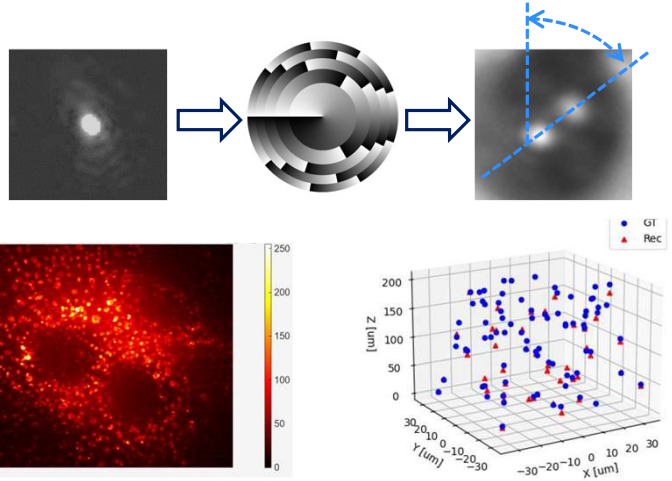
Optogenetics at MST

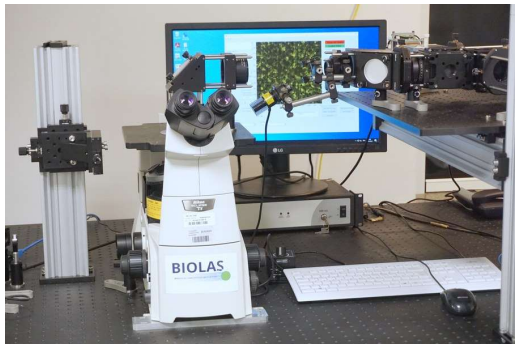
3D Localization Microscopy for Investigating Cardiac Dynamics



- single-shot 3D localization microscopy based on helical point spread function
- observe labelled cell nucleii
- determine 3D contraction of cardiomyocytes

R. Wendland, F. Schmieder, M. Sikandar, W.-H. Zimmermann, O. Bergmann, J. Czarske, L. Büttner, „Real-time optogenetic control of excitation wavefronts in human cardiomyocytes using holographic one- and two-photon stimulation“, SPIE Photonics West, 13836-7, San Francisco, USA (18th Jan 2026)

Optogenetic Stimulation Platform



- 2λ operation for Concurrent Activation and Inhibition
- Arbitrary 3D Patterns based on Computer Generated Holograms (CGH)
- Subcellular Spatial Resolution
- Fast Pattern Generation (1 kHz)
- Real-Time Closed-Loop Control possible
- Experiments performed at human induced stem-cell derived neurons and cardiomyocytes

Schmieder, F., Habibey, R., Striebel, J., Büttner, L., Czarske, J. & Busskamp, V. "Tracking connectivity maps in human stem cell–derived neuronal networks by holographic optogenetics", Life Science Alliance **5**, (2022)