

Presenter: Andrey Andreev

Title: Brain-wide neural activity imaging and modulation in zebrafish

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Abstract: Sleep is a brain-wide process, and regulated by multiple circuits. We are developing custom 2P light-sheet imaging for longitudinal imaging of sleeping zebrafish brain using tail movement as a behavioral readout, integrated with two-photon optogenetics capability. Our preliminary unique data provides cellular resolution and brain-wide coverage. Analysis of these data characterized neurons with differential patterns of activity during sleep and wake across different brain regions. One finding is that wake-tuned neurons are more heterogeneous in activity than rest-tuned, but both types are widely dispersed across brain regions. Further detailed analysis is possible with our current approach, and integration of physiological and behavioral markers will allow more precise description of sleep states similar to higher vertebrates sleep studies. In that project we integrate several modalities in one: 24hr-long continuous brain imaging, simultaneous observation of heart rate, tail and eyes movement, and optogenetics for causal studies.