



University
of Basel

Department of
Biomedical Engineering



Seminar Series:

Latest Breakthroughs in Biomedical Engineering Research

Location: DBE Science Lounge, Hegenheimermattweg 167C, 4123 Allschwil

Date & Time: Thursday 09.04.2026 | 16:30 – 17:30

Host: Dr. Ben Suter

Machine learning for optical microscopy in neuroscience

Dr. Johannes Seelig

Max Planck Institute for Neurobiology of Behavior, Germany

Abstract

Optical microscopy is widely used to investigate biological samples in vivo. However, microscopic imaging in living tissue—such as the brain—faces multiple challenges. Samples are typically non-transparent and do not lie within a single focal plane; they scatter light, are three-dimensional, and often not stationary at the micrometer scale.

Machine learning offers novel ways to address these longstanding challenges. I will discuss recent work from our group on correcting aberrations and scattering using different approaches, including neural networks and differentiable physics. I will also present tomographic imaging methods for optical microscopy based on Bessel beams—line-shaped focal spots that extend across multiple focal planes.

Biosketch

Johannes Seelig studied physics at University of Basel with a minor in molecular biology from 1997-2002. He obtained his PhD in the field of single molecule microscopy from ETH Zurich in 2006. He was a postdoctoral associate (2007-11) and later a research specialist (2011-2015) at Janelia Research Campus where he worked on neural circuits in *Drosophila*. From 2016-2025 he was “free-floating” Max Planck Research Group Leader at the Max Planck Institute for Neurobiology of Behavior – caesar.