

"Towards a cellular blueprint of vertebrate development with custom light sheet microscopy"

Abstract: Light sheet microscopy allows us to image living organisms at high resolution and in toto with its low phototoxicity and fast acquisition. However, visualizing the interplay of all tissues simultaneously across an entire embryo requires multi-view, multi-color, three-dimensional time-lapse imaging and analysis. Custom microscope hardware and software is needed to streamline acquisition and real-time data processing to avoid superfluous data. We combine fast long-term imaging with single cell resolution across the entire embryo, a multi-scale computational analysis framework based on single-cell tracking and the interactive, web-based visualization of the data to study different aspects of development in vertebrates.



Jan Huisken is a principal investigator and director of Medical Engineering at the Morgridge Institute for Research and Professor at the University of Wisconsin-Madison. Jan studied physics in Göttingen and Heidelberg and has a background in three-dimensional fluorescence microscopy, optical manipulation and trapping, developmental biology and zebrafish development. He received his PhD from the EMBL Heidelberg, where he pioneered multidimensional light sheet microscopy (also Selective Plane Illumination Microscopy, SPIM) in the labs of Ernst Stelzer and Joachim Wittbrodt. For one of the first applications of light sheet microscopy, Huisken moved to the lab of Didier Stainier at the University of California, San Francisco as a cross-disciplinary HFSP postdoctoral fellow in 2005 to study cardiovascular morphogenesis and function in zebrafish. From 2010 until 2016 Huisken was an independent group leader at the Max Planck Institute for Molecular Cell Biology and Genetics in Dresden, Germany. Huisken is now best known for his interdisciplinary work at the interface of gentle high-resolution microscopy and quantitative developmental biology. His lab covers all aspects of modern in vivo imaging from sample preparation to image analysis. Recently he has started an initiative to democratize the access to advanced microscopy with a modular and portable microscope platform called Flamingo. For his contributions to modern optical microscopy Huisken was awarded the Royal Microscopy Society Medal for Light Microscopy in 2017.