Advanced Light sheet Imaging Center (ALICE) Development of a full-service imaging platform – from sample clarification to 3D VR visualization

Lightsheet microscopy is a fluorescence imaging technique that allows visualization of whole organs or small organisms while preserving their physical integrity i.e. without the need to slice them prior imaging. Although the principle of operation of this technology was developed more than 100 years ago, it is only in the last fifteen years that biologists have commonly started to use such microscopes. Since that time, this type of microscopy has become a standalone field of research that has never been as active as it is now. At the Wyss Center for Bio and Neuroengineering in Geneva, Switzerland, we have created an imaging center, available to everyone, which integrates a series of cutting edge and custom-tailored tools into a single working pipeline aimed at imaging whole organs at high temporal or spatial resolution. We then analyze the data in a Virtual Reality environment. The center includes a customized version of the COLM/SPED (originally designed by Prof. Raju Tomer - Columbia University) microscope for near diffraction-limited resolution imaging of large clarified samples (cm range). Recently we expanded the capabilities of lightsheet microscopy, setting up a large-scale imaging system: mesoSPIM (see poster from Fabian F. Voigt). This customized system enables whole brain imaging at cellular resolution, in a few minutes with no need for further stitching processes. Finally, we are developing innovative 3D exploration and analysis tools that will enable researchers to navigate and segment their own lightsheet data in a virtual reality environment. This complete pipeline offers to the researcher the possibility for large scale screening, high resolution imaging and data visualization and analysis.

Affiliation

Wyys Center for Bio and Neuro Engeeniring

Terms and Conditions

Yes

Primary author(s) : PAGES, Stephane (Wyys Center for Bio and Neuro Engeeniring)

Co-author(s) : VOIGT, F. Fabian (Brain Research Institute, University of Zurich); BATTI, Laura (Wyss Center, Geneva); Dr REYMOND, Gilles (Wyys Center for Bio and Neuro Engeeniring); Dr CHEREAU, Ronan (CMU-U-NIGE); Dr BARRAUD, Quentin (EPFL); Mr CHO, Newton (Center for Neuroprosthetics and Brain Mind Institute, School of Life Sciences, Swiss Federal Institute of Technology (EPFL),); Mr SQUAIR, Jordan (Center for Neuro-prosthetics and Brain Mind Institute, School of Life Sciences, Swiss Federal Institute of Technology (EPFL),); Dr BRANA, Corinne (Wyss Center for Bio and Neuroengineering); Mrs TISSOT, Audrey (Wyss Center for Bio and Neuroengineering); Mr MOREILLON, Fabien (University of Applied Sciences and Arts Western Switzerland (HES-SO), Geneva, Switzerland); Prof. PASSERAUB, Philippe (University of Applied Sciences and Arts Western Switzerland (HES-SO), Geneva, Switzerland); Prof. COURTINE, Grégoire (Center for Neuroprosthetics and Brain Mind Institute, School of Life Sciences, Swiss Federal Institute of Technology (EPFL), Geneva, Switzerland.); HELMCHEN, Fritjof (Brain Research Institute, University of Zurich); Prof. ZENEIH, Michael (Stanford University, Stanford, CA, USA); Prof. GOUBRAN, Maged (Stanford University, Stanford, CA, USA); Prof. DEISSEROTH, Karl (Stanford University, Stanford, CA, USA); Prof. RAJU, Tomer (Columbia University, NY, NY, USA); HOLTMAAT, Anthony (University of Geneva); LÜSCHER, Christian (University of Geneva); Prof. DONOGHUE, John (Wyss Center for Bio and Neuroengineering, Geneva, Switzerland)

Presenter(s) : PAGES, Stephane (Wyys Center for Bio and Neuro Engeeniring)

Session Classification : Posters