

OCTOBER

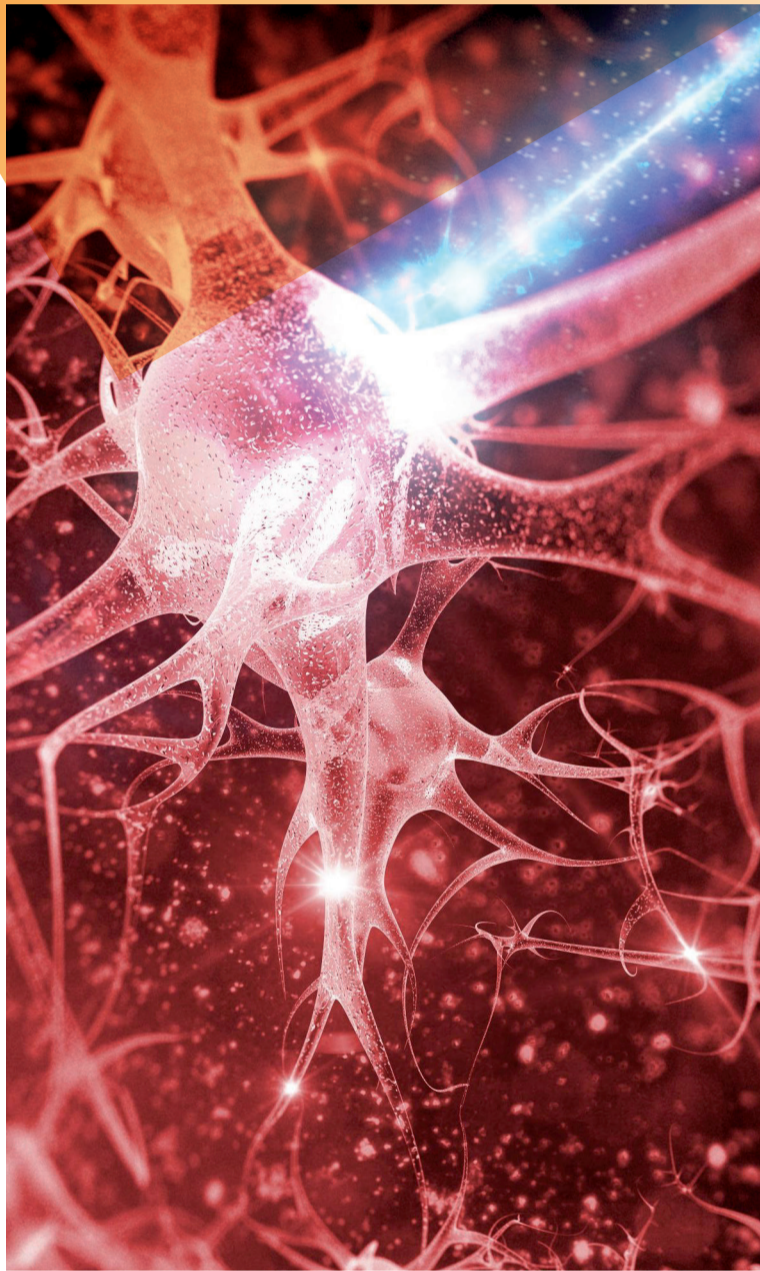
> 11TH 2016

VENUE / STRASBOURG

> SALLE DES THÈSES
NOUVEAU PATIO
20 RUE RENÉ DESCARTES

REGISTRATION & MORE INFO /

www.neurex.org or contact@neurex.org



Crédit photo: Jamani Caillet / EPFL

THIS MEETING DAY IS ORGANIZED BY NEUREX
IN THE FRAMEWORK OF THE NEUROCAMPUS PROJECT

DOES OPTOGENETICS STILL SHINE AFTER 11 YEARS?

Organizer **Domitille BOUDARD**

Considering the development, utility and future of optogenetic tools in the field of Neuroscience beyond the “gee wiz” first glimmers of hope.

On September 2005, **Edward Boyden**, Karl Deisseroth *et al.* published a study in Nature Neuroscience in which they describe how neurons expressing the light-sensitive microbial protein Channelrhodopsin-2 can be activated by light pulses in a very temporally precise manner.

Soon, the publication of this basic curiosity-driven discovery got the Neuroscience community all hepped up by the evident usefulness of the technology. Researchers quickly grasped, with a frenzied enthusiasm, how remotely controlling the activity of a specific neuronal type in a fine temporal scale, whether in culture, tissue or freely moving animals, could apply to a vast array of questions. Above all, the main game-changer in the field of Neuroscience remained the hope to actually make causal connections between neuronal circuit activity patterns and a given behavior. In other words, optogenetics allowed the possibility to move the entire neuroscience research field forward from the observational and correlational stage to the causality era.

Since 2005, improvements to early techniques have provided the community with a very powerful kit of optogenetic tools. However some technical challenges still need to be taken to make the technology more accessible and usable to its full potential: gaining selective and comprehensive genetic access to the neurons of interest, controlling variation in the expression of the optogenetic tools (when using viruses) and its precise localization (axon vs. presynaptic terminals), tailoring light-delivery system signals to individual cells in a population rather than the population as a whole, developing observation techniques which have the same spatial and temporal resolution as those tools... to cite only a few of them.

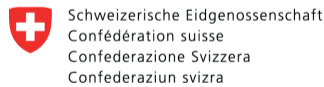
This special **Optogenetics day** will be the occasion to take stock of this groundbreaking technique progresses and achievements in Neuroscience beyond the viral buzz created by the seminal publication of Boyden *et al.* 11 years ago, and notably to:

- 1/ go back into the historical context of the discovery of the technique,
- 2/ describe the basic principle of the technology, list the genetically encoded light-activated sensors available and technical obstacles that remained to be overcome,
- 3/ review the major impacts and breakthroughs achieved with the use of these tools in our field,
- 4/ consider and discuss the challenges to be tackled and possible perspectives.

Mandatory registration on the Neurex website at <http://www.neurex.org/>.

PROGRAM

- 11.00 am « STATE OF ART OF THE TECHNIQUE: HISTORICAL BACKGROUND AND DISCOVERY »
PHILIPPE ISOPE, CNRS UPR 3212, Institute of Cellular and Integrative Neuroscience, Strasbourg, France
- 12.00 am **Lunch**
- 01.30 pm « HOW DOES OPTOGENETICS WORK ? GENERAL MECHANISMS AND TECHNICAL PRINCIPLE OF THE MAIN TOOLS »
WILFRIED WEBER, Faculty of Biology / BIOS Center for Biological Signalling Studies, University of Freiburg, Germany
- 02.30 pm « POSSIBILITIES OF USES: FIELDS OF APPLICATION, DISCOVERIES AND MAJOR BREAKTHROUGHS IN NEUROSCIENCE »
PHILIP TOVOTE, Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland
- 03.30 pm **Coffee break**
- 04.00 pm « LIMITATIONS AND FUTURE CHALLENGES »
ANDREW STRAW, Department of Neurobiology and Behavior, Freiburg, Germany
- 05.00 pm « KEYNOTE LECTURE: PERSPECTIVES »
EDWARD BOYDEN, Media Lab, Massachusetts Institute of Technology, USA



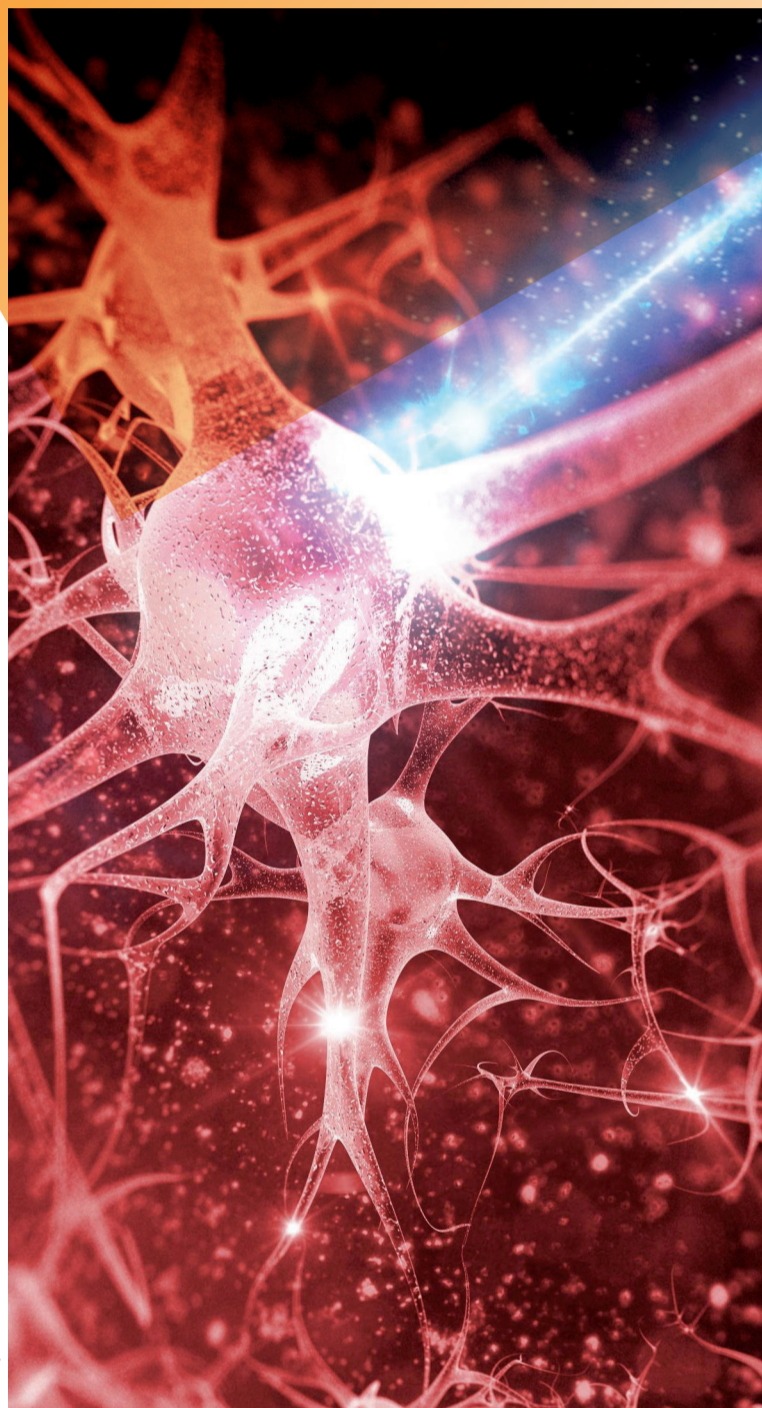
Program Interreg V Upper Rhine «Transcending borders with every project», Neurex, CNRS, INSERM, Université de Strasbourg, Région Grand Est, Département du Bas-Rhin, Département du Haut-Rhin, Eurométropole Strasbourg, Hôpitaux Universitaires de Strasbourg, Bernstein Center Freiburg, Klinik für Psychiatrie und Psychotherapie Freiburg, Neurozentrum Freiburg, Universität Freiburg, Universität Basel, Universitäre Psychiatrische Kliniken Basel, Kanton Basel-Stadt, Kanton Basel-Landschaft, Confédération suisse.



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Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

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