ICFO

L4H SEMINAR: The chemo-mechanical regulation of brain development

KRISTIAN FRANZE

October 25, 2022
12:00 to 13:00
Seminar Room

ABSTRACT:
During brain morphogenesis, neurons are highly motile. However, even though motion is driven by forces, our current understanding of the physical interactions between neurons and their environment is very limited. We here show how local mechanical brain tissue properties contribute to specifying and guiding neuronal axons. In vivo time-lapse atomic force microscopy revealed viscoelasticity gradients in developing brain tissue, which axons followed towards soft. Interfering with brain stiffness and mechanosensitive ion channels in vivo both led to aberrant neuronal growth patterns with reduced fasciculation and pathfinding errors. Moreover, mechanical signals not only directly impacted neuronal growth but also indirectly by regulating neuronal responses to and the availability of chemical guidance cues, strongly suggesting that chemical and mechanical signaling pathways are intimately linked, and that their interaction is crucial for morphogenetic events.

SHORT BIO:
Kristian Franze qualified as a Veterinarian at the University of Leipzig in Germany, where he also obtained a PhD in Physics in 2007. After a postdoc at the Cavendish Laboratory of the University of Cambridge, UK, he started his group in 2011 at the Department of Physiology, Development and Neuroscience in Cambridge. Kristian received several awards for his work, including an MRC Career Development Award, an HFSP Young Investigator Award, and an ERC Consolidator Award. In 2020, he obtained an Alexander von Humboldt-Professorship t become the Director of the Institute of Medical Physis at FAU and of the newly founded Ma Planck Zentrum für Physik und Medizin in Erlangen, Germany. His research focuses on h w mechanical signals contribute to regulating the development and regeneration of t e nervous system.

Hosted by: Michael Krieg