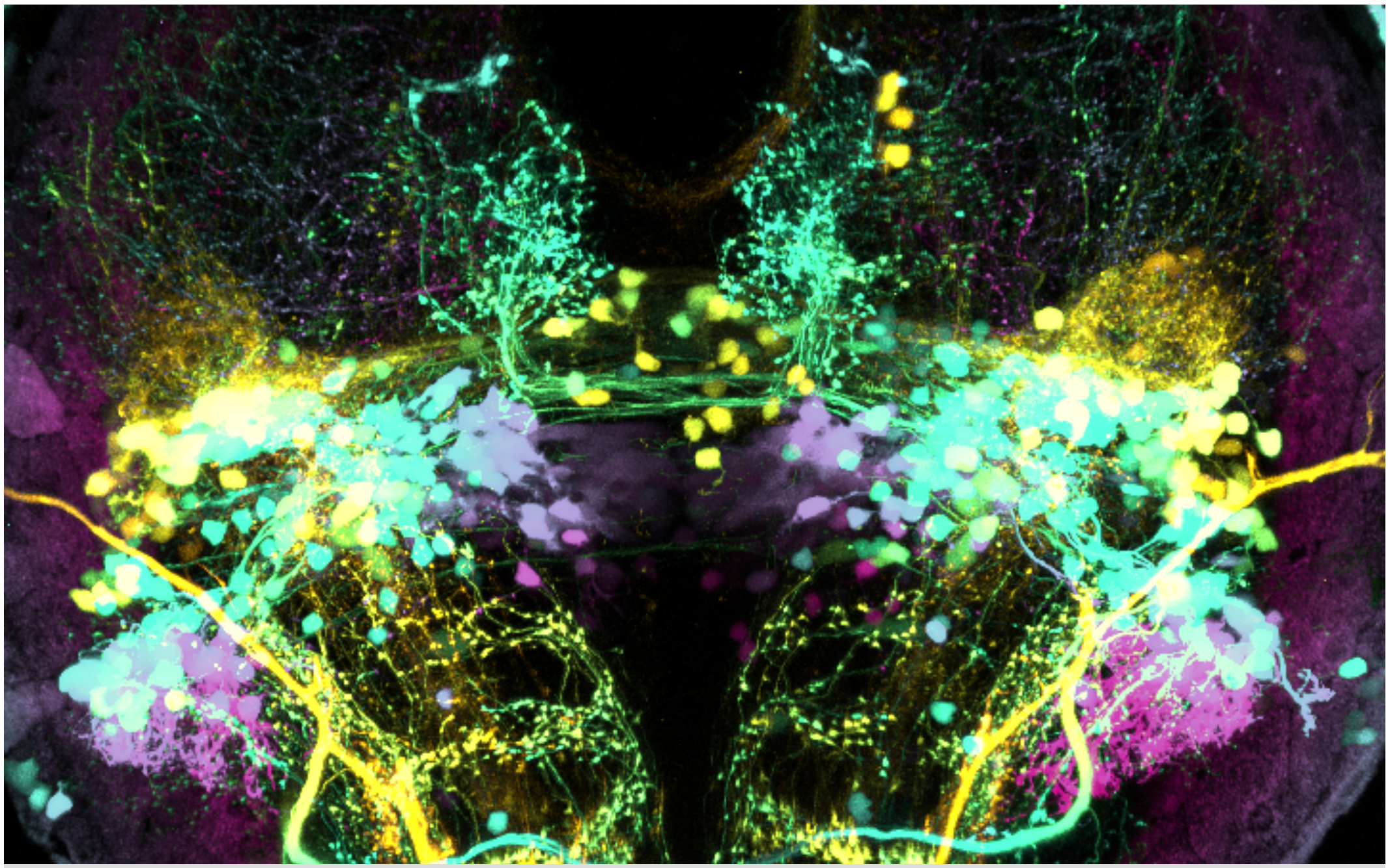

BME PARIS
BioMedical Engineering
MASTER'S PROGRAM

TASTING FROM WITHIN?

Open Your Mind Seminar

Friday, Nov 13 2020
1.30 pm – 3 pm

Online (ZOOM)

Discovery of a novel sensory system in the spinal cord

The cerebrospinal fluid (CSF) is a complex solution circulating around the brain and spinal cord. Recent evidence indicate that the development of the nervous system is strongly influenced by the content and flow of the CSF. Yet, it is not known whether neuronal activity changes as a function of the physico-chemical properties of the CSF. We identify that CSF-contacting neurons by their location at the interface between the CSF and the nervous system were in ideal position to sense CSF cues, to relay information to local networks and to regulate CSF content by secretion. By combining electrophysiology, optogenetics and calcium imaging in vivo in zebrafish larvae, we demonstrate that neurons contacting the CSF detect local bending of the spinal cord and in turn feedback GABAergic inhibition to multiple interneurons driving locomotion and posture in the spinal cord and hindbrain. This GABAergic feedback modulates target in a state-dependent manner, depending on the fact that the animal is at rest or actively moving at a define speed. Behavioral analysis of animals deprived of this sensory pathway reveals differential effects on speed for slow and fast regimes, as well as impairments in the control of posture during active locomotion. Our work first sheds light on the cellular and network mechanisms enabling sensorimotor integration of mechanical and chemical cues from the CSF onto motor circuits controlling locomotion and posture in the spinal cord. We will present multiple evidence that this interoceptive sensory pathway is involved in development, with the formation and maintenance of spine curvature, as well as innate immunity via the detection and combat of pathogens intruding the CSF during bacterial meningitis.

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