Bocconi

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04:00 PM

Bocconi University
Room 3-E4-SR03
Via Röntgen 1, Milano (3° floor)

Circuit and synaptic architecture of visual selectivity in mouse visual pathway

Speaker

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Abstract

The goal of the research in my lab is to understand how the specialised neuronal activity that embodies sensory, cognitive, and motor intelligence, emerges from the architecture of neuronal connections; how the plasticity of this wiring allows animals to learn; and how gene expression predisposes this blue-print. We address these problems studying the visual system, and combining methods from system neuroscience, physiology, anatomy, and molecular biology to link neuronal computation to connectivity, and gene expression in neural circuits in vivo.

In this talk, I will focus on two fundamental computations for the visual system: orientation selectivity, which underlies animals ability to perceive shape, and direction selectivity, which underlies the ability to perceive the motion of visual stimuli. I will first talk about published work (Rossi et al, Nature, 2020), where we mapped the architecture of the cortical excitatory and inhibitory connections that endows neurons with orientation and direction selectivity. In the second part, I will present a project in publication, where we dissect, at the cellular scale, the role of neuronal dendrites for these responses, and reveal an unexpected functional specialisation that can potentially expand the computational power of single neurons. If time allows, I will also touch on ongoing work addressing how the visual neurons may afford stable coding of visual motion during eye movements.