Bocconi

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

Glial place cells: complementary encoding of spatial information in hippocampal astrocytes

Speaker

Tommaso Fellin
Senior Researcher Tenured - Principal Investigator
Istituto Italiano di Tecnologia

Abstract

Changes in the intracellular concentration of calcium in astrocytes profoundly modulate the activity of nearby synapses and neurons. However, astrocytic calcium signals are believed to merely mirror the activity of neighboring neuronal cells. As a consequence, current models of information coding in brain networks either neglect astrocytes or assign them an overall, information-independent, modulatory effect on neurons and synapses. In this talk, I will present data combining the first simultaneous two-photon functional imaging of astrocytes and neurons in the hippocampus with information theory analysis. Using this combined approach, we demonstrate that, during virtual spatial navigation, calcium dynamics in topographically-organized subcellular regions of hippocampal astrocytes encode information about the animal's position. Information encoded into astrocytic calcium dynamics is unexpectedly different to that encoded in the spike output of surrounding neurons. These results suggest that the complementary place-dependence of localized astrocytic calcium signals regulates clusters of nearby synapses, enabling dynamic, context-dependent, variations in population coding within brain circuits.

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