

Avviso di Seminario

Martedì 08 luglio 15:15 Sala Riunioni (1)

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Terrà un seminario dal titolo :

"Recent progresses on microelectronic devices and micro-/nano technologies for large-scale electrophysiological measures at the microscale within neural circuits."

Abstract :

A stringent need in neuroscience is to drastically upscale the number of simultaneously measured neurons within large neural circuits. This seminar will present an approach based on active microelectrode arrays realized in CMOS technology to record electrophysiological signals from several thousands of densely integrated microelectrodes. Microelectrode arrays (MEAs) represent an increasingly used methodology for investigating the ongoing or evoked network-wide neurodynamics, either in-vivo or in-vitro. In order to realize MEAs integrating arrays with a higher electrode density an emerging methodology is based on the implementation of active electrode arrays that integrate adapted microelectronic circuits. Based on an original technological approach derived from light imaging sensors, we have realized a high-density MEA platform that manages arrays of 4096 microelectrodes with electrode separations of 21 μm and enables a sampling rate of 7.7 kHz/electrode when recording from the full active area of 2.6 x 2.6 mm² (recently up-scaled to 5x5 mm²). This technology required also the development of adapted computational methods to represent and analyze neuronal activity recorded from such a large number of electrodes. During the seminar, we will focus on the system development but also on recent experimental results obtained within EC-funded projects, thus highlighting the unprecedented capabilities offered by this platform for electrophysiological studies on spontaneously active hippocampal neuronal networks, for investigating epileptogenesis and plasticity in cortico-hi