SEMINARIO GENERALE DIFI/INFN

SPEAKER:  Prof. Egidio D’Angelo  
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TITOLO: "Dalla biofisica dei neuroni ai circuiti cerebrali: nuove tecnologie e modelli per comprendere il cervello"

DATA: Giovedì 3 aprile alle ore 15:15 in Aula Magna

Abstract:

The brain is the most complex structure in nature and its understanding represents the greatest challenge for current science. Beside the issues arising about the molecular and cellular biophysics of neurons and synapses, there is a critical question on how microcircuits operate and on how the many microcircuits of the brain operate in concert generating sensorimotor and cognitive functions. Answering this question is complicated by the fact that the microcircuits are designed to operate in closed-loop rather than as self-standing units, implying that their analysis needs to be performed under realistic operative conditions. Therefore, there are two major methodological problems to overcome: first, to record many neurons simultaneously, and secondly, to do it under meaningful functional conditions, i.e. in closed-loop. Beside the development of specific experimental strategies (e.g. multi-electrode arrays, patch-clamping, multi-spot two-photon microscopy, MRI, TMS), a new core strategy is the development of bottom-up mathematical models of the brain and run them in a robotic context, i.e. in closed-loop. This strategy has been fully integrated into the Human Brain project. The Pavia unit is specifically addressing the case of the cerebellar network, which lays at the core of the closed-loop operations of the entire brain.