1. Record Nr. UNINA9910137218803321

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Titolo	Criticality as a signature of healthy neural systems [[electronic resource]] : multi-scale experimental and computational studies / / topic editors Paolo Massobrio, Lucilla de Arcangelis, Valentina Pasquale, Henrik J. Jensen and Dietmar Plenz
Pubbl/distr/stampa	Frontiers Media SA, 2015 [Lausanne, Switzerland] : , : Frontiers Media SA, , 2015
Descrizione fisica	1 online resource (139 pages) : illustrations; digital, PDF file(s)
Collana	Frontiers Research Topics Frontiers in Systems Neuroscience
Soggetti	Neurosciences Nervous system Neuroscience Human Anatomy & Physiology Health & Biological Sciences
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di bibliografia	Includes bibliographical references.
Sommario/riassunto	Since 2003, when spontaneous activity in cortical slices was first found to follow scale-free statistical distributions in size and duration, increasing experimental evidences and theoretical models have been reported in the literature supporting the emergence of evidence of scale invariance in the cortex. Although strongly debated, such results refer to many different in vitro and in vivo preparations (awake monkeys, anesthetized rats and cats, in vitro slices and dissociated cultures), suggesting that power law distributions and scale free correlations are a very general and robust feature of cortical activity that has been conserved across species as specific substrate for information storage, transmission and processing. Equally important is that the features reminiscent of scale invariance and criticality are observed at scale spanning from the level of interacting arrays of neurons all the way up to correlations across the entire brain.

Moreover, the existing relationship between features of structural connectivity and functional critical states remains partly unclear, although investigated with both analyses of experimental data and in silico models. Thus, if we accept that the brain operates near a critical point, little is known about the causes and/or consequences of a loss of criticality and its relation with brain diseases (e.g. epilepsy). The study of how pathogenetical mechanisms are related to the critical/non-critical behavior of neuronal networks would likely provide new insights into the cellular and synaptic determinants of the emergence of critical-like dynamics and structures in neural systems. At the same time, the relation between the impaired behavior and the disruption of criticality would help clarify its role in normal brain function. The main objective of this Research Topic is to investigate the emergence/disruption of the emergent critical-like states in healthy/impaired neural systems and to link these phenomena to the underlying cellular and network features, with specific attention to structural connectivity. In particular, we would like this Research Topic to collect contributions coming from the study of neural systems at different levels of architectural complexity (from in vitro neuronal ensembles up to the human brain imaged by fMRI).