



MULTILAYER NETWORK MAPS OF FUNCTIONAL HUMAN BRAIN

A TALK BY **MANLIO
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FONDAZIONE BRUNO KESSLER

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Understanding how the human brain is structured, and how its architecture is related to the function, is of paramount importance for a variety of applications, including new ways to prevent, deal with and cure brain diseases, such as Alzheimer's or Parkinson's, and psychiatric disorders, such as Schizophrenia. The recent advances in structural and functional neuroimaging, together with the increasing attitude to interdisciplinary approaches involving computer science, mathematics and physics, are fostering interesting results from computational neuroscience, that are quite often based on the analysis of complex network representation of human brain. In the last years, this representation experienced a theoretical and computational revolution that are breaching neuroscience, allowing to cope with the increasing complexity of human brain across multiple scales and in multiple dimensions, and to model structural and functional connectivity from new perspectives, often combined with each other.

In this talk we will discuss about one recently proposed approach, based on frequency decomposition, to represent the functional human brain as a multilayer network. We will briefly introduce the theoretical and computational tools required to analyze multilayer functional networks and we will show how this novel framework allows to distinguish between healthy and schizophrenic populations, achieving higher accuracy than conventional network approaches in clinical applications.



Manlio De Domenico, PhD, is the Head of the Complex Multilayer Networks (CoMuNe) Research Unit at the Center for Information Technology of Fondazione Bruno Kessler.

He is also co-director of the Mediterranean School of Complex Networks and member of the Complex Systems Society Council. His research covers a broad range of topics ranging from structure and dynamics of multilayer networks to complex analysis of (big) data and find applications in systems biology, systems medicine, computational social sciences, computational epidemiology and data-driven policy making.



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