



Università degli Studi di Cagliari

Dipartimento di Fisica - Cittadella Universitaria – 09042 Monserrato (CA)

Dipartimento di Fisica

AVVISO CICLO DI LEZIONI

I giorni

7/8/9 Febbraio p.v. – ore 15:00-17:30 – Sala B

si terrà il seguente ciclo di lezioni su:

Spatial Networks

Marc Barthelemy

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Complex systems are very often organized under the form of networks where nodes and edges are embedded in space. Transportation and mobility networks, Internet, mobile phone networks, power grids, social and contact networks, neural networks, are all examples where space is relevant and where topology alone does not contain all the information. Characterizing and understanding the structure and the evolution of spatial networks is thus crucial for many different fields ranging from urbanism to epidemiology. In this set of lectures I will expose the current state of our understanding of how the spatial constraints affect the structure and properties of these networks. I will first review the most recent empirical observations and then the most important models of spatial networks. If time allows, I will also discuss various processes which take place on these spatial networks, such as random walks, navigation, resilience, and disease spread.



Outline:

I. Introduction: Space and networks

II. Empirical results

1. Transportation networks
2. Infrastructure networks
3. Mobility networks

III. Models of spatial networks

1. Geometric graphs
2. Spatial generalization of the Erdos-Renyi graphs
3. Spatial generalizations of the Watt-Strogatz small-world
4. Spatial generalizations of the preferential attachment model
5. Optimal networks

IV. Processes on spatial networks

1. Random walks
2. Navigating and searching spatial networks
3. Robustness and resilience
4. Disease spreading

BIO:

Marc Barthelemy is a former student of the Ecole Normale Superieure of Paris. In 1992, he graduated at the University of Paris VI with a thesis in theoretical physics titled "Random walks in random media". After his thesis, Marc Barthelemy focused on disordered systems and their properties. In 1999, he visited Prof. Stanley at Boston University and started to work on the properties of complex networks. Since 1992, he has held a position at the CEA (Paris) where his interests moved towards applications of statistical physics to complex systems. In particular, he worked on complex networks, theoretical epidemiology, and other problems in urban systems.

Tutti gli interessati sono invitati a partecipare.

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