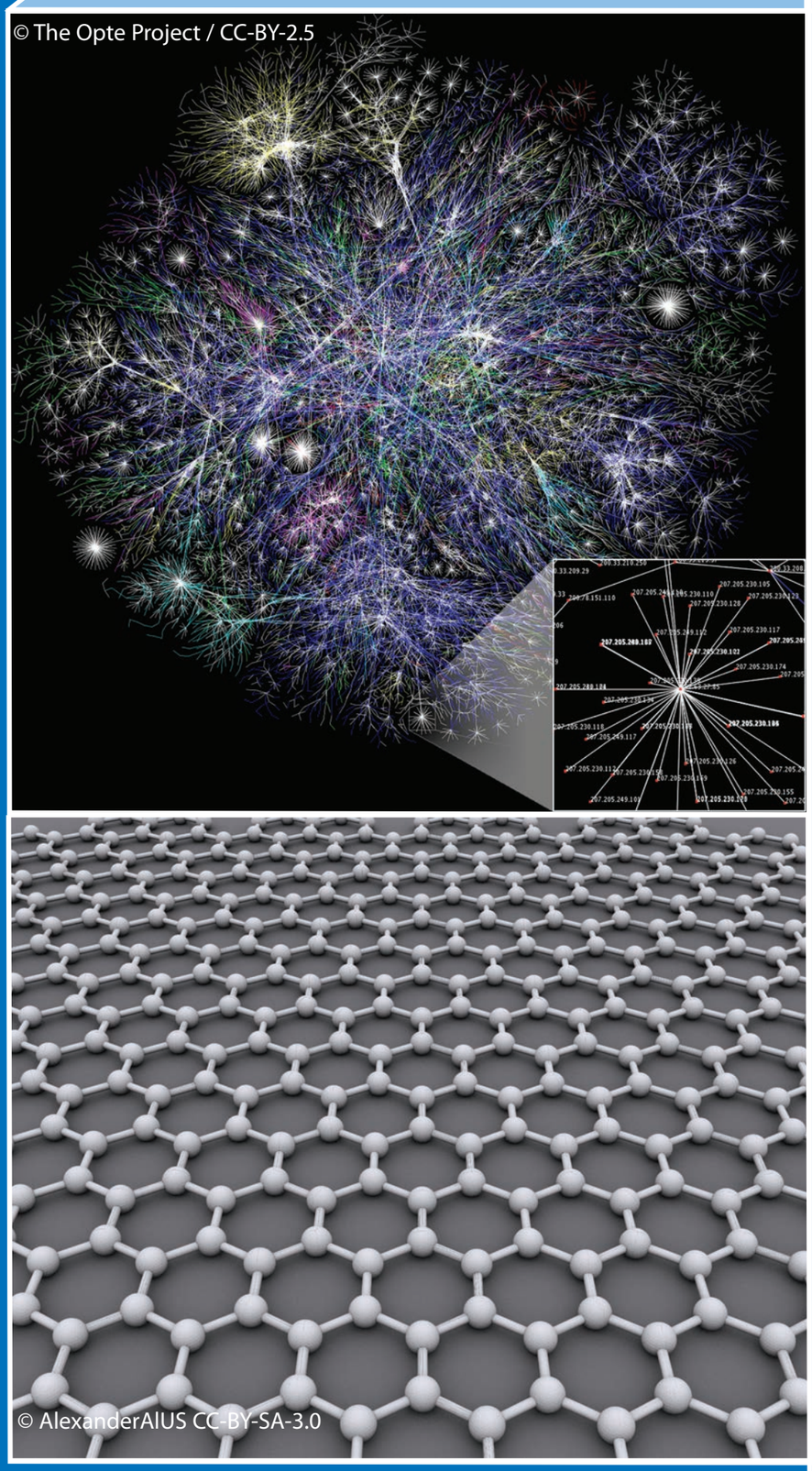
Berlin Mathematical School

BMS Friday Colloquium

Friday 9 May 2014 at 14:15

Tea & Cookies starting at 13:00

BMS Loft, Urania, An der Urania 17, 10787 Berlin



Mario Arioli (*TU Berlin*)

A gentle introduction to complex and quantum graphs and their applications

A quantum graph is a graph in which we associate a differential law with each edge. This differential law models the interaction between the two nodes defining each edge. The use of quantum graphs (as opposed to more elementary graph models, such as simple unweighted or weighted graphs) opens up the possibility of modeling the interactions between agents identified by the graph's vertices in a far more detailed manner than with standard graphs. Quantum graphs are now widely used in physics, chemistry and engineering (nanotechnology) problems, but can also be used, in principle, in the analysis of complex phenomena taking place on large complex networks, including social and biological networks. Such graphs are characterized by highly skewed degree distributions, small diameter and high clustering coefficients, and they have topological and spectral properties that are quite different from those of the highly regular graphs, or lattices arising in physics and chemistry applications.

The purpose of Arioli's talk is twofold. First, he will illustrate the properties of quantum graphs and of complex graphs in modeling several applications. Second, he will investigate the numerical solution of PDEs posed on quantum graphs with complex topologies. As an example, Arioli will consider different time dependent PDEs for modeling the spreading of information on a complex network of interacting agents.

Mario Arioli is an Italian mathematician who specializes in the analysis of stability in algorithms and physical problems. A former member of the Science and Technology Facilities Council (UK), he is currently BMS Guest Professor at the TU Berlin and is giving a BMS Advanced Course this semester.

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