



181 Longwood Avenue
Boston, Massachusetts 02115-5804

Department of Medicine
Channing Division of Network Medicine

Channing Network Science Seminar

Dec 18, 2015, 11am @ 5th floor large conference room



Marco Tulio Angulo, Dr. Eng.
Postdoctoral Research Associate @ Center for Complex Networks Research
Northeastern University
Sponsored Staff @ Channing Division of Network Medicine,
Brigham and Women's Hospital and Harvard Medical School.

Rigorous analysis of complex networked systems combining Network Science and System Theory

Abstract: In this talk, I will discuss some case studies illustrating a rich synergy that exists between Network Science and System Theory —control theory and system identification, in particular. This synergy provides the means to rigorously understand and diagnose complex networked dynamic systems in very diverse fields. In the first case study, by combining novel notions of stability for nonlinear systems with simple model reduction techniques, I will show it is possible to understand the microscopic patterns of real networks (so-called network “motifs”) in terms of small subgraphs that favour stability. Second, I will briefly discuss how these same notions of stability can be used to provide conditions for stability of nonlinear networked systems knowing the signs of their interactions only. Finally, I will show how notions of system identification can be used to characterize the fundamental limitations of network reconstruction, governing our ability to reconstruct properties of the interconnection network underlying a system from temporal data of its nodes. Counterintuitively, this analysis reveals that generically network reconstruction is as hard as parameter identification.

Bio: Marco Tulio Angulo got his Dr.Eng degree in Automatic Control from the National Autonomous University of Mexico. Since 2014, he has been a Postdoctoral Research Associate at the Center for Complex Networks Research (CCNR), Northeastern University working under the supervision of László Barabási. Since 2015, he has also been Sponsored Staff in the Channing Division of Network Medicine, Brigham and Women's Hospital, Harvard Medical School.

Hosted by Yang-Yu Liu