1127-92-219 **Jacopo Grilli**, **Gyorgy Barabas** and **Matthew J Michalska-Smith** (sallesina@uchicago.edu), Chicago, IL 60637, and **Stefano Allesina*** (sallesina@uchicago.edu), 1101 E 57th, Zoology Building 403A, Chicago, IL 60637.

Higher-order interactions stabilize dynamics in competitive network models.

The difficulty of reconciling the staggering biodiversity found in tropical rainforests with classical theories of resource partitioning has led ecologists to explore neutral coexistence, in which all species have the same physiological parameters, and variations in species abundance arise from stochastic fluctuations. The debate on neutral theories has led ecologists to reconsider the foundations of the discipline. However, the strong assumption of equivalence among all species, and the high sensitivity of neutral models to slight perturbations of the parameters are still considered problematic.

Here we propose a theory of coexistence in which all species have different physiological rates, and interact with each other through a network of competitive interactions. We show that our models produce robust coexistence of many species even when parameters are drawn at random. Importantly, the dynamical stability of our models is due to higher-order interactions—interactions involving more than two species at a time. The existence of higher-order interactions has been debated in ecology for decades, but their role in shaping ecological communities is still understudied. Results show that higher-order interactions can have dramatic effects on the dynamics of ecological systems. (Received February 04, 2017)