SYMBIOTIC CONTACT PROCESS

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Symbiosis is the living together of two phylogenetically unrelated species in close association [1], and it is a rather common phenomenon in nature. For example, lichens are symbiotic complexes of algae living inside fungi, and the roots of higher plants use symbiotic associations with fungi to receive important nutrients. Macroscopic models derived from modifications of the Lotka-Volterra competition equations have been employed to model symbiotic relations for decades. Such model however neglect stochastic effects, relevant due to the discrete nature of the individuals and in spatially extended systems. Therefore, interacting spatially extended multi-species processes became an issue of recent interest [2-5].
In this talk, we show how to introduce symbiotic interactions in a stochastic multi-species birth-and-death process with a spatial structure, using the two-species Contact process (CP) [6]. We review our main results, characterize the absorbing phase transition, and show that diffusion raises the possibility of catastrophic (discontinuous) collapse of strongly symbiotic interspecies alliances under increasingly adverse conditions, even if the change is gradual [7].

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