

Generalized Chase-Escape Models

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Chase-escape is a competitive growth process in which red particles spread to adjacent uncolored sites, while blue particles overtake adjacent red particles. This model can be viewed as rabbits escaping from wolves that are pursuing them on an infinite graph. In this talk, we explore generalizations of chase-escape. In chase-escape with death, each rabbit has a random lifespan, after which it dies. This variant introduces a new phase where death enhances the survival of the rabbit population. We analyze the phase transitions of this process on a d -ary tree by leveraging a connection between probability and analytic combinatorics. This approach also allows us to study further generalizations of chase-escape, which we will present in the talk. This talk is based on joint work with Erin Beckman, Keisha Cook, Nicole Eikmeier, and Matthew Junge; and with Matthew Junge, Naina Ray, and Nidhi Ray.

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