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*Catalytic branching processes*

A catalytic branching diffusion processes is a continuous state branching process in which the branching rate depends on the presence of a catalyst. A catalytic branching network corresponds to a multitype system in which some types serve as catalysts for other types. Catalytic branching networks in which there are closed cycles of catalytic types, perturbations of these, and catalytic systems distributed in space pose a number of challenging mathematical problems. In this lecture we discuss some aspects of these problems from the viewpoint of the hierarchical mean-field limit.