Emerging generalized Fermi-Dirac distribution in Lévy branching and annihilating process

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We study the dynamics of the branching and annihilating process with long-range interactions. Static particles generate an offspring and annihilate upon contact. The branching distance is supposed to follow a Lévy-like power-law distribution. We analyze the long term behavior of the mean particles number and its fluctuations. The average occupation number distribution is shown to evolve from the standard Fermi-Dirac form to the generalized one within the context of nonextensive statistics.