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We study discrete state, possibly non-Markovian, jump processes on large sparse graphs. These models arise in a variety of fields including population biology, traffic modeling, and load balancing. Such models are typically not amenable to exact analysis or (for large graphs) numerically tractable. Under broad conditions on the dynamics and graph structure, which allows for some asymmetry and heterogeneity in the dynamics, we will present a novel autonomous characterization of the marginal dynamics at a neighborhood of a typical particle in the limit as the number of particles goes to infinity. This complements earlier work of Lacker et al (2019) for homogeneous and symmetrically interacting diffusions. We also show how our characterization can be applied to a variety of interesting problems. This talk is based on joint work with Kavita Ramanan. (Received September 16, 2019)