Many-particle limit passage of interacting particle systems

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We study the many-particle limit of an interacting particle system. The velocities of the particles are described by a non-linear function which depends on all particle positions. The resulting system of first-order ODEs has a gradient flow structure with respect to an energy functional E_n, where n is the number of particles. Our first main result states Γ-convergence of the energy functionals E_n as $n \to \infty$. The Γ-limit E is defined on the space of measures, equipped with the 2-Wasserstein topology. These measures represent the particle density. Our second result guarantees the convergence of the related gradient flows.