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Jingwei Hu (talk 9): An explicit energy-conserving particle method for the Vlasov-Fokker-Planck equation

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We present an explicit particle method for the Vlasov-Fokker-Planck equation that conserves energy at the fully discrete level. The method features two key components: a conservative particle discretization for the nonlinear Fokker-Planck operator (also known as the Lenard-Bernstein or Dougherty operator), and an explicit time integrator that ensures energy conservation through an accuracy-justifiable correction. We validate the scheme on several plasma benchmarks, demonstrating its effectiveness. This work is in collaboration with Lee Ricketson and Jiyoung Yoo.