1052-82-54 **Yves Elskens*** (yves.elskens@univ-provence.fr), UMR 6633, eq. turbulence plasma, case 321, campus Saint-Jerome, Marseille cedex 13, 13397, and **Michael K-H Kiessling** (miki@math.rutgers.edu) and **Valeria Ricci** (ricci@unipa.it). *Vlasov limit for particles coupled with a wave field.*

We report on progress towards deriving the relativistic Vlasov-Maxwell system from the dynamics of $N \to \infty$ charged particles coupled with the electromagnetic fields, accomplished for a toymodel. The electromagnetic vector potential A^μ is replaced with a scalar field ϕ, the interaction regularized with a smooth kernel with compact support, and the coupling switched from repulsive to attractive. This 'gravity-like' toy dynamics is generated by a Hamiltonian which is bounded below, and globally well-posed.

The empirical N-particle measures under this N-body+field dynamics are weak solutions to the Vlasov equation which conserve mass, energy, momentum and angular momentum. The Kantorovich-Rubinstein distance between solutions does not grow faster than exponentially in time from its initial value.

If the (limit) initial measure is absolutely continuous with density $f_0 \in L^p$, then for all time t the (limit) solution $f_t \in L^p$ and Casimir functionals are invariant. (Received August 26, 2009)