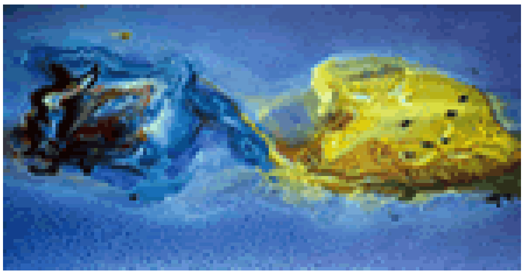

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The proper-time evolution of the magnetic susceptibility in a magnetized quark-gluon plasma

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In ultrarelativistic heavy ion collisions enormous magnetic fields are generated because of fast moving charged particles. In the presence of this magnetic field, the spin of particles are aligned either in the parallel or in the antiparallel direction with respect to the direction of the magnetic field. This alignment produces a finite magnetization.
It is kown that finite magnetic susceptibility of the medium, χ_m, changes the evolution of the energy density of the Quark-Gluon Plasma, which is believed to be created in these collisions. It slows down or speeds up the decay of the energy density, depending on whether the system under consideration is a paramagnetic ($\chi_m > 0$) or diamagnetic ($\chi_m < 0$) fluid.
All these studies have been done under two assumptions : 1) A transversally homogeneous and longitudinally boost invariant expansion and 2) a uniform magnetic susceptibility. In general, one expects that the magnetic susceptibility depends on the magnetic field and temperature. These parameters evolve with the evolution of the fluid so that a nonuniform magnetic susceptibility in this system is naturally expected. In this work, we determine first χ_m by making use of the standard anisotropic kinetic theory method, where the one-particle distribution function is replaced by the corresponding anisotropic distribution function. We then study the proper-time dependence of the magnetic susceptibility in the framework of ideal magnetohydrodynamics.

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