Contribution ID : **92** Type : **not specified**

Abrikosov Gluon Vortices in Color Superconductors

Tuesday, 10 November 2009 16:30 (1:00)

Abstract content

Summary

A color superconductor exhibits a peculiar magnetic behavior. The conventional electromagnetic field is combined with the 8th gluon field to redefine the in-medium electromagnetism. There is no Meissner effect for the in-medium magnetic field, and some of the gluon fields become charged with respect to the new electromagnetic field. In the first part of this talk, I will discuss how the in-medium magnetic field can influence the gluon dynamics in a three-flavor color superconductor. I will show how at field strengths comparable to the charged gluon Meissner mass a new phase can be realized, giving rise to Abrikosov vortices of charged gluons. In that phase, the inhomogeneous gluon condensate anti-screens the magnetic field due to the anomalous magnetic moment of these spin-1 particles. This paramagnetic effect can be of interest for astrophysics, since due to the gluon vortex antiscreening mechanism, compact stars with color superconducting cores could have larger magnetic fields than neutron stars made up entirely of nuclear matter. In the second part of my talk, I will discuss a second gluon condensation phenomenon connected to the Meissner instability attained at moderate densities by two-flavor color superconductors. In this situation, an inhomogeneous condensate of charged gluons emerges to remove the chromomagnetic instability created by the pairing mismatch, and as a consequence, the charged gluonic currents induce a magnetic field.

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Session Classification : Non perturbative methods in FT I