Protoneutron Star Neutrinos as a Signal of Color Superconductivity

Gregory W. Carter Sanjay Reddy

*Department of Physics and Astronomy, SUNY Stony Brook, NY, 11794-3800*

b *Institute for Nuclear Theory, University of Washington, Seattle, WA, 98195*

---

*Presented by: Gregory W. Carter*

---

Abstract

The onset of color superconductivity in dense quark matter will modify in-medium neutrino propagation. We calculate the neutrino mean free path in order to study the cooling of such matter via neutrino diffusion. The cooling process slows when quark matter undergoes a second order phase transition to a superconducting phase at the critical temperature $T_c$. Cooling subsequently accelerates as the temperature decreases below $T_c$. This may lead to observable changes in the neutrino signal from a newly born neutron star, should its core contain quark matter, and thus provide evidence for superconductivity in extremely dense matter.