Abstract Submitted
for the SES16 Meeting of
The American Physical Society

A QCD Model of the Chemical Potential Kaon Boundary Formation for a Compact Quark Star.[1] KEITH ANDREW, Department of Physics and Astronomy, Western Kentucky University , KRISTOPHER ANDREW, Department of Physics and Astronomy, University of Kentucky , REBECCA BROWN, BENJAMIN THORNBERRY, SETH HARPER, ERIC STEINFELDS, Department of Physics and Astronomy, Western Kentucky University, THAD ROBERTS, Western Kentucky University — A signature of the QCD phase transition from bound hadronic states to the quark gluon plasma is a change in sign of the chemical potential for the strange quark. The combined data from ALICE, RHIC, and CBM have been used to identify the energy regime where the sign change takes place. Following the work of Baym we use a QCD motivated equation of state to model the change in chemical potential associated with the three lightest quarks and fit the resulting temperature dependent chemical potentials to the accelerator data. These functions are then coupled to a quark star model to determine the interior pressure and temperature as functions of the compact core radius. When the interior pressure is high enough the strange quark chemical potential will shift below the up and down quark chemical potentials making strange quark production favorable. This results in the formation of a boundary layer in the star initially separating free up, down and strange quarks from up and down confined quarks. The strange quarks at the boundary will undergo weak interactions with a strong branching ratio for Kaon formation and thereby result in copious neutrino production. Here we develop a model to find the radial location of the Kaon boundary layer in a quark star.

[1]We wish to thank the Institute for Astrophysics and Space Science

Keith Andrew
Department of Physics and Astronomy, Western Kentucky University

Date submitted: 30 Sep 2016 Electronic form version 1.4