

Abstract Submitted
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Constraining phases of quark matter with studies of r -mode damping in neutron stars GAUTAM RUPAK, Mississippi State University, PRASHANTH JAIKUMAR¹, California State University, Long Beach — We study r -mode damping in the color-flavor-locked phase with kaon condensation (CFL-K0) and contrast it with the CFL phase. The mode frequency in these phases are found to differ very slightly. While the bulk viscosity in either phase is only effective at damping the r -mode at temperatures $T \gtrsim 10^{11}$ K, the shear viscosity in the CFL-K0 phase is the only effective damping agent all the way down to temperatures $T \gtrsim 10^8$ K characteristic of cooling neutron stars. However, it cannot keep the star from becoming unstable to gravitational wave emission for rotation frequencies $\nu \approx 56 - 11$ Hz at $T \approx 10^8 - 10^9$ K. Stars composed almost entirely of CFL or CFL-K0 matter are ruled out by observation of rapidly rotating neutron stars, indicating that dissipation at the quark-hadron interface or nuclear crust interface must play a key role in damping the instability.

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