SPEAKER:

Allen Wu, University of Oklahoma

TITLE:

Steady Rapidly Rotating Stars

ABSTRACT:

A rotating star may be modeled as gas under self gravity with a given total mass and prescribed angular velocity. Mathematically this leads to the Euler-Poisson system. In this talk, we present an existence theorem for such stars that are rapidly rotating, depending continuously on the speed of rotation. No previous results using continuation methods allowed rapid rotation. The key tool for the result is global continuation theory via topological degree, combined with a delicate limiting process. The solutions form a connected set $\mathcal{K}$ in an appropriate function space. Take an equation of state of the form $p = \rho^\gamma$; $6/5 < \gamma < 2$, $\gamma \neq 4/3$. As the speed of rotation increases, we prove that either the density somewhere within the stars becomes unbounded, or the supports of the stars in $\mathcal{K}$ become unbounded. Moreover, the latter alternative must occur if $\frac{4}{3} < \gamma < 2$. This result is joint work with Walter Strauss.