北京理工大學

数学与统计学院学术报告

GNS-inequalities and ground states of relativistic Hartree-Fock model

报告人：曾小雨 (武汉理工大学)

时间： 2026 年 4月 3日（周五上午）10：00—11：00

地点：#腾讯会议：182-790-732

报告人简介： 曾小雨，武汉理工大学数学科学研究中心教授，主要从事与薛定谔方程相关的变分问题、抛物方程爆破解构造等研究。主持国家自然科学基金优青、面上项目和青年科学基金项目，并作为核心成员参与国家自然科学基金重点项目。主要成果发表在Trans.AMS、JMPA、JFA、Ann. Inst. H. Poincar'eAnal. Non Lin'eaire等国际期刊上。

摘要： In this talk, we present a rigorous mathematical analysis of the relativistic Hartree-Fock model for finite Fermi systems. We first establish an optimal Gagliardo-Nirenberg-Sobolev (GNS) inequality with Hartree-type nonlinearities for orthonormal systems and characterize the qualitative properties of its optimizers. Furthermore, we derive a finite-rank Lieb-Thirring inequality involving convolution terms and show that it is the duality of the GNS-inequality. For the relativistic Hartree-Fock model, we prove that ground states exist if and only if the coupling parameter $K<K_\infty^{(N)}$, where $K_\infty^{(N)}$ is the optimal constant in the GNS-inequality. Finally, under suitable assumptions on the external potentials, we calculate the precisely asymptotic behavior of ground states as $K\nearrow K_\infty^{(N)}$. This is based on a joint work with Dr. Yuanda Wu and Pro. Yimin Zhang

主办单位：北京理工大学数学与统计学院
School of Mathmatics and Statistics, Beijing Institute of Technology