



复旦大学物理系 Colloquium

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Quantum Statistical Theory for Non-Hermitian Thermal Systems: From Open Systems to Quantum Maxwell's Demons 热非厄米系统的量子统计理论：从开放系统到量子麦克斯韦妖

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Abstract: In general, about non-Hermitian systems, there are two features -- the dissipativity and the controllability. People always focused on the earlier one ("dissipativity") but have never paid attention to the other very important feature -- "controllability". The connection between non-Hermitian systems and Maxwell's demons comes from the "controllability". Therefore, we concludes that "Non-Hermitian many-body system = Quantum system controlled by Maxwell's demons"! As a result, it is found that in non-Hermitian systems at finite temperature, due to the post-selection measurements both Boltzmann distribution law and its theoretical basis - Equal Probability principle - are broken down. Then, we developed a quantum Liouvillian statistical theory - the generalization of usual quantum statistical theory to non-Hermitian systems at finite temperature. With the help of the quantum Liouvillian statistical theory and the thought of Maxwell's demons, we explored a lot of exotic physical phenomena compared with their Hermitian counterparts in many-body Bosonic/Fermionic system with nonreciprocal hoppings, i.e., Liouvillian Bose-Einstein condensation and Liouvillian Fermi-surface in real space.



报告人简介: 寇谡鹏，北京师范大学物理学系教授，博士生导师。1994年获得南京大学学士学位；1999年获中国科学院物理研究所博士学位。1999年-2001年在清华大学高等研究中心做博士后。2001年入职北京师范大学物理学系。2004年11月至2005年10月，在“杰出青年学者数学物理研修项目”资助下赴美国麻省理工学院物理系凝聚态理论研究组研修。2007年入选教育部“新世纪优秀人才支持计划”；2007年被评为北京市教育创新标兵；2010年获得第十三届茅以升北京青年科技奖。2021年获得第十七届北京市高等学校教学名师奖。寇谡鹏教授主要从事拓扑量子态、超导理论、冷原子系统等凝聚态物理方面研究，发表SCI学术论文100余篇，其中美国物理评论快报 (PRL) 4篇，Nature communication 2篇，美国物理评论 (PR) 40余篇。主持国家自然科学基金8项、973基金2项 (在研2项、结题8项)。