Physical Research Laboratory, Ahmedabad

Special Colloquium 21_02

Speaker: **Prof. Mohit Randeria**

Professor,The Ohio State University, Columbus, United States

Title: **"Are there Upper Bounds on the Superconducting Transition Temperature?"**

Date and Time: **Wednesday, 13 January 2021, 10:30 – 11:30 IST [UTC +5:30 hours]**

YouTube Link: **https://www.youtube.com/watch?v=6_J0wS0Mp7g&feature=youtu.be**

Abstract

Understanding limits on the superconducting transition temperature Tc is a question of fundamental and practical importance. The talk will begin with an overview of experiments and earlier ideas on limits on Tc, followed by a description of how recent developments in ultra-cold Fermigases and in quantum materials challenge conventional ideas on what determines Tc. Recent progress [1] on rigorous bounds on the super fluid phase stiffness will then be discussed. These lead to upperbounds on Tc of 2D systems, irrespective of pairing mechanism or strength. Applications to the 2D BCS-BEC cross over in cold atoms, where Tc is shown to be bounded by one-eighth the Fermi temperature and to a variety of quantum materials including magic-angle twisted bilayer graphene will be discussed. Finally, the open question of deriving rigorous upper bounds on Tc in 3D will be discussed.

[1] T. Hazra, N. Verma, M. Randeria, Physical Review X 9, 031049 (2019)

The Speaker

Prof. Mohit Randeria is a Professor of Physics at the Ohio State University. His current research is in the area of condensed matter theory focusing on correlated and topological states of quantum materials and ultra-cold atoms. He obtained his B.Tech. in electrical engineering at IIT Delhi, MS at Caltech, and Ph.D. in theoretical physics from Cornell University. After post-doctoral research at the University of Illinois, Urbana-Champaign, he taught at Stony Brook and was on the staff of Argonne National Labs. He was on the faculty of the Tata Institute of Fundamental Research from 1995-2004. He has been a visiting professor at Urbana-Champaign (2003-04), Berkeley (2015), and MIT (20I6). He has been awarded the Swarnajayanti Fellowship in 1998, the 2002 Bhatnagar Award, the 2002 ICTP Prize, the Distinguished Alumni Award of IIT Delhi in 2007, and the Fellowship of the American Physical Society in 2008.

ALL ARE WELCOME