



# 清华大学高等研究院

Institute for Advanced Study, Tsinghua University

## 学术报告

**Title:** The ups and downs of quantum criticality in cuprate High Tc superconductors

**Prof. Jan Zaanen**

**Speaker:** (*Lorentz Institute for the Theoretical Physics, Leiden University and Physics Department, Stanford University*)

**Time:** 10:00am, Friday, September 6, 2019

**Venue:** Conference Hall 322, Science Building, Tsinghua University

### Abstract

Since many years it has been believed the highly anomalous properties of the metallic- and superconducting state observed in the copper-oxides is controlled by a quantum phase transition centered at the highest Tc superconductors. This revolves around a conventional ordered state that undergoes a quantum melting. Despite an intense search the nature of this order could not be established. I will report on the latest progress that I witnessed during my sabbatical year at Stanford that is just over, involving the latest generation of the fancy experimental machines of condensed matter physics. On the one hand, state of the art resonant inelastic X-ray scattering revealed for the first time direct evidence for genuine quantum criticality associated with the disappearance of the charge order in the underdoped systems. Ironically, this has nothing to do with the physics of the strange metal at optimal doping. The latest photoemission data reveal that this is actually not at all related to such conventional quantum criticality. These show that it is about a strange metallic phase reminiscent of the holographic strange metals that suddenly switches at optimal doping to a state that appears to be more like a fermi liquid when the electron density is tuned through the critical doping.