



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

Astrophysics Seminar

- Title:** Saturn's magnetic field revealed by the Cassini Grand Finale
- Speaker:** Hao Cao
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- Time:** 10:00am, Friday, January 11, 2019
- Venue:** Conference Hall 322, Science Building, Tsinghua University

Abstract

Magnetic fields are windows into planetary interiors. Saturn's magnetic field continues to offer surprises since the first in-situ measurements made during the Pioneer 11 Saturn flyby. The Cassini mission entered the Grand Finale phase in April 2017, during which time the spacecraft dived through the gap between Saturn's atmosphere and the inner edge of the D-ring 22 times before descending into the deep atmosphere of Saturn on Sep. 15th 2017. The unprecedented proximity to Saturn (reaching $\sim 2550 \pm 1290$ km above the cloud deck) and the highly inclined nature of the Grand Finale orbits provided an ideal opportunity to decode Saturn's internal magnetic field and the electromagnetic environment between Saturn and its rings.

Here we will report new features of Saturn's magnetic field revealed by measurements from the Cassini Grand Finale phase. We will show a newly discovered low-latitude inter-hemispherical field-aligned current (FAC) system, the directly determined northward offset of Saturn's magnetic equator and its "longitudinal" variations, small-scale yet highly consistent magnetic structures along the latitudinal direction. Observational constraints on the time variation of Saturn's internal magnetic field will also be presented. We will discuss how these latest measurements provide a new perspective on answering some key questions concerning Saturn's interior: level of differential rotation, the existence and extent of stable stratification, and the size and nature of the central core. Implications on the properties of "ring ionosphere" will be discussed as well.