



## SEMINAR 專題演講



國立中央大學 太空科學與工程學系

Department of Space Science and Engineering, National Central University

### Time

Thursday,

September 4, 2025

15:30 – 16:30

### Place

健雄館 (科四館)

S4-917 教室

Room S4-917,

Chien-Shiung

Building

# MAVEN Observations of Ion Properties in the Martian Magnetosheath: First Statistical Comparison of Core and Total Ion Populations

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For the first time, we present a statistical comparison of ion properties between the thermal core and total ion populations in the Martian magnetosheath based on nine years of MAVEN observations. The core population, extracted from bi-Maxwellian fits to three-dimensional velocity distributions, contributes about 80% on average to the total density and dominates the bulk flow. In contrast, the total population—which combines the core with suprathermal ions—exhibits much higher temperatures, thermal pressures, and plasma beta. Both the core and total populations show enhanced temperature anisotropy downstream of quasi-perpendicular shocks compared to quasi-parallel shocks, reflecting stronger compression and a greater contribution from reflected solar wind ions under quasi-perpendicular conditions. Strikingly, the core population consistently shows greater anisotropy than the total. Furthermore, its anisotropy immediately downstream of the shock lies well above CGL predictions, pointing to additional perpendicular heating mechanisms beyond shock compression. A plausible candidate is stochastic energization by kinetic Alfvén waves. Together, these findings reveal hidden thermodynamic structures and energization pathways that shape ion dynamics in the Martian magnetosheath.