

Title: The coupling between the main rings and the Saturnian system.

Abstract:

The Saturnian system is immersed in a vast neutral gas cloud of O₂, H₂, H₂O and their dissociated products like OH, O and H. The sources of neutrals and plasma (once ionized) include Titan's exosphere, Enceladus' water plumes (and other small icy satellites), and the ring atmosphere. The main ring system is a significant source of O₂ and H₂, which can be injected into Saturn and its magnetosphere via scattering processes. Therefore, the ring atmosphere of O₂ could be an external source of the water molecules detected in Saturn's stratosphere by ISO, in addition to water molecules ejected from Enceladus. Also, "Ring Rain" could be another important source that the charged grains (mostly water ice) from the main rings can be deposited in Saturn. However, the detail in the coupling dynamics between Saturn's ionosphere and the main rings is not solid yet and it needs further investigation. In order to complement these efforts, we propose describing the role of the main rings in the coupling dynamics between **Saturn's** atmosphere, ionosphere, and magnetosphere. Through a combination of computer modeling and comparisons with the spacecraft and telescopic data (and the ALMA data, if possible), we will answer the following science questions:

Q1: What is the dominant source of oxygen in Saturn's stratosphere? The ring atmosphere and/or the Enceladus plumes?

Q2: What is the cause of the latitudinal dependence of Saturn's **ionospheric electron and ion density**?