龍虎山講座

Dragon and Tiger Talk Series

Electro-dynamic moon-magnetosphere interactions in our Solar System

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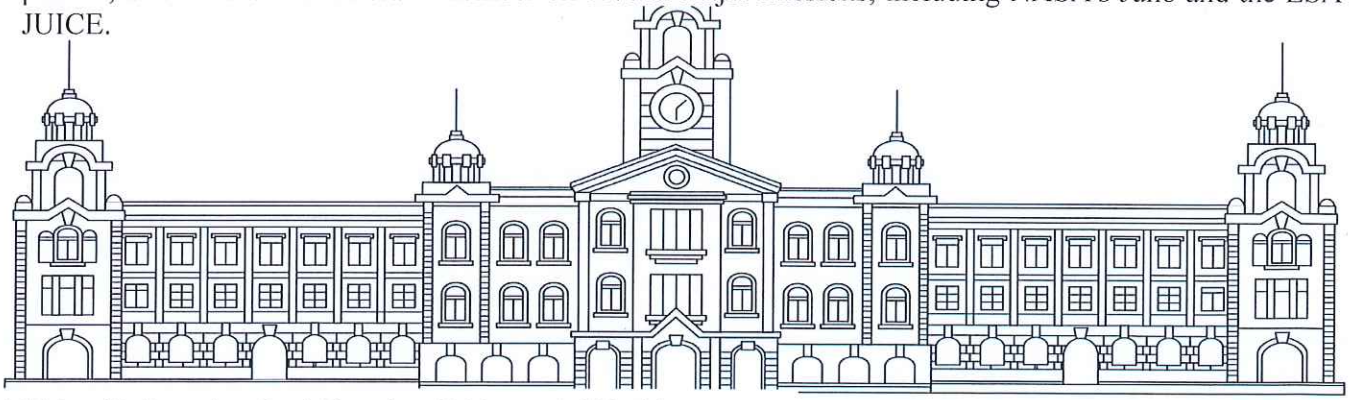
Room 105, James Lee Science Building

Abstract: The electro-dynamic interactions between moons and the magnetosphere of their host planets have been investigated since the mid-20th century and the implication of the Alfvén waves was recognized right away. However, in the first models, Alfvén waves were only considered as current carriers. It is only after the Voyager missions that the possibility of complex reflection patterns was considered and their ability to accelerate particles became fully appreciated only recently. For this seminar, I will review the history of our understanding of the various cases of moon-magnetosphere interactions in our Solar System. The presence of the largest of these moons in the stream of the magnetospheric plasma generates powerful large-scale Alfvén waves, which can break up into smaller scales, reflect off density gradients and accelerate particles, ultimately impacting the atmosphere of the planet to generate auroras and trigger radio emissions. The best-known case is the Io-Jupiter interaction, since its observational signatures are the richest and most obvious. As our means of investigation improved, signatures of similar interactions have also been discovered for the other Galilean moons, as well as for moons orbiting Saturn. Interestingly, similar interactions can occur on rare occasions between the planets themselves and the solar wind and most likely take place in exo-planetary systems as well.

Biography: Prof. Bertrand Bonfond is an FNRS-F.R.S. Research Associate and Associate Professor at the University of Liège, where he currently serves as the Director of the Space Sciences, Technologies and Astrophysics Research (STAR) Institute. Prof. Bonfond received his PhD from the University of Liège in 2009 and was a postdoctoral researcher at the University of California, Los Angeles and the Southwest Research Institute in Boulder, USA. Over his career, he has been the recipient of several prestigious awards, including the European Geosciences Union Division Outstanding Young Scientist Award in 2015 and the Baron Nicolet Prize from the Royal Academy of Belgium in 2014. Dr. Bonfond's research focuses on the aurorae of giant planets, and he is a science team member on several major missions, including NASA's Juno and the ESA's JUICE.



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