(Seminar at BIRA, Uccle, Green Room / Friday, 17 December 2010, 14:00 h)

Title: **The interaction between the Solar Wind and the geomagnetic field: an update of the current situation**

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Abstract: The standing study of the interaction of the Solar Wind and the geomagnetic field started in 1961 when two alternative classes of magnetospheric models were proposed respectively by Axford & Hines (1961), and by Dungey (1961): (i) closed magnetospheres, & (ii) open magnetospheres (the template for many subsequent "magnetospheric reconnection scenarios"). These models were mainly described as quasi-steady state ones.
The first time-dependent model was formulated at BISA by Lemaire and Roth (1978, 1991). It was first presented in 1976 at the EGS General Assembly in Amsterdam. This new interaction model for the magnetopause region is known as the "Impulsive Penetration Model".

In this presentation I will recall, in a historical perspective, the different models and theories describing the magnetopause surface separating the Solar Wind plasma from the magnetospheric region, where charged particles are confined inside the Earth's geomagnetic field.

Relevant in-situ observations, including recent measurements from the CLUSTER mission published by Lavraud et al (2009), will be presented.

Dungey, J.W., Interplanetary magnetic fields and the auroral zones, *Phys. Rev. Letters,* ***3,*** *685, 1961*

Axford, I. and **Hines, C.O.,** A unifying theory of high-latitude geophysical phenomena and geomagnetic storms, *Can. J. Phys.,* ***38,*** *1433, 1961*

Lemaire, J., and **Roth, M.,** Penetration of solar wind plasma elements into the magnetosphere, , *J. Atmosph.. Terr. Phys.,* ***40,*** *337, 1978*

Lemaire, J., and **Roth, M. ,** Non-steady-state solar wind-magnetosphere interaction, *Space Science Reviews,* ***57,*** *59-108, 1991*

Lavraud et al., Tracing solar wind plasma entry into the magnetosphere using ion-to-electron temperature ratio, *Geophys. Research Letters,* ***36****, L18109, doi:10.1029/2009GL039442, 2009*