

Analytical modeling of terrestrial planets' upper atmospheres: analysis of the scarce collisions and influence of the stellar radiation pressure

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The external part of the atmosphere, the exosphere, is not a well-known region. The densities are too low for many instruments compared with their detection capabilities, and the modeling of the particles dynamics can be complex. During my PhD thesis, I focused on two problems: the production of "satellite" particles from the scarce collisions in the lower exosphere and the influence of the radiation pressure on the exosphere structure.

In the first part of this talk, I will present the results about the influence of the scarce collisions near the exobase on the density profiles at higher altitudes for the Earth, Titan and Mars, through the production of "satellite" particles, that are neglected in the collisionless models. In a second part, I will show the effect of the radiation pressure on the structure of the exosphere with a semi-analytical approach. The radiation pressure changes the ballistic particle density profiles and implies strong asymmetries at high altitudes. It increases also the thermal escaping flux, which we determined analytically at the subsolar point. Finally, I will show also its influence on the Three-Body problem and on the stability of the atmospheres, in particular for hot Jupiter exoplanets.