New evaluation of $N^+$, $N_2^+$ and $N_2^{++}$ ion-molecule reactions relevant for the chemistry of Titan’s ionosphere

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In the next weeks and years, the Cassini-Huygens mission will bring some new discoveries on the upper atmosphere of Titan. In this context, it is important to well characterize the ion production and decay processes for a good understanding of the ionosphere chemistry.

In Titan’s ionosphere, the dissociative and non-dissociative photoionisation of $N_2$ by solar vacuum ultra-violet are the principal processes responsible for the production of $N^+$, $N_2^+$ and $N_2^{++}$ primary ions during the day. We will first discuss how these processes can lead to species with internal excitation (electronic and/or vibrational) and also with translational energy [1-3].

The subsequent reactions of these primary ions have been measured in laboratory experiments [1,4] and compared to the literature values [5-7] used in ionospheric models. We will show how the rate constants and the branching ratios to secondary products can be strongly affected by the primary ion internal and translational energy. Consequences on the ionospheric models are discussed.


computation of the diurnal secondary ion production in the ionosphere of Titan, accepted in Icarus.


