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Hydrogen Lyman Alpha emission from Titan's exosphere: Comparing measurement and model

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Saturn's biggest moon, Titan, is the only moon in the entire solar system having a dense atmosphere showing large similarities when compared to Earth's primordial atmosphere. During the ninth close encounter of the satellite mission Cassini with Titan on December 25, 2005 (T9), the Hydrogen Deuterium Absorption Cell (HDAC), which is part of the Ultraviolet Imaging Spectrograph Subsystem (UVIS), was scheduled to directly measure the D/H ratio in Titan's exosphere at Lyman alpha wavelengths, in order to investigate Titan's evolution since its formation. Unfortunately, problems with the absorption cells prevented an exact measurement.

A 3D Monte Carlo model has been developed to model the hydrogen Lyman Alpha emission at 121.56 nm in Titan's exosphere. With this model one can estimate the emission of resonantly scattered solar radiation by the hydrogen atoms in Titan's exosphere and re-analyze the measurements obtained by HDAC. Assuming successful interpretation of HDAC's measured data, the instrument might be used again during the extended mission of Cassini during another close encounter with Titan.

We show here the first results of our Monte Carlo calculations and compare our results with the HDAC measurements.