## A Numerical Model of Line Emission in Comet Atmospheres

## MIGUEL DE VAL-BORRO $^1$ and CHRISTOPHER JARCHOW $^1$ and PAUL HARTOGH $^1$

<sup>1</sup> Max Planck Institute for Solar System Research

Sub-millimiter observations can constrain the mixing ratios of volatiles in comet atmospheres and link these measurements to the origin of the solar nebula. We obtain production rates for several molecules based on simulations of the line profiles using a Monte Carlo radiative transfer method. Collision rates with water and electrons have been obtained from the current version of the LAMDA database (Schöier et al. 2005). We adopt a constant neutral gas kinetic temperature throughout the coma and the electron temperature profile given by Bensch & Bergin (2004). Production rates are calculated comparing line intensities with the integrated synthetic lines obtained with the numerical model. The model has been run to derive production rates for comet C/2004 Q2 (Machholz) observed with the Submillimeter Telescope of the Arizona Radio Observatory. In addition, we predict the water level populations and line profiles observed with the Heterodyne Instrument for Far-Infrared on the Herschel Space Observatory.

Keywords: Comets; Radiative transfer; Methods: Numerical;

## References

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