Geophysical Research Abstracts, Vol. 9, 07850, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07850

The impact of nonthermal loss processes on planet masses from Neptunes to Jupiters

H. Lammer (1), M. L. Khodachenko (1), H. I. M. Lichtenegger (1), Yu. N. Kulikov (2), and G. Wuchterl (3)

(1) Space Research Institute, Austrian Academy of Sciences, Graz, Austria, (2) Polar Geophysical Institute (PGI), Russian Academy of Sciences, Murmansk, Russian Federation, (3) Thüringer Landessternwarte Tautenburg, Germany (helmut.lammer@oeaw.ac.at, herbert.lichtenegger@oeaw.ac.at, kulikov@pgi.ru, gwuchterl@tls-tautenburg.de)

The orbital distance at which close-in exoplanets maintain their initial mass is estimated by modelling the maximum expected nonthermal mass loss rates over several Gyr. Our results indicate that nonthermal mass loss induced by Coronal Mass Ejections of a host star can significantly erode weakly magnetized short periodic gas giants. The observed exoplanets Gliese 876d at 0.0208 AU with a mass of about 0.033 Jupiter masses and 55 Cnc e at 0.045 AU with a mass of about 0.038 Jupiter masses could be strongly eroded gas giants, while HD69830b, at 0.078 AU, HD160691d at 0.09 AU and HD69830c at 0.18 AU belonged most likely since their origin to the Neptune-mass domain. The consequences for the planetary population expected to be discovered with the CoRoTs are: (1) for orbital distances less than about 0.05 AU weakly magnetized or highly irradiated gas giants may lose a large fraction of their initial mass and even completely lose their gas envelopes. (2) Observed planetary masses which resemble theoretically calculated planetary mass spectra at these orbital periods would indicate a major effect of magnetic field protection. (3) At distances larger than 0.05 AU the impact of loss processes for Hot Jupiters is minor and the observed mass spectra should be close to the theoretical ones.