Abstract Submitted
for the GEC07 Meeting of
The American Physical Society

Electron cooling rates in the atmospheres of Mars and Venus LAURENCE CAMPBELL, MICHAEL BRUNGER, ARC Centre for Antimatter-Matter Studies, Flinders University, THOMAS RESCIGNO, Lawrence Berkeley National Laboratory, Berkeley — Vibrational excitation of molecules by electron impact, followed by radiative decay, is a cooling mechanism in planetary atmospheres. As carbon dioxide is the dominant constituent below 200 and 140 km in the atmospheres of Mars and Venus respectively, the electron cooling rates for CO_2 are required in modeling the atmospheres of these planets. Such cooling rates were determined many years ago, but new measurements and calculations of the electron impact cross sections have since become available. There have also been new measurements of the atmospheric parameters, such as of the electron density on Mars, that are required in the calculations. Therefore we have assembled a new data base of electron impact cross sections for CO_2, based on the more recent measurements and calculations, and used it to calculate electron cooling rates for Mars and Venus. One result is that we predict a larger cooling rate for the altitude range 100–150 km in the Martian atmosphere. This may explain why temperatures observed in this region are less than predicted.

Michael Brunger
ARC Centre for Antimatter-Matter Studies, Flinders University

Date submitted: 08 Jun 2007 Electronic form version 1.4