VIBRATIONAL RELAXATION IN A PULSED-DISCHARGE MOLECULAR BEAM

M. E. SANZ, M. C. McCARTHY and P. THADDEUS, *Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA 02138 and Division of Engineering and Applied Sciences, Harvard University, 29 Oxford St., Cambridge, MA 02138, USA*.

Vibrational relaxation has been systematically investigated in our pulsed-discharge molecular beam by means of Fourier transform microwave spectroscopy. Three diatomics, SO, SiO and SiS, as well as several polyatomic molecules (OCS, OC_3S, HC_3N, HC_5N and SiC_2S) have been studied. Rotational transitions in highly excited vibrational states ($v > 30$) have been observed for all diatomic species, while several bending and stretching modes were populated enough to be detected for the different polyatomics. Comparisons of vibrational populations with and without the discharge were possible for OCS and HC_3N. Vibrational temperature diagrams were derived for each species, and with these it is possible to propose a general model which qualitatively explains our observations.