Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

V-V state-to-state rate constants in N_2 –N_2 and N_2-CO collisions in a wide temperature range: semiclassical calculations and analytical approximations MARIO CACCIATORE, National Research Council- IMIP Bari, Italy, ALEXANDER K. KURNOSOV[1], ANATOLY NAPARTOVICH, SERGEY SHNYREV, Institute of Innovation and Fusion - Russia, CNR-INSTITUTE OF INORGANIC METHODOLOGIES AND PLASMAS- BARI, ITALY TEAM, INSTITUTE OF INNOVATION AND FUSION - TROITSK-RUSSIA TEAM — Accurate semiclassical collision data for single- and multi-quantum vibrational state-selected V-V exchanges in $N_2(v)$-$N_2(u)$ and $N_2(v)$-$CO(u)$ collisions have been calculated over a large range of vibrational quantum numbers (v, u) and gas temperature. Analytic approximations are also proposed that agree well with the semiclassical [1] calculations performed for different classes of vibrational exchange processes, from near-resonant to far-from -resonance processes. The newly proposed analytical rate constants, together with the numerical *ab initio* rates, can be used with confidence in vibrational kinetic modeling of nitrogen and carbon monoxide-based gaseous systems, including plasmas sources in laboratory and in nature, under non-thermal equilibrium conditions.

[1] Kurnosov A K, Napartovich A P, Shnyrev S and Cacciatore M, 2007 *J.Phys.Chem. A* **111**, 7057

[1]Troitsk- Moscow region

Mario Cacciatore
National Research Council

Date submitted: 14 Jun 2010 Electronic form version 1.4