Observation of N$_4^+$ recombination at near atmospheric pressure$^1$
S.F. ADAMS, C.A. DEJOSEPH, JR., Air Force Research Laboratory, Wright-Patterson AFB, OH 45433, J.M. WILLIAMSON, Innovative Scientific Solutions, Inc., Dayton, OH — We previously reported our initial modeling results of the N$_4^+$ + e$^-$ recombination observed by monitoring the time-resolved N$_2$ emission (GEC03, paper SRP 24). The N$_2$ 2nd positive ($C^3Π_u - B^3Π_g$) and N$_2^+$ 1$^st$ negative ($B^2Σ_u^+ - X^2Σ_g^-$) emission was measured following laser resonance-enhanced multi-photon ionization (REMPI) of N$_2$ at near-atmospheric pressure. N$_4^+$ is produced by the three-body association reaction of N$_2^+$ + N$_2$ which occurs rapidly at these pressures. Two types of fluorescence are observed following irradiation of N$_2$ by the laser pulse. A “prompt” fluorescence composed primarily of emission from the N$_2^+$ 1$^st$ negative system ($B^2Σ_u^+ - X^2Σ_g^-$) followed by a “delayed” fluorescence form the aforementioned N$_2$ (C-B). The preliminary modeling presented previously has been extended to include other key N$_2$ neutral and ionic species as well as the important loss channel of N$_4^+$ by laser photodissociation which had been neglected. The improved model along with additional N$_2^+$ LIF and N$_4^+$ UV photolysis results will be presented.

$^1$This work supported by the Air Force Office of Scientific Research

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Date submitted: 14 Jun 2005
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