# Energy Transfer Involving $N_2(A^3\Sigma_u^+,v)$ Molecules in $N_2$-$CO_2$-$CH_4$ Plasmas

- **Time-resolved $N_2(A^3\Sigma_u^+)$ number density measured in ns pulse discharges in high-pressure mixtures of $N_2$, $N_2$-$CO_2$, $N_2$-$CH_4$, $N_2$-$CO_2$-$CH_4$, $N_2$-$H_2$, P=150 Torr**

- **Vibrational relaxation of $N_2(A)$ observed in gas mixtures containing $N_2$ and $CH_4$ such that $N_2(A,v=1)$ relaxes into $N_2(A,v=0)$:** $N_2(A, v = 1) + CH_4 \rightarrow N_2(A, v = 0) + CH_4$

- **Kinetic mechanisms of $N_2(A)$ generation and decay are well understood**
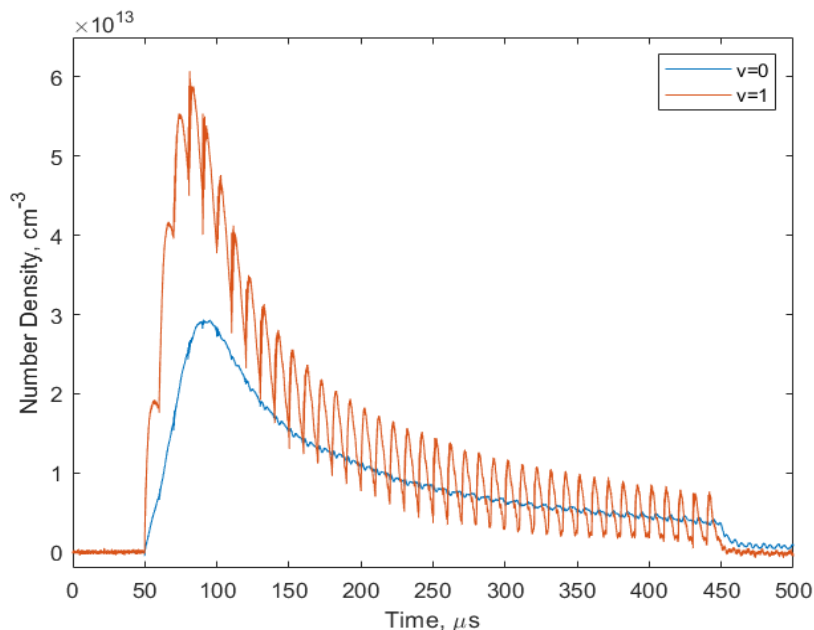


$N_2(A^3\Sigma_u^+,v=0,1)$ population in pure $N_2$, 100kHz pulse rep. rate
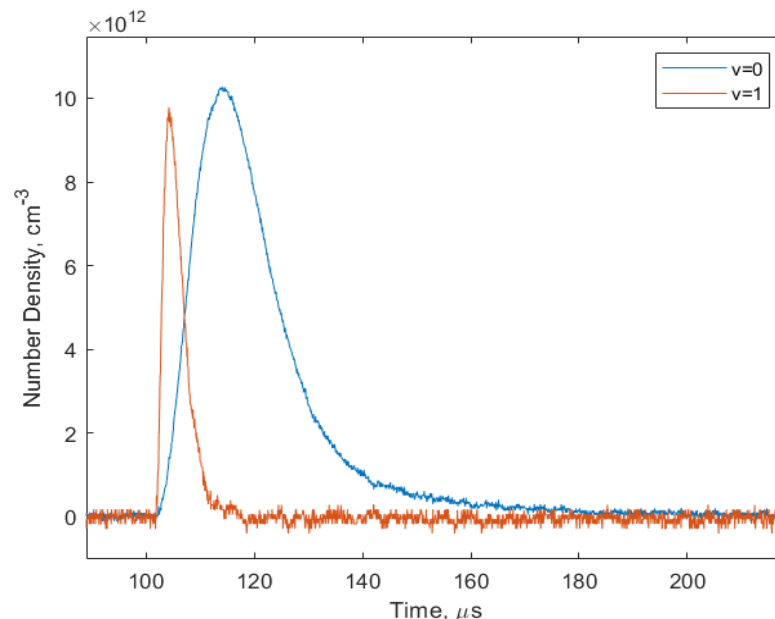


$N_2(A^3\Sigma_u^+,v=0,1)$ population in $N_2$-$CH_4$, 3kHz pulse rep. rate

*HIGHLIGHT*

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