Abstract Submitted
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Radiative electronic attachment to molecules of astrophysical interest[1] NICOLAS DOUGUET, University of California at Davis, VIATCHESLAV KOKOOULINE, University of Central Florida, SAMANTHA FONSECA DOS SANTOS, University of California at Davis, OLIVIER DULIEU, MAURICE RAOULT, Laboratoire Aimé Cotton, ANN OREL, University of California at Davis — We have developed a first-principles approach to study the process of radiative electron attachment (REA) to linear molecules of astrophysical interest $Mol + e^- \rightarrow Mol^- + \hbar\omega (Mol^- = C_nH^-, C_nN^-)$. The approach is based on accurate ab initio calculations of electronic bound and continuum states of the negative ion, obtained through the complex Kohn variational method. We present our benchmark calculation for the formation of the simplest observed ion CN^- by REA, as well as our preliminary results for the formation of C_3N^- and C_4H^- by REA. We calculated a low rate of 10^{-15}cm^3/s at 30 K for CN^- and rates about 20 time larger for C_3N^- and C_4H^- due to larger transition dipole moments. These two latter ions possess dipole states and we have also considered their potential role in the process of radiative electronic attachment. Finally, our results suggest that the negative molecular ions, recently observed in the interstellar medium, can hardly be formed by the process of radiative electron attachment.

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