

ELECTRON-MOLECULAR CATION COLLISIONS IN INTERSTELLAR SPACE

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In the interstellar medium, highly excited states of molecules can form a state of matter called Rydberg Matter. Mainly, they are formed by the promotion of an electron from the lower layers of the molecule to the highly excited ones. However, these can also be formed by temporarily capturing an electron in high energy orbitals following its collisions with cations. This paper focuses on the latter, the collisional approach, which is more suitable for explaining these highly excited states that can be found in this environment. It should be mentioned that in this environment cations are abundant and the probability of collision with electrons is high generating with high rates these highly excited states of the neutral called Rydberg states. It is found that low-energy electrons, such as those in the interstellar medium, generate these neutral capture states much more frequently. These results provide a quantitative description of Rydberg matter, which by its properties is a good candidate for dark matter. As a case study the molecular cation NS^+ is considered as a target for obtaining strongly excited states of neutral NS after collisions with low energy electrons.