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Spin depolarisation of N_2^+ ($^2\Sigma^+$) in collisions with ^3He and ^4He in a magnetic field THIERRY STOECKLIN, GRÉGOIRE GUILLON, ANATOLI VORONIN — The possibility of tuning the interactions between atoms and molecules ^[1] using a magnetic field has open new perspectives of controlling collisional energy transfer at very low temperature. In a first study dedicated to He-N_2^+ inelastic collisions we found that spin free collisions of N_2^+ with ^3He and ^4He exhibit a strong isotope effect in the ultra cold regime ^[2,3], and recently found a similar effect for another ionic system: the He-CH^+ ^[4]collision. In the present work, we compare first in the absence of an applied magnetic field the cross sections for the transitions changing the projection of the total angular momentum of $N_2^+(^2\Sigma)$ in collisions with ^3He and ^4He at very low collision energy^[5]. In the second part of this contribution we investigate the effect of an applied magnetic field and compare the results obtained for the fundamental states of the two nuclear spin isomers of N_2^+ . As a result of the different mechanisms of action of the spin rotation interaction for these two rotational levels we find a great difference of sensitivity to the applied magnetic field. Whereas even moderate values of the applied magnetic field (10 Gauss) completely modify the very low collision energy behaviour of the spin depolarisation cross section of the fundamental ortho level, we find that one has to apply magnetic fields two orders of magnitude larger to obtain similar effects for the fundamental para level.

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