# Suppression of Majorana Spin-Flip Losses in a Zeeman Decelerator

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Zeeman deceleration is an experimental technique which makes it possible to manipulate the velocity of open-shell atoms and molecules in a supersonic beam [1,2]. The method is based on the Zeeman interaction between paramagnetic particles and time-dependent, inhomogeneous magnetic fields generated by pulsing high currents through an array of solenoid coils.

Here, we present progress on the deceleration of hydrogen atoms in a 12-stage Zeeman decelerator that has been set up in Oxford. Results from previous Zeeman deceleration experiments [3] strongly suggest that nonadiabatic transitions, induced by a rapid reversal of the magnetic field direction, can lead to a significant loss of decelerated particles. Experiments to further quantify these effects are currently underway.

In the future, the Zeeman decelerator will be combined with other sources of cold ions and molecules [4] to study chemical collisions at low temperatures. The work will contribute towards the understanding of chemical reactivity in the low-temperature regime and it will provide fundamental tests for chemical reaction theories.

References:
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