

DSMC Simulations of Polarized Atomic Beam Sources Including Magnetic Fields

M. Gaisser^a, A. Nass^a, and H. Ströher^a

^a*Forschungszentrum Jülich, Leo-Brandt-Str.1, 52425 Jülich, Germany,
m.gaisser@fz-juelich.de*

In recent decades a lot of work has been done to understand and optimize the output of polarized atomic beam sources. However, there are many effects which prevent a complete analytic description of the system. Now, a DSMC (Direct Simulation Monte Carlo) simulation based on OpenFOAM 1.7.1 using Birds¹ algorithm is set up. So far, the simulated particles have been given spin and a generic utility to include arbitrary magnetic fields has been created. The equation of motion in every timestep is solved by a fourth order Runge-Kutta scheme. First results of the simulations are promising. Additionally a tool to measure the collision age has been created. Further effects to be included are recombination on the walls and spin exchange collisions. After that an algorithm will be included to optimize the output of the atomic beam source.

References

1. G. A. Bird, Molecular Gas Dynamics and the Direct Simulation of Gas Flows, Oxford Science Publications, 1998