**Elastic collisions**

In this project, you should analyse the elastic collisions of two particles.

Elastic collisions in one dimension are covered in all introductory mechanics courses. The results can "easily" be generalised to two or three dimensions. We will consider cases with one moving particle (called projectile) and one particle in rest (called target).

The relation between the energy transfer from the projectile to the target as a function of the scattering angle (i.e. the angle between the projectile velocity before and after the collision) can be found from the conversation of energy and momentum. Plot a figure illustrating this relation.

From now on assume that both particles are hard spheres. Simulate a number of projectiles with different impact parameters. (The impact parameter is the perpendicular distance between the path of the projectile and the centre of the target.) Plot the following:
   • The projectile scattering angle as function of the impact parameter.
   • The energy transfer from the projectile to the target as a function of the impact parameter.
   • The energy transfer as a function of the scattering angle.
   • The probabilities for the different scattering angles.

Further work could include the expansion to three dimensions and two moving particles. Which of the above mentioned figures would change?

Describe in your report your strategy to evaluate if your results are reasonable.

If you use any literature, don't forget to give references. If you include figures you did not create yourself, make sure you have the permission to do so.

The grading will be based on the quality of the code (minimum requirement is that it produces the plots mentioned above) and the report (minimum requirement is a presentation of the background or equations and a description of the methods you used to get the results).