HW assignment 9

Due Thu Apr 23 at the lecture.

Problem.

A beam of spineless nuclear particles of mass m and momentum p is directed along the z-axis. The particles collide with an aligned diatomic molecule but interact only with the nuclei of the molecule. If the nuclei are taken to be at $y = b$ and $y = -b$, and the constant a is positive, the interaction potential is given by

$$V(r) = a\delta(y - b)\delta(x)\delta(z) + a\delta(y + b)\delta(x)\delta(z)$$

Calculate the scattering amplitude and the differential cross section in the Born approximation