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Angular Momentum in Electron-Helium Collisions[1]

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The study of atomic ionization collisions provides crucial information about the interactions of charged particles, and helium has long been a target atom of interest due to its simple, but unique electronic structure. Recently, a growing body of work has focused on ionization collisions involving oriented targets, which can provide even greater detail about charged particle interactions. In particular, the use of oriented targets is ideal for the study of angular momentum in the collision process. Here we present theoretical results that examine the sources and role of angular momentum in ionizing collisions between electron projectiles and helium targets. In particular, we examine angular momentum transfer from the projectile electron to the ionized electron, as well as angular momentum within the target atom. We show that the amount of angular momentum transferred to the ionized electron can depend on the collision kinematics, as well as the collision process itself. We present both fully and double differential cross sections and show that both the projectile and target atom are sources of angular momentum.

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