Collisions

Collisions are a fundamental topic in physics that describe the interaction between two or more bodies when they come into contact, exerting forces on each other. These interactions can be classified into two primary categories: elastic and inelastic.

In an elastic collision, both momentum and kinetic energy are conserved. This means that the total momentum and total kinetic energy of the system before the collision are equal to the total momentum and total kinetic energy after the collision. Elastic collisions are typically exemplified by billiard balls striking one another, where they bounce off without any permanent deformation or generation of heat. The velocities of the colliding bodies can be calculated using conservation laws and are dependent on both the masses and the velocities of the objects involved.

In contrast, an inelastic collision is characterized by the conservation of momentum, but not kinetic energy. During an inelastic collision, some of the kinetic energy is transformed into other forms of energy, such as sound, heat, or energy required to deform the objects. A completely inelastic collision is a special case where the colliding objects stick together and move as a single entity afterward.

Physics describes these phenomena with precise mathematical relationships, employing both Newtonian mechanics for macroscopic objects and quantum mechanics for subatomic particle collisions. Understanding the principles governing collisions is crucial in multiple fields, from engineering safer vehicles to studying particle interactions in accelerators, illustrating the pervasive influence of physics in explaining the dynamics of our universe.