Physics Reference #04

Momentum (accurate)

$$p = \frac{m_0 v}{\sqrt{(1-(v/c)^2)}}$$

Momentum (approximate)

$$p = mv$$

Invariant Mass

$$m_0$$

Lorentz Factor

$$\gamma = \frac{1}{\sqrt{(1-(v/c)^2)}}$$

Center of Mass

$$r_{cm} = \frac{\sum m_i r_i}{\sum m_i}$$

Center of Mass

$$r_{cm} = \frac{\int x dm}{\int dm}$$

Density [in 3, 2, 1 dimension(s)]

$dm = \rho dV$, $dm = \sigma dA$, $dm = \lambda dL$

Elastic Collision

$$K_{\sum,Final} = K_{\sum,Initial}$$

1 >> 2 → 1 2 >>

Inelastic Collision

$$K_{\sum,Final} < K_{\sum,Initial}$$

1 >> 2 → 1 2 >

Perfectly Inelastic Collision

$$p_{1,Initial} + p_{2,Initial} = p_{Final} = v_F m_{\sum}$$

1 >> 2 → 1 2 >

Super Elastic

$$K_{\sum,Final} > K_{\sum,Initial}$$

1 >> 2 → 1 2 >>>

Angle of Movement after Collision (P. Inelastic)

$$\theta = \tan\text{-}1\left(\frac{m_2 v_{2i}}{m_1 v_{1i}}\right)$$

Velocity of Projectile used with a Ballistic Pendulum

$$v_b = \frac{m_b + M_b}{m_b}\sqrt{(2gH)}$$

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