

## [mex222] Relativistic mass

Two particles with equal masses  $m$  as measured when at rest are undergoing an inelastic collision as shown in the lab frame  $S$ . From the conservation of total momentum in frame  $S$  [mln63],

$$m(v)\mathbf{v} + m(0)\mathbf{0} = M(\bar{v})\bar{\mathbf{v}}, \quad v = \frac{2\bar{v}}{1 + \bar{v}^2/c^2},$$

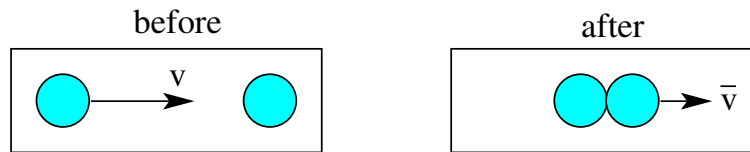
and the relation

$$m(v) + m(0) = M(\bar{v}),$$

between individual masses before the collision and compound mass after the collision [mex221], derive the expression

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

for the relativistic mass, where  $m_0 = m(0)$  is called the rest mass.



**Solution:**