**Figure 1:** Definition of the kinematical quantities relevant for the large-angle scattering experiment of Rutherford. The picture depicts the large-angle deviation due to a single atom. The impact parameter is $b$ (before the collision) and the resulting scattering angle is $\theta$. The position of the $\alpha$ particle along its trajectory is given by $(r, \alpha)$. The distance of closest approach is defined by $DCA$ along an axis $z'$.