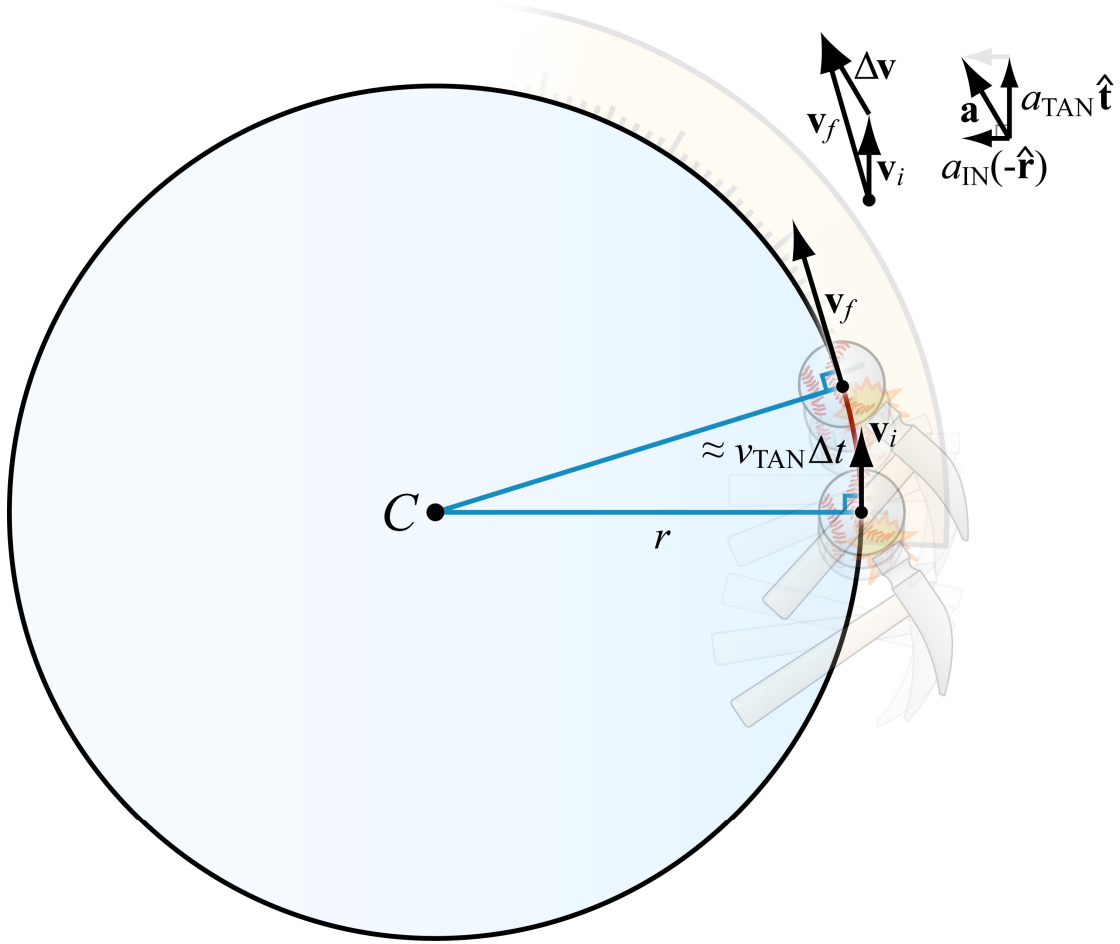
Uniform and non-uniform circular motion



U/CM Kinematics

r	radius
$c = 2\pi r$	circumference
T	period (lap time)
$f := \frac{1}{T}$	frequency $\quad [f] = \frac{1}{\text{s}} = \text{Hz}$
$\omega = 2\pi f$	angular frequency
$v_{\text{TAN}} = \frac{c}{T} = \frac{2\pi r}{T}$	tangential speed
$a_{\text{IN}} = \frac{v_{\text{TAN}}^2}{r}$	inward (centripetal) acceleration
$a_{\text{TAN}} = \frac{\text{d}v_{\text{TAN}}}{\text{d}t}$	tangential acceleration

$$\vec{\mathbf{a}} = a_{\text{IN}}(-\hat{\mathbf{r}}) + a_{\text{TAN}}\hat{\mathbf{t}}$$

U/CM Dynamics

$\Sigma F_{\text{IN}} = ma_{\text{IN}}$	**net** of inward (centripetal) force components

$$\Sigma\vec{\mathbf{F}} = m[a_{\text{IN}}(-\hat{\mathbf{r}}) + a_{\text{TAN}}\hat{\mathbf{t}}]$$