1. 推导 $I = \left[\frac{b_0}{4\sin^2(\theta/2)}\right]^2$.

$F = \frac{q_1 q_2}{4\pi\varepsilon_0 r^2}$, $F_\perp = \frac{q_1 q_2}{4\pi\varepsilon_0 r^2}\sin\theta'$

$\rightarrow dV_\perp = \frac{F_\perp}{m}dt = \frac{q_1 q_2 \sin\theta'}{4\pi\varepsilon_0 m r^2}dt$.

$L = mr^2\frac{d\theta'}{dt} = mv_0 b$

$\rightarrow dV_\perp = \frac{q_1 q_2 \sin\theta'}{4\pi\varepsilon_0 m v_0 b}d\theta$.

取 $\frac{\theta}{2}$分量: $V_{\perp\infty} = v_0 \sin\theta$

$\rightarrow v_0 \sin\theta = \int_\pi^\theta \frac{q_1 q_2}{4\pi\varepsilon_0 m v_0 b}\sin\theta' d\theta' = \frac{q_1 q_2}{4\pi\varepsilon_0 m v_0 b}(1+\cos\theta)$

$\rightarrow b = \frac{q_1 q_2}{4\pi\varepsilon_0 m v_0^2}\cot\theta$.   最接近: $\frac{1}{2}mv_0^2 = \frac{q_1 q_2}{4\pi\varepsilon_0 b_0} \rightarrow b_0 = \frac{q_1 q_2}{2\pi\varepsilon_0 m v_0^2}$

$= \frac{b_0}{2}\cot\theta$.

$I = \frac{d\sigma}{d\Omega} = \frac{b}{\sin\theta}\left|\frac{db}{d\theta}\right| = \frac{\frac{1}{2}\frac{\cos\frac{\theta}{2}}{\sin\frac{\theta}{2}}b_0}{2\sin\frac{\theta}{2}\cos\frac{\theta}{2}} \cdot \frac{b_0}{2}\frac{-\frac{1}{2}}{\sin^2\frac{\theta}{2}} = \left(\frac{b_0}{4\sin^2\frac{\theta}{2}}\right)^2$