**Homework #5**
**Due 7 October 2003**

1.      **Show that**

$$d\sigma = \frac{-\pi \cdot a_{TF}^{2}}{2} \cdot \frac{f(\sqrt{t})}{\sqrt{t^{3}}} \cdot dt$$

**Can be written in the form:**

$$d\sigma = \frac{\pi \cdot a^{2}}{2} \cdot \frac{\sqrt{T_{M}}}{\varepsilon} \cdot \frac{f(\sqrt{t})}{\sqrt{T^{3}}} \cdot dT$$

2.      **For $M_1 < M_2$ (He on Si), $M_1 = M_2$ (Si on Si) and $M_1 > M_2$ (Xe on Si), calculate the values of the dimensionless collision parameter t, the center of mass scattering angle $\theta_c$, and the laboratory scattering angle $\theta$ for values of $T/T_m$ = 0.25, 0.5, and 0.75.  Assume an incident particle energy of 100keV in all cases.**

3.      **Calculate the velocity v, the Thomas-Fermi (Firsov) screening length $a_{TF}$, the universal screening length $a_U$ and the reduced energy $\varepsilon$ for 1, 10, and 100 keV Ar ions ($Z_1$ = 18, $M_1$ = 40) incident on Cu ($Z_2$ = 29, $M_2$ = 64).**

4.      **Calculate the nuclear stopping cross section and $dE/dx|_n$ for Cu in Ni for $\varepsilon$ = 0.1 and $\varepsilon$ = 1.**