

Electric Dipole in Uniform Electric Field



- Electric dipole moment: $\vec{p} = q\vec{L}$
- Torque exerted by electric field: $\vec{\tau} = \vec{p} \times \vec{E}$
- Potential energy: $U = -\vec{p} \cdot \vec{E}$

$$U(\theta) = - \int_{\pi/2}^{\theta} \tau(\theta) d\theta = pE \int_{\pi/2}^{\theta} \sin \theta d\theta = -pE \cos \theta$$

Note: $\tau(\theta)$ and $d\theta$ have opposite sign.

