

Inductance of a Solenoid



- A : cross-sectional area
- ℓ : length
- n : number of turns per unit length
- $N = n\ell$: total number of turns
- $B = \mu_0 nI$: magnetic field inside solenoid
- $\Phi_B = BA$: magnetic flux through each turn
- $\Rightarrow$ Inductance of solenoid: $L \equiv \frac{N\Phi_B}{I} = \mu_0 n^2 A \ell$

