

Monday Reading Assessment: Unit 4, Sources of Magnetic Fields

Prof. Jordan C. Hanson

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1 Memory Bank

- $\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{\text{enc}}$... Ampère's Law
- $\vec{B} = \mu_0 (N/L) I_{\text{enc}} \hat{z}$... Solenoid B-field.

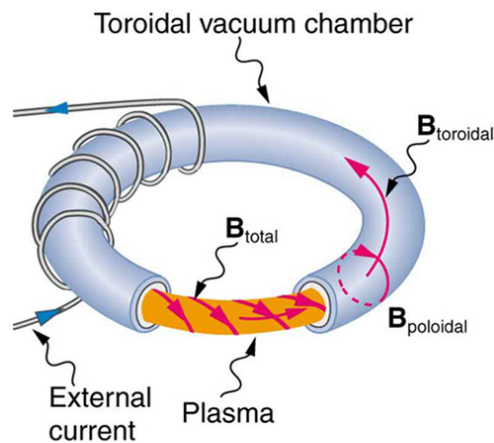


Figure 1: The B-field of a wire surrounding a current-carrying wire.

2 Solenoids and Toroids

1. What is the B-field inside a solenoid with 1000 turns per meter, carrying a current of 10 A?
2. Consider Fig. 1. Suppose the current is 10 Amps, and the number of turns per meter is 1000. If the radius of the toroid in Fig. 1 is 2 meters, what is the toroidal B-field inside of it?
3. Suppose plasma is trapped inside the toroid, and has an effective current of 0.1 Amp. What is the *poloidal* field that results from this current, at a distance of 0.5 m from the center of the plasma, corresponding to the radius of the pipe?