

# PHYS 1444 – Section 501

## Lecture #17

*Wednesday, Mar. 29, 2006*

*Dr. Jaehoon Yu*

- Solenoid and Toroidal Magnetic Field
- Biot-Savart Law
- Magnetic Materials
- $B$  in Magnetic Materials
- Hysteresis

Today's homework is #9, due 7pm, Thursday, Apr. 13!!

Wednesday, Mar. 29, 2006



PHYS 1444-501, Spring 2006  
Dr. Jaehoon Yu

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# Announcements

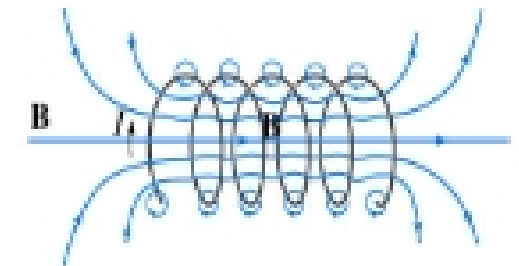
- Reading assignments
  - CH28 – 7, 28 – 8, 28 – 9 and 28 – 10
- Two Colloquia you must attend
  - Dr. H. Weerts, director of High Energy Physics Division at Argonne National Laboratory
    - Friday, Apr. 21
    - International Linear Collider: The Physics and Its Challenges
  - Dr. I. Hinchcliff, Lorentz Berkley Laboratory
    - Wednesday, Apr. 26
    - Title: Early Physics with ATLAS at the LHC
- Term exam #2
  - Date and time: 5:30 – 6:50pm, Wednesday, Apr. 5
  - Location: SH103
  - Coverage: Ch. 25 – 4 to Ch. 28



# Solenoid and Its Magnetic Field

- What is a solenoid?

- A long coil of wire consisting of many loops
- If the space between loops are wide

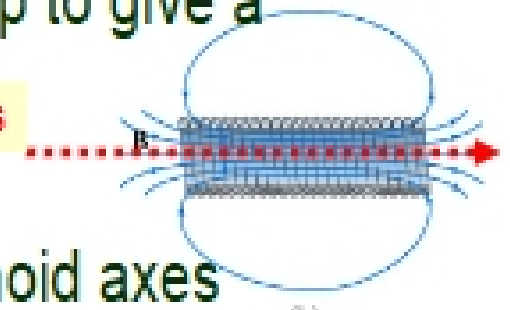


- The field near the wires are nearly circular
- Between any two wires, the fields due to each loop cancel
- Toward the center of the solenoid, the fields add up to give a field that can be fairly large and uniform

- For a long, densely packed loops

- The field is nearly uniform and parallel to the solenoid axes within the entire cross section
- The field outside the solenoid is very small compared to the field inside, except the ends

Solenoid Axis



- The same number of field lines spread out to an open space

