

# PHYS 1444 – Section 003

## Lecture #22

*Wednesday, Nov. 23, 2005*

*Dr. Jaehoon Yu*

- Achievements of Maxwell's Equations
- Extension of Ampere's Law
- Gauss' Law of Magnetism
- Maxwell's Equations
- Production of Electromagnetic Waves



# Announcements

- Quiz results
  - Average: 61.2
    - Previous averages: 71 and 54
  - Top score: 80
- Final term exam
  - Time: 11am – 12:30pm, Monday Dec. 5
  - Location: SH103
  - Covers: 29.3 – which ever chapter we finish next, Wednesday, Nov. 30
  - Please do not miss the exam
  - Two best of the three exams will be used for your grades



# Maxwell's Equations

- The development of EM theory by Oersted, Ampere and others was not done in terms of EM fields
  - The idea of fields was introduced somewhat by Faraday
- Scottish physicist James C. Maxwell unified all the phenomena of electricity and magnetism in one theory with only four equations (Maxwell's Equations) using the concept of fields
  - This theory provided the prediction of EM waves
  - As important as Newton's law since it provides dynamics in electromagnetism
  - This theory is also in agreement with Einstein's special relativity
- The biggest achievement of 19<sup>th</sup> century electromagnetic theory is the prediction and experimental verification that the electromagnetic waves can travel through the empty space
  - What do you think this accomplishment did?
    - Open a new world of communication
    - It also yielded the prediction that the light is an EM wave
- Since all of Electromagnetism is contained in the four Maxwell's equations, this is considered as one of the greatest achievements of human intellect

