

**Topic List for Exam #4  
(not exhaustive)**

**Tuesday, April 29, 2008  
exam to be held in room HS 366**

- special relativity
  - historical development/background – Michelson-Morley, Galilean transformation
  - postulates of relativity
  - reference frames, clock synchronization, operational definition of simultaneity
  - relativity of simultaneity, length contraction, time dilation
  - relativistic momentum, energy-mass equivalence
  - event reporting, Lorentz transformation
- electromagnetic waves
  - Maxwell-Ampere law, displacement current
  - Maxwell's equations, em waves & their mathematical description
  - energy, energy density, intensity, Poynting vector
  - momentum, radiation pressure
  - em wave production & detection
  - polarization, polaroids
  - scattering – oscillator model, polarization by scattering, Rayleigh scattering
- light theories
  - wave theory & corpuscular theory
    - models for specific behaviors – rays, reflection, refraction, etc.
  - Foucault's experiment
- geometric optics
  - ray, reflection, refraction – Snell's law
  - mirrors and image formation
    - plane mirror, spherical mirror – sign conventions

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