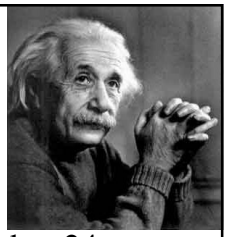

Monday, September 24

Thorne pgs.: Ch. 6-7

Agenda

- Announce:
  - Read up to (and including) Ch. 10 by Thursday
  - Test one week from Thursday
- Discuss Movie so far
- Ch. 6
- Ch. 7

Movie Part I

- Faraday came up with magnetic field lines
- Saw electricity and magnetism unified
- Though light was made of electromagnetic waves
- Maxwell came "translated" Faraday's work into the "Maxwell Equations"
- These equations showed that em waves *had* to move at the same speed observed for light!
- Faraday/Maxwell ←→Einstein/(Minkowski,Riemann,etc)

Ch. 6—Beginning of acceptance

- Wheeler:
  - Objected that at center of BH matter might be able to transmute and leak out
  - Thought black holes ideal arena in which to study interface of gravity and quantum
  - Came up w/ name "Black Hole"
- Oppenheimer & Snyder found equations for a spherical, pressureless, uniform stellar collapse
  - Showed star surface experiences nothing spectacular at "Schwarzschild singularity"
  - External observers observe freezing at critical surface
- Connection between bomb work and stellar death
- Resolution of strangeness of critical circumference
  - Finkelstein's coordinates…both right
- Difference between dark star and BH

Ch. 7—Black Hole Properties

- Kip's Hoop Conjecture:
  - Massive enough stars much collapse
  - Cylindrical magnetic configuration cannot
- No Hair Conjecture:
  - "Irregularities" (distortions from sphere, magnetic fields) are radiated away
  - Only a few conserved properties describe BHs
  - "The black holes of nature are the most perfect macroscopic objects there are in the universe"—Chandrasekhar…Why are they so?
- Perturbation Methods
- Charged holes (Reisnner-Nordstrom Solution)
  - Electric field lines sticking out radially
- Rotating Black Holes (Kerr Solution)
  - Rotate spacetime itself near horizon
  - Bulges appear
  - Maximum spin rate