B2
Symmetry and Relativity
Lecture 1

Outline

- Books and links
- Symmetry
- Overall lecture scheme

- Please remind your tutors that the problem sets have been re-ordered!

Books and links

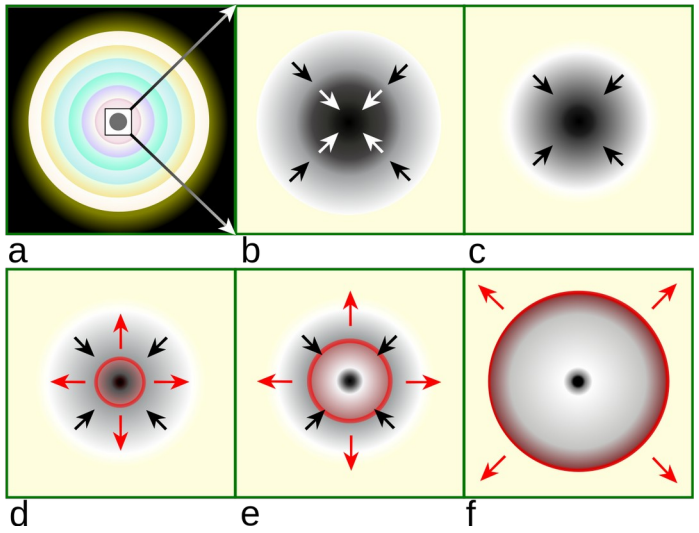
- AM Steane, *Relativity Made Relatively Easy* (OUP, 2012)
  - Main text for the course, by the original lecturer
- JD Jackson, *Classical Electrodynamics*
- Oxford lecture notes, especially AM Steane, CWP Palmer, S Balbus, J Binney
- Canvas
  - Lecture notes: being revised, weeks 1-2 up so far
  - Brief lecture notes: the least you need to know
  - Problem sets
  - Old lecture notes with detailed derivations

Overall scheme

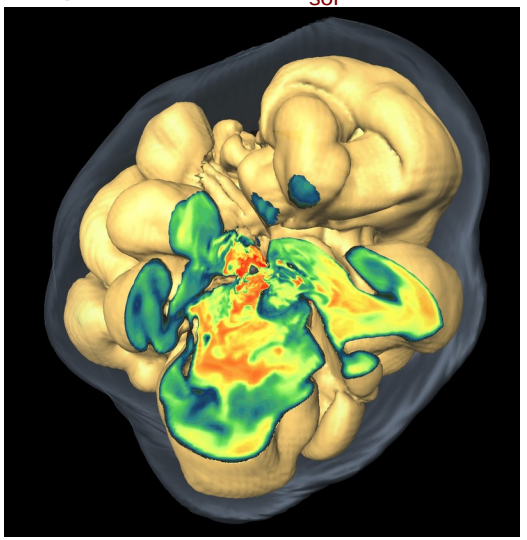
- Vectors, tensors, and groups (weeks 1-2)
  - Mathematical forms, symmetry
- Lorentz transformations (weeks 3)
- Mechanics (weeks 4-5)
- Electromagnetism (weeks 6-7)
- Radiation (week 8)

Dimensional reduction

- 3D phenomena with spherical symmetry
  - Transformation: 3D rotations
  - Sometimes symmetry is only approximate



3D simulation of core-collapse supernova, $15M_{sol}$, 0.5s



By Illustration by R.J. Hall. Redrawn in Inkscape by Magasjukur2 - File:Core collapse scenario.png, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=12779311

Leonhard Scheck, MPA, 2007;
see Woolsey, Janka, Nature Physics 1 (2005) 147.
https://wwwmpa.mpa-garching.mpg.de/ccsnarchive/