Galactic and intergalactic magnetic fields

Summer term 2010

Lecture Outline

1. Introduction
   - Magnetism, physical quantities
   - History, observational evidence

2. Radiation processes
   - Free-free radiation
   - Synchrotron radiation
   - Inverse-Compton radiation
   - Spinning dust grains

3. Diagnostics
   - Optical polarisation
   - Synchrotron radiation
   - Faraday rotation
   - Zeeman effect
   - Polarised dust emission

4. Milky Way
   - Diffuse ISM
   - Molecular clouds and star-forming regions
   - Supernova remnants
   - Acceleration of cosmic rays
   - UHECR

5. External galaxies
   - Spiral galaxies
   - Dwarf irregular galaxies
   - Elliptical galaxies
   - CR containment
   - Galactic dynamo

6. Active Galactic Nuclei
   - The AGN zoo
   - Radio galaxies
   - Quasars
   - Seyfert galaxies
   - Origin of magnetic fields

7. Intergalactic magnetic fields
   - Clusters of galaxies
   - Radio halos
   - Rotations measures
   - Radio relics
   - Mini-halos
   - Inverse-Compton emission
   - Magnetisation of the IGM

8. Cosmological magnetic fields