

## HIGH ENERGY ASTROPHYSICS

- Cosmic Rays
- Sources of High Energy Radiation: pulsars, supernova remnants, X-ray binaries, active galactic nuclei, gamma ray bursts
- Radiative transfer
- Radiation from relativistically moving sources (superluminal motion, Doppler boosting)
- Photon-photon absorption (cross section, optical depth, gamma-ray absorption in relativistically moving sources: the need for a large Doppler factor)
- Synchrotron radiation (radiative losses, radiation spectrum, synchrotron self-absorption, astrophysical applications)
- Curvature radiation (radiative losses, astrophysical applications)
- Inverse Compton scattering (radiative losses, Thomson and Klein Nishina limits, SSC mechanism, Comptonization in thermal plasma, astrophysical applications)
- Bremsstrahlung (thermal and relativistic, astrophysical applications)
- High energy proton interactions (proton-proton, proton-photon, astrophysical applications).
- Particle acceleration (first and second order Fermi acceleration)
- Kinetic equations (basic principles, solution techniques, astrophysical applications)