

Major Option C1: Astrophysics

Advanced Stellar Evolution

Dr Ph. Podsiadlowski

(www-astro.physics.ox.ac.uk/~podsi/lec_c1_mt04.html)

DWB (NAPL), Room 702,
Tel.: (2)73343
email: podsi@astro.ox.ac.uk

Lecture schedule (Approximate)

- 1/2) The evolution of massive stars; supernovae: explosion mechanisms, classification, supernova lightcurves, supernova kicks, Type Ia supernovae and their use as cosmological candles
- 2/3) The formation of compact objects; neutron stars and black holes, radio pulsars, millisecond pulsars (Reference: [Black Holes, White Dwarfs and Neutron Stars; Shapiro & Teukolsky](#))
- 4) Hypernovae and gamma-ray bursts; history and observations; the fireball model, the progenitors of gamma-ray bursts
- 5) Compact binaries: the formation of compact binaries (dynamical mass transfer, common-envelope evolution), the Eddington limit, Roche-lobe overflow and wind accretion, accretion onto black holes
- 6) Classification of X-ray binaries, the origin of binary and single millisecond pulsars; black-hole binaries and X-ray transients, micro-quasars, ultraluminous X-ray sources in external galaxies
- 7) The origin of elements: summary of nucleosynthesis in the big bang and in stars, the s- and r-process, explosive nucleosynthesis, Fe production, unsolved problems
- 8/9) Star formation: observations; molecular clouds and gravitational collapse (Jeans instability), pre-main-sequence evolution; simulations of star formation: in clusters, binary formation, the first stars, planet formation