Stellar Evolution

Star formation, giant molecular clouds. How long it takes a star to collapse under gravity. Process of star formation; cloud fragmentation, Collapse to a protostar, heating up. Star formation efficiency. Evolutionary track in the H-R diagram. T Tauri stars, the onset of nuclear fusion. Brown dwarfs. Eddington Luminosity. Zero age main sequence. Circumstellar disks, protostellar jets. Initial mass function.

Main sequence lifetimes. Internal structures of high and low mass stars. Phases in the life of a low mass star. Degeneracy pressure. Triple alpha process. Temperatures for nuclear fusion of different fuels. Planetary nebulae, white dwarfs, black dwarfs. Phases in the life of a high mass star. CNO cycle. Nucleosynthesis in the cores of high mass stars. Collapse of the core when fuel runs out. Neutronization. Supernovae.

Stellar Evolution *(continued)*

Stellar corpses: white dwarfs. Chandrasekhar limit. Size – mass relationship for white dwarfs. Gravitational redshift. Novae. Two types of supernovae. Supernova remnants.

Neutron stars. Neutron degeneracy pressure. Pulsars. Emission of light from pulsars. The Lighthouse model. Pulsar spindown. Accretion disks, X-ray binaries. Pulsars speeding up.

Black holes. Event horizon, Schwartzchild radius. Distorted space-time. Tidal forces. Time dilation. Detecting black holes through accretion disks.