ADVANCED STELLAR EVOLUTION

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Teaching staff

Name Surname: Maria Letizia Piera PUMO

Email: marialetizia.pumo@unict.it

Office: Department of Physics and Astronomy "Ettore Majorana" - room 358 (*Cittadella universitaria*, Building 6) or Catania Astrophysical Observatory - room 88

Reception hours: by appointment via email

Program of the course:

1. Introduction: general view of the research field, equations of stellar evolution and numerical techniques (brief overview), regimes of the stellar evolution and transition masses;

2. Stellar evolution (and associated nucleosynthesis) as a function of the initial stellar mass: low- and intermediate-mass stars (brief overview), so-called Super-AGB stars, massive stars (brief overview);

3. Supernovae from Super-AGB and massive stars: electron-capture supernovae, iron-core-collapse supernovae, post-explosive evolution of the ejected material and its modelling (analytical functions and scaling relations, semi-analytic approaches, and fully radiation-hydrodynamical models);

4. Selected current issues: convective overshooting in stellar evolution, supernovae progenitors, peculiar explosive events, artificial intelligence methodologies for characterizing supernova events, electromagnetic counterparts of gravitational wave sources.

Bibliography:

[-] Kippenhahn R. & Weigert A., 1990, Stellar Structure and Evolution, Springer-Verlag

[-] Herwig F., 2005, Annu. Rev. Astron. Astrophys., 43, 435

[-] Woosley S.E., Heger A., Weaver T.A., 2002, Rev. Mod. Phys., 74, 1015

[-] Lecture notes by the teacher (provided in PDF format)

P.S. Other research papers will be suggested to cover specific topics.