

## Laurea Specialistica in Scienze Fisiche

a.a. 2006-2007

Astrofisica II

Titolare: Prof. S.Shore

### Programma.

Appunti delle lezioni

N.B.: Astrofisica I is not a pre-requisite for this course, no previous background to astrophysics will be assumed. Lectures will (with apologies) be in English. The purpose of the course is to introduce you to fundamental radiative and fluid processes in cosmic environments.

Radiative processes (e.g. continuum and line formation, opacity, scattering processes); radiative transfer and radiative equilibrium; plasma processes and radiative coupling to cosmic plasmas, equations of statistical equilibrium, spectral taxonomy (to connect with ideas of classification), (abundance determination, plasma diagnostics)

Hydrodynamics and MHD of astrophysical relevance -- equations of motion, vorticity and rotation, accretion in disks and from winds, binary star phenomena, shocks, winds, a range of classical and astrophysical instabilities (convection, Rayleigh-Taylor, Kelvin-Helmholtz, MRI, etc), comparisons with observations

Possible additional topics include Radiation by high energy particles (synchrotron, inverse Compton scattering, gyrosynchrotron) Acceleration processes related to cosmic hydrodynamics

Environments to be surveyed along the way will include nova and supernova ejecta; mass accreting systems in binaries and active galaxies; interstellar medium.

Some suggested readings: Carroll, B. W. and Ostlie, D. A. 1996, An introduction to Modern Astrophysics (Reading: Addison-Wesley)

Landau, L. and Lifshitz, E. M., 1987, Fluid Mechanics, 2nd Ed. (Oxford: Pergamon)

Mihalas, D. and Mihalas B., 2000, Foundations of Radiation Hydrodynamics (NY: Dover Books)

Shore, S. N. 1992, An Introduction to Astrophysical Hydrodynamics (San Diego: Academic Press) (second edition, Astrophysical Hydrodynamics, An Introduction, 2007 VCH/Wiley)

Shore, S. N. 2003, The Tapestry of Modern Astrophysics (NJ: J. Wiley)

Shu, F. H. 1992, The Physics of Astrophysics (vol.s 1, 2) (Sacramento: Univ. Science Books)

Readings from Ann. Rev. Fluid Mech., Ann. Rev. Astron. Ap., Rev. Mod. Phys., J. Fluid Mech., J. Quantitative Spectr. Radiative Transfer, among others, will be involved; papers and reviews will be used for dis