Corso di Laurea Specialistica in Scienze Fisiche
a.a. 2004-2005
Cosmologia e Astrofisica Galattica
Titolare: Prof.Steve Shore

Programma.

Three sessions per week, two hours per session (but some additional time may be needed during the semester by arrangements)

FIRST MEETING: 14/02/2005 10:00 Aula T1

Some of the basic topics:

1. Interstellar Medium (and intergalactic medium)

Basic radiative and dynamical processes affecting low density gas, effects of self-gravitation, thermal and gravitational instabilities, magnetic fields.

2. Structure and Dynamics of galaxies

Equations of stellar hydrodynamics, galactic rotation curves, structure of galaxies (ellipticals, spirals, irregular), tidal interactions, active galactic nuclei (AGNs), galaxy evolution.

3. Clusters of galaxies

X-ray emission processes, evidence for dark matter, gravitational lensing, evolution of galaxies in clusters.

4. Cosmological kinematics and observational calibrations

Redshift, Hubble expansion law, distance scale, funmdamental observational parameters, K-correction and evolution corrections.

5. Relativistic physical cosmology

Friedmann-Robertson-Walker (FRW) metric and prediction of expansion, equation of state, cosmic background radiation (COBE, Boomerang, WMAP), larege scale structure formation and evolution, re-ionization and the Gunn-Peterson effect, Sunyaev-Zeldovich effect, Sachs-Wolff effect.

6. Inflation and Dark Matter

Basic properties of all inflationary models, the cosmological constant, dark matter searches.

NB: Although Astrofisica 1,2 are NOT required, the notes are available on the website (astro.df.unipi.it/SAA) and some background will be assumed. Lectures will be in (Italglish) English.

NOTES: There will be a lecture set available after each lecture covering the material of the lectures and extending the material. You will be expected to read through your notes and come with questions during the sessions.

Some suggested readings (monographs):

Peacock, J. A. 1999, Cosmological Physics (Cambridge: Cambridge Univ. Press)

Peebles, P. J. E. 1993, Principles of Physical Cosmology (Princeton: Princeton Univ. Press)

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

(Mainly Chapters 7 and 8, although some material from Ch. 6 will be used -- ISM)

Weinberg, S. 1972, Gravitation and Cosmology (NY: J. Wiley)

Required readings: papers and reviews in situ

Exercises will be give in lecture for additional background including analysis of cosmologically interesting observational data.