



DIPARTIMENTO DI FISICA
UNIVERSITÀ DI PISA
CORSO DI DOTTORATO

AVVISO

Prof. Masataka Fukugita

(Univ. of Tokyo and Inst. Adv. Study, Princeton)

Terrà un ciclo di lezioni
nell'ambito del corso di Dottorato di Ricerca in Fisica su:

"Introduction to Astrophysical Cosmology"

Presso la Sala Seminari (al I piano dell' edificio C)
Dipartimento di Fisica E. Fermi - via F. Buonarroti 2

con il seguente calendario:

Venerdi 20/09/02 - ore 15-17; Lunedì 23/09/02 - ore 11-13
Martedì 24/09/02 - ore 11-13; Mercoledì 25/09/02 - ore 11-12(Seminar)
Giovedì 26/09/02 ore 11-13; Lunedì 30/09/02 - ore 15-16;
Lunedì 17.00 (Colloquio Galileiano)
Martedì 1/10/02 - ore 15.30-16.30(Seminar)

ABSTRACT

In a series of lectures, I am going to show Physical Cosmology, starting from an elementary level, with special emphasis given to the interface of theory and observation. I will organise the lectures in a way to show derivations of the fundamental equations as much as time permitting, rather than just to show an overview of the results like a picture show. I do not assume that the audience have any knowledge of cosmology, or astronomy. The requirement is the knowledge of elementary physics, especially of statistical physics and fluid dynamics, and elementary knowledge of general relativity.

"Introduction to Astrophysical Cosmology"

(M. Fukugita)

PROGRAMMA DELLE LEZIONI

- 1. Elements of Cosmology** - elements of cosmology from a somewhat higher viewpoint.
Cosmological assumption, Robertson-Walker metric, Friedmann-Lemaitre equations
MD universe, Lemaitre's coasting, de Sitter universe



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- 2. Elements of Cosmology II:** connexion to observational cosmology.
World geometry and observational quantities, observational cosmology: galaxy number counts, luminosity functions, horizons
- 3. The early universe**
Evolution of the radiation dominated universe, thermal history, primordial nucleosynthesis, observational determination of 4-He and D, baryon abundance in the universe, constraints on exotic particles
Thomson optical depth
- 4. Gravitational lensing**
Elements of lensing, isothermal distribution, cosmological tests, microlensing – MACHO, shear and convergence, weak lensing
- 5. (Seminar) Cosmological Parameters and Dark Matter: The State of the Research**
Hubble constant; matter density; cosmological constant, dark matter, anthropic considerations
- 6. Gravitational instability: linear theory**
Peculiar velocity field, correlation functions, characterisation of large-scale structure, non-linear collapse, N-body simulation, Press-Schechter theory, evolution of clusters
- 7. CMB anisotropies**
Relativistic perturbation theory, Sachs-Wolfe effect, acoustic peaks, determination of cosmological parameters
- 8. (Seminar) Structure Formation in the Universe:**
Formation and evolution of clusters of galaxies and galaxies