ASTROPHYSICAL NUCLEOSYNTHESIS

A.A. 2004/2005 SEM II (24 ore)

DOTTORATO/FISICA

First session Giov. 17/3/2005, once per week, 3 hrs

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1. Constraints on models and what is to be explained -- abundances of the elements: solar system (meteoritic, planetary atmospheres), stellar (stellar atmospheres), and interstellar and intergalactic determinations

2. Basic reaction theory for astrophysical processes (quick review)

3. Equlibrium stellar nucleosynthesis: overview of stellar interiors and processes emphasizing equlibrium nuclear reactions and energy generation, turbulent transport and mixing mechanisms, mass loss mechanisms, binary star evolution

4. Non-equilibrium processes: proton processes -- rp-process, explosive nucleosynthesis (XR novae, classical novae), accretion processing and symbiotic stars, non-equilibrium CNO and origin of peculiar light element abundances

5. Non-equilibrium processes: neutron processes -- s-process, r-process; supernova nucleosynthesis, processes in late stages of stellar evolution

6. URCA and lepton processes in stellar interiors

7. Chemical evolution of galaxies in the universe

8. Cosomological nucleosynthesis

Suggested readings: these will be described at the time abnd there will be material handed out and recommended during the lectures.