**D. Nadyozhin (ITEP, Moscow)**

**"Nuclear Astrophysics (stellar nucleosynthesis)"**

Lecture 1 (an introductory overview)
Nuclear processes in stars and the origin of chemical elements

Content: Cosmic abundances of chemical elements.
The main nuclear processes in stars:
hydrogen burning, helium burning,
\alpha-process,
nuclear statistical equilibrium (e-process),
slow neutron capture (s-process),
rapid neutron capture (r-process).
The observational evidences of nucleosynthesis in stars: discovery of radioactive Tc in red supergiants, enhanced abundances of C,N,O isotopes in spectra of some stars, Wolf-Rayet stars, novae, supernovae.

Lecture 2 The hydrogen and helium burning in stars

Content: Detailed description of reactions in the pp-chain and CNO-cycle. The resolving of solar neutrino problem. The resonant nature of 3\alpha reaction and the origin of C12. The role of C12(\alpha,\gamma)O16 reaction. Hot CNO-cycle. Production of Ne,Na,Mg, and of radioactive Al26.

Lecture 3 The explosive nucleosynthesis in supernovae.
The role of weak interaction (beta-processes) in stellar evolution and nucleosynthesis.

Content: The acceleration of final stages of stellar evolution owing to the losses of energy by neutrino emission. A brief description of supernova mechanisms (thermonuclear explosion with total disruption of the star and gravitational collapse of stellar core into a neutron star or a black hole). Production of radioactive Ni56. Neutrino nucleosynthesis. Theoretical predictions of the nuclear yields for supernovae.