

ATOMIC AND MOLECULAR RADIATION PHYSICS: ASTRONOMY TO BIOMEDICINE

Prof. Anil K. Pradhan and Prof. Sultana Nahar (Ohio State Univ., USA), Under the US-India Fulbright Programme

- 4 Week Lecture Course, February 10 - March 8, 2013
- Time: 3-5 PM, Days: M,T,W
- Venue: Dept. of Physics and Astrophysics, University of Delhi
- Textbook: “Atomic Astrophysics and Spectroscopy”

Anil K. Pradhan and Sultana N. Nahar (Cambridge, 2011)

Week 1 (Feb 10,11,12): AMO Physics and the Universe

- i) Light and Matter
- ii) Plasma Sources
- iii) Particle and Photon Distributions
- iv) Atomic Structure: Hydrogenic and Non-hydrogenic Spectra

Week 2 (Feb 17,18,19): Theory and Computational Laboratory

- i) Multi-electron Systems
- ii) Hartree-Fock Approximation
- iii) Dirac Equation and Breit-Pauli Approximation

Week 3 (Feb 24,25,26): Atomic Processes

- i) Radiative Transitions
- ii) Excitation and Ionization
- iii) Photoionization and Recombination
- iv) Coupled Channel Approximation: R-Matrix Method

Week 4 (Mar 3,4,5): Applications

- i) Opacity Project, Iron Project, Databases
- ii) High-Energy-Density Fusion and Laser Plasmas
- iii) Molecular Structure and Spectra
- iv) Nanophysics and Biomedicine

