

Condensed course:

”Atomic Spectroscopy of Collisional and Radiative Processes in Astrophysical Plasmas”

With Computational Workshop: R-matrix Codes & SUPERSTRUCTURE

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• Under the partnership of *Obama-Singh 21st Century Knowledge Initiative Award Project* between Ohio State & Aligarh Muslim Universities

• 3 Weeks Lecture Course: February 20 - March 11, 2016

• Textbook: ”Atomic Astrophysics and Spectroscopy”

-By A.K. Pradhan and S.N. Nahar (Cambridge University Press, 2011)

• Computation: the Ohio Supercomputer Center (OSC)

• Time and Venue: TBA, Dept of Physics, Aligarh Muslim University

SYLLABUS

Week 1 (Feb 20 - 26, 2016): *Plasma, Atomic Structure, Computational Workshop*

i) Light and Matter

ii) Plasma Sources

iii) Particle and Photon Distributions

iv) Atomic Structure: Hydrogenic & Non-Hydrogenic Spectra

v) Computational Workshop: SUPERSTRUCTURE

Week 2 (Feb 27 - Mar 4): *Structure, Radiative and Collisional Atomic Processes, Computational Workshop*

i) Hartee-Fock, Dirac, Breit-Pauli Approximations

ii) Radiative Transitions

iii) Computational Workshop: SUPERSTRUCTURE

iv) Atomic Process in Plasmas - Electron-Impact Excitation,

v) Photoionization, Electron-Ion Recombination

vi) Close-Coupling Approximation and R-matrix Method

vii) Computational Workshop: R-matrix

Week 3 (Mar 5 - 11): *Collision Process, Computational Workshop, Exam, Certificate*

i) Electron-Impact Excitation

ii) Computational Workshop: R-matrix Calculations

iv) Exam

v) Future Directions and Certificate ceremony