

Indian Institute of Technology, Kanpur

Proposal for a New Course

1. Course No: SPA 635
2. Course Title: Study of compact objects using real space data (Astrosat) 3. Lectures per week: 0 (L), Tutorial: 01(T), Laboratory: 1 (P), Additional hours: (0-2): 0 (A)
Credits ($1*L+0*T+3P+0*A$): 05 Duration of Course: Full Semester
4. Proposing Department: SPASE
5. Proposing Instructors: J. S. Yadav and P. K. Jain
6. Course Description

(A) Objectives:

Compact binraies (blackhole and neutron star X-ray binaries) use most efficient energy producing mechanism namely accretion. It produces very high temperature in the inner accretion disk and emits in X-ray. LAXPC instrument onboard Astrosat provides X-ray data best suited to study accretion flow in X-ray binaries. Student will use data of LAXPC instrument. It will introduce the basic principles and techniques like; good or bad data and data selection, data analysis, instrument background, generating light curves, Power Density Spectrum (PDS), Energy spectrum. Using this data, Students will drive basic physical properties of the black hole and Neutron star X-ray binaries like temperature, inner disk radii, source energy spectrum state: soft or hard, spectrum timing properties, thermonuclear burst, Neutron star spin frequency, flux variation and others.

(B) Contents (preferably in the form of 5 to 10 broad titles): No. of

No. Of	Lectures	Practical lab classes
S. No Broad Title Topics		
1. Data Acquisition	Data download, Data type; good or bad selection, factors that affect data quality and the data levels	spectrum of a neutron star binary. Testing various spectral models. Thermonuclear bursts, Neutron star spin frequency, amount of matter between observer and the galactic or extragalactic sources and absorption column density. Timing spectrum (PDS), fitting timing spectra, and low and Khz Quasi-periodic oscillations (QPOs).
2. Data analysis	Selecting the data, understanding of space instrument used, satellite orbit details, instrument background, generating lightcurves, data intervals and over all data quality	1 2 3 3
3. The physical properties of the source using actual space instrument data	Soft energy spectrum of a black hole binary source, Hard energy spectrum of a black hole binary source, Soft energy	

