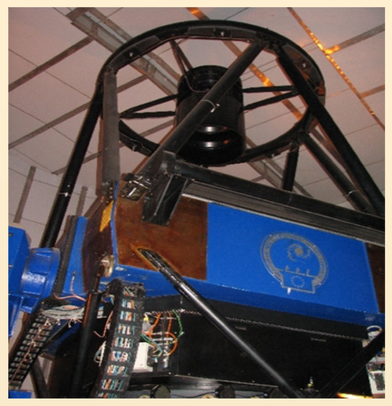
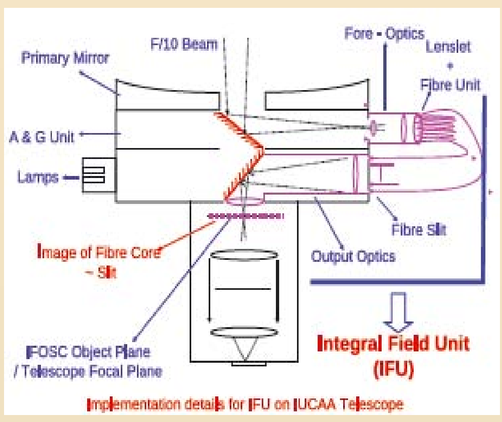
IGO DISCOVERIES



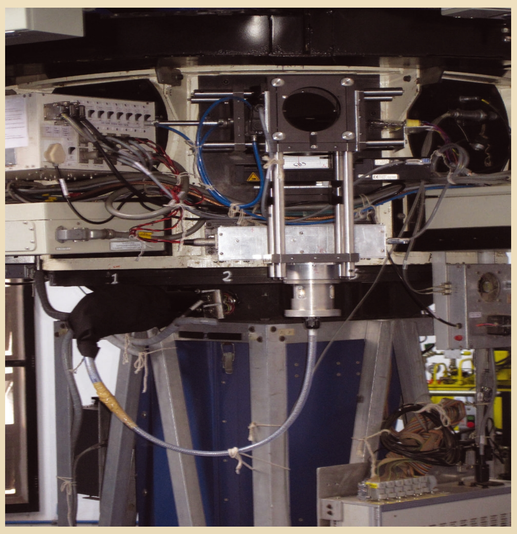
Design and development of an optical-fibre-based Integral Field Unit (IFU) on the IUCAA 2-m telescope

Mudit K. Srivastava, *A. N. Ramaprakash, Hillol K. Das, Mahesh P. Burse,* Pravin A. Chordia, Abhay A. Kohok and Chaitanya V. Rajarshi

An optical-fibre-based Integral Field Unit (IFU) has been developed for IUCAA Faint Object Spectrometer and Camera (IFOSC), the main back-end instrument on the IUCAA 2-m telescope at Girawal. This IFU enables IFOSC to perform two-dimensional spectroscopy of extended astronomical objects and is being used as one of the modes of IFOSC.



Schematics showing the implementation details for FIFUI as a side-port instrument on the IUCAA telescope. The fore-optics of FIFUI is mounted on a side port of the telescope to accept the telescope beam. The fibre slit is terminated at the wall of the calibration unit and is re-imaged on the IFOSC's slit/object plane by the output optics.

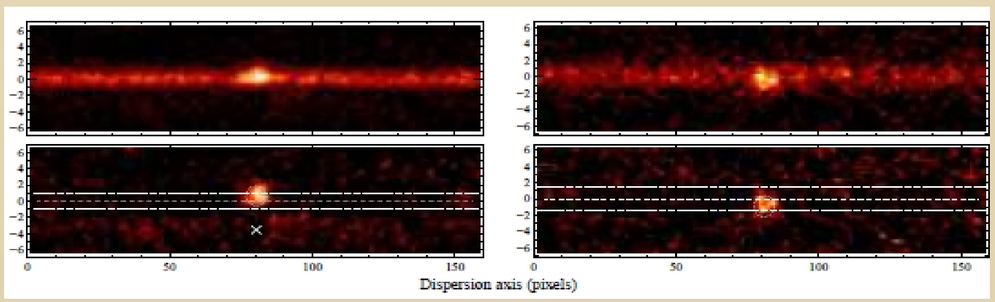


FIFUI installed on the telescope side port. FIFUI's front mechanical unit is shown, along with fibre units. The front mechanical unit provides a mechanical interface between the fore optics and the telescope. The foreoptics components are housed within and it also consists of calibration lamps for FIFUI's calibration.

Quasars probing intermediate redshift star-forming galaxies

P. Noterdaeme, R. Srianand and V. Mohan

Absorption lines seen in the spectra of distant QSOs are luminosity unbiased tracers of galaxies in between us and the QSO. Knowing the location of absorption lines in the QSO spectrum one will be able to detect the galaxy responsible for the absorption. Using IGO spectroscopy it is possible to trace such distant galaxies. One such example is given below.

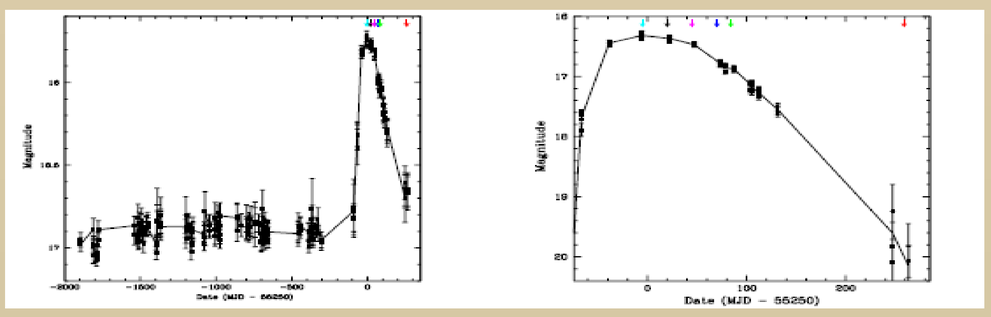


The background-subtracted 2D spectra of the quasar SDSS J113108+202151 and the galaxy at *zgal = 0.56. Top: Total (quasar+galaxy) spectra* obtained with two slit orientations (left: P1, 10 degrees from North; right: P2, 92 degrees from North, see Fig. 10). Bottom: Same spectra after removing the quasar trace. The centre of the quasar trace is represented by the horizontal dashed lines, and its FWHM by the horizontal dotted lines.

THE DISCOVERY AND NATURE OF OPTICAL TRANSIENT CSS100217:102913+404220

A.J. Drake, S.G. Djorgovski, A. Mahabal, J. Anderson, R. Roy, V. Mohan, S. Ravindranath,D. Frail, S. Gezari, James D. Neill, L.C. Ho, J.L. Prieto, D. Thompson, J. Thorstensen,M. Wagner, R. Kowalski, J. Chiang, J.E. Grove, F.K. Schinzel, D.L. Wood, L. Carrasco,E. Recillas, L. Kewley, K.N. Archana, Aritra Basu, Yogesh Wadadekar, Brijesh Kumar,A.D. Myers, E.S. Phinney, R. Williams, M.J. Graham, M. Catelan, E. Beshore, S. Larson,and E. Christensen

A extremely luminous optical transient CSS100217:102913+404220 was discovery at a redshift of 0.147.

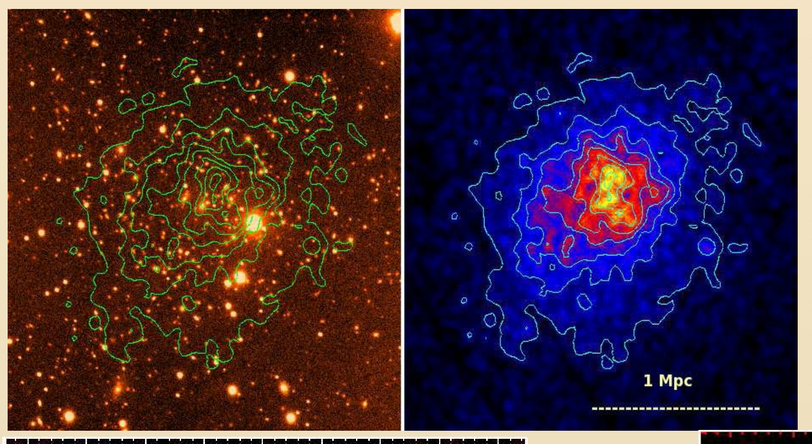


The VCSS lightcurves of CSS100217 taken with the 0.7m Catalina Schmidt telescope with respect to Modified Julian Date and maximum light. Left: the full CSS light curve covering host and event. Right: the event light curve after subtracting the galaxy flux. The dates at which the IGO, P200, APO, MDM, and Keck follow-up spectra were observed are marked with arrows.

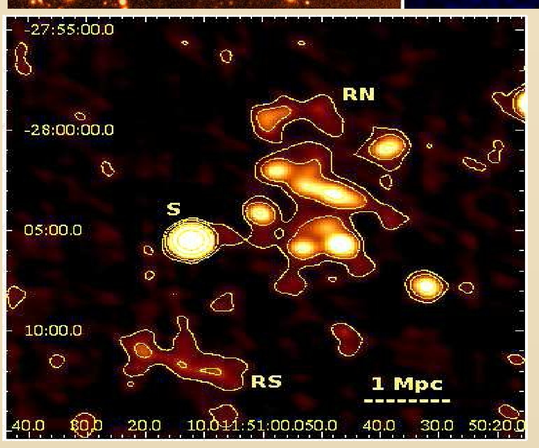
DISCOVERY OF THE FIRST GIANT DOUBLE RADIO RELIC IN A GALAXY CLUSTER FOUND IN THE PLANCK SUNYAEV-ZEL'DOVICH CLUSTER SURVEY: PLCK G287.0+32.9

Joydeep Bagchi, S. K. Sirothia, Norbert Werner, Mahadev B. Pandge, Nimisha G. Kantharia, C.H. Ishwara-Chandra, Gopal-Krishna, Surajit Paul and Santosh Joshi

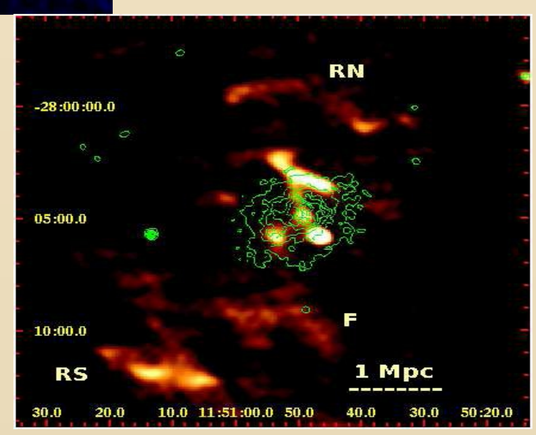
The discovery of large-scale diffuse non-thermal radio emission in PLCK G287.0+32.9, an exceptionally hot (T 13 keV), massive, and luminous galaxy cluster, strongly detected by the Planck satellite in a recent, all-sky blind search for new clusters through Sunyaev–Zel'dovich effect. Optical imaging with the IUCAA 2m telescope and XMM-Newton X-ray data confirm a very rich galaxy cluster with a morphologically disturbed core region, suggesting a dynamically perturbed merging system.



Left: deep R-band image taken with the 2m telescope of IUCAA. The FOV is 7 arcmin on each side (2.2 Mpc). X-ray contours are from XMM-Newton (0.3 - 10 keV, MOS1/2, and PN detectors, binned and smoothed). Right: the same X-ray image is shown along with iso-contours.



Radio image from VLA 1.4 GHz NVSS at 45″ FWHM resolution. Contours are logarithmically spaced between 0.9 to 60.0 mJy beam−1 and the noise rms is 0.45 mJy beam−1. The pair of peripheral radio relics are marked RN and RS.

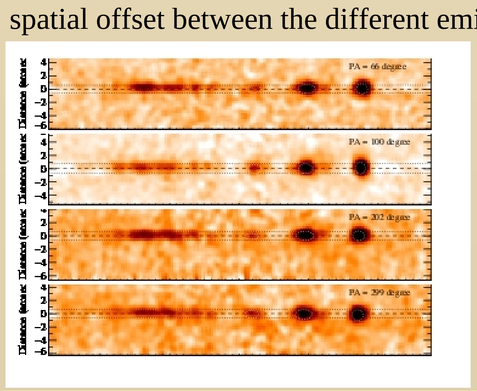


GMRT 150 MHz radio map of the cluster (orange-yellow, beam FWHM 36.84″ x 28.58″ in 47.6◦ P.A.).Superposed are the XMM-Newton X-ray emission contours (green) in 0.3-10 keV energy range. A pair of giant radio relics at the cluster periphery are marked RN and RS

SDSS J092712.64+294344.0: recoiling blackhole or merging galaxies?

Vivek, M.; Srianand, R.; Noterdaeme, P.; Mohan, V.; Kuriakosde, V. C.

SDSS J092712+294344 is a peculiar AGN with three sets of emission lines. Several models like recoiling black hole, binary black holes and merging galaxies are proposed to explain the observations. Based on the observations at IGO, Vivek et al. measured the acceleration and spatial offset between the different emitting regions and ruled out the binary black hole model.



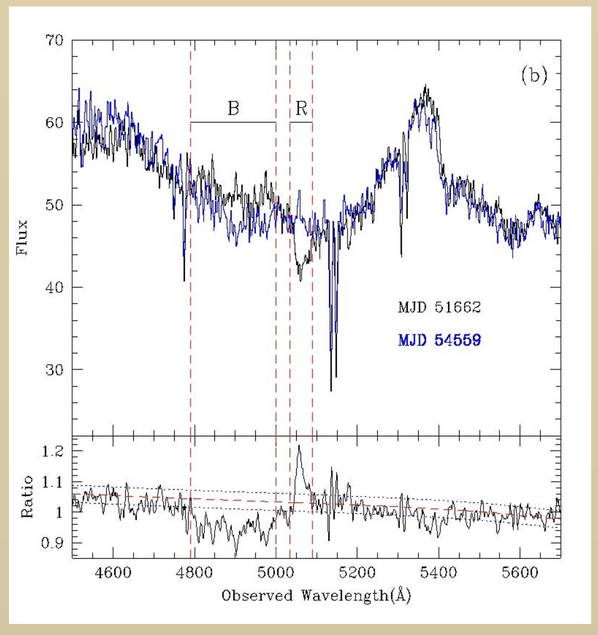
Top 4 panels give 2D spectra of J0927+2943, in the Hβand O iii region, after subtraction of the QSO continuum

Dynamically evolving Mg II broad absorption line flow in SDSS J133356.02+001229.1

Vivek, M.; Srianand, R.; Mahabal, A.; Kuriakose, V. C.

Absorption line variability studies are useful for understanding the physical conditions and dynamics of gas close to the AGN central engine.

Vivek et al. reported the first discovery of a dynamically evolving low ionization broad absorption line flow in the QSO SDSS J133356.02+001229.1 using the observations at IGO. The broad Mg II absorption line visible in the earlier SDSS spectra is seen to have completely disappeared in the IGO spectra and a new Mg II component emerged. The variations are attributed to the motion of the clouds across the line of sight. The correlation between the flux of the QSO and the Mg II column density suggests a possible ejection mechanisms triggered by the changes in the accretion disk.



The spectra of SDSS J1333+0012 obtained at different epochs are shown.