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NCRA•TIFR, Pune

Annual Report

2007–08

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Research Contributions

Sun & Solar Wind

LFVN VLBI observations using S2 recording system: The results of two sessions of observations at the Low-Frequency VLBI Network (LFVN), carried out in 1999 (INTAS99.4) and 2000 (INTAS00.3) at a wavelength of 18 cm using the S2 recording system and processed using the correlator system in Penticton, Canada have been presented. In different configurations of the experiments on studying the solar wind and active galactic nuclei, the antennas at the following sites were employed: Medvezhji Ozera (RT-64, Special Engineering Bureau of Moscow Power Engineering Institute, Russia), Pushchino (RT-22, Pushchino Radio Astronomy Observatory, Russia), Hartebeesthoek (RT-25, South Africa), Noto (RT-32, Italy), Shanghai (RT-25, China), Pune (RT-45, India), Svetloe (RT-32, Institute of Applied Astronomy RAS, Russia). The work resulted in successful testing of the method of radio probing of the solar-wind plasma by radiation of extragalactic sources, supplemented with the method of radio interferometric reception. We present and discuss the retrieved images of STA-102 quasar and the BL Lacertae object 1418+546 with millisecond angular resolution.

[S. Ananthakrishnan with Gavrilenko, V. G.; Nechaeva, M. B.; Pushkarev, A. B.; Molotov, I. E.; Tuccari, G.; Chebotarev, A. S.; Gorshenkov, Yu. N.; Samodurov, V. A.; Hong, X.; Quick, J.; Dougherty, S.]

CME Propagation Characteristics: The relationships are explored among three coronal mass ejections (CMEs), observed on 28 Oct 2003, 7 Nov 2004, and 20 Jan 2005, the type II burst-associated shock waves in the corona and solar wind, as well as the arrival of their related shock waves and magnetic clouds at 1 AU. Using six different coronal/interplanetary density models, the speeds of shocks are calculated from the frequency drifts observed in metric and decametric radio wave data.

[P.K. Manoharan with Pohjolainen, S.; van Driel-Gesztelyi, L.; Culhane, J. L.; Elliott, H. A.]

Magnetic Reconnection of a Flare-Associated Coronal Mass Ejection: The evolution of an X2.7 solar flare, that occurred in a complex ß γ δ magnetic configuration region on 3 November 2003 is discussed by utilizing a multi-wavelength data set. The very first signature of pre-flare coronal activity is observed in radio wavelengths as a type III burst that occurred several minutes prior to the flare signature in Hα. This type III burst is followed by the appearance of a loop-top source in hard X-ray (HXR) images

obtained from RHESSI. During the main phase of the event, Hα images observed from ARIES solar tower telescope, Nainital, reveal well-defined footpoint (FP) and loop-top (LT) sources. The evolution of LT and FP sources is consistent with the reconnection models of solar flares. The results also contain evidence for breakout reconnection before the flare phase.
[P.K. Manoharan with Joshi, Bhuwan; Veronig, Astrid M.; Pant, P.; Pandey, Kavita]

North-South Asymmetry of Solar Activity during Cycle 23: A statistical analysis is made of solar Hα flares that occurred during the period 1996 to 2005 to investigate their spatial distribution with respect to northern and southern hemispheres of the Sun. The analysis includes a total of 21608 single events. The study shows a significant N-S asymmetry which is persistent with the evolution of the solar cycle. We also find that in terms of asymmetric behavior of solar flares, cycle 23 seems to act quite differently from cycle 22 but comparably to cycle 21.
[P.K. Manoharan with Joshi, B.; Pant, P.; Pandey, K.]

Study of CME transit speeds for the event of 07-NOV-2004: Several methods for CME speed estimation are discussed. These include velocity derivation based on the frequency drifts observed in metric and decametric radio wave data using a range of coronal density models. We discuss the application of some of these methods to the transit to Earth of a complex CME that originated earlier than 16:54 U.T. on 07-NOV-2004. The difficulties in making velocity estimates from radio observations, particularly under disturbed coronal conditions, are highlighted.
[P.K. Manoharan with Culhane, J. L.; Pohjolainen, S.; van Driel-Gesztelyi, L.; Elliott, H. A.]

Electron acceleration in a post-flare decimetric continuum source: A high brightness temperature (~10^9 K) post-flare source is imaged at 1060 MHz with GMRT. The information from these images and the dynamic spectrum from the Hiraiso spectrograph is used together with the theoretical method described in Subramanian & Becker to calculate the power input to the electron acceleration process. It is found that the power input to the non-thermal electrons is in the range 3×10^{25}–10^{26} erg/s.
[S. Ananthakrishnan with Subramanian, P. White, S. Karlický, M.; Sych, R.; Sawant, H. S.]

Solar Wind Turbulence in the near-Sun Region: An attempt has been made to probe the strong scattering regime of the solar wind, within the solar offset of ~50$R_\odot$, to understand the turbulence caused by the density irregularities and various coronal processes in the near-Sun region. Ooty measurements on different compact radio sources (of angular size <25 mas) provide the shape and scale-size of the turbulence. This study clearly

indicates that the scintillation at these distances is dominated by the plasma irregularities of size close to and greater than the Fresnel scale.
[P.K. Manoharan]

Interplanetary manifestations of Coronal Mass Ejections associated with AR696: The interplanetary consequences and propagation characteristics of 7 full halo and 5 partial halo coronal mass ejections (CMEs) have been investigated using white-light images from the LASCO instrument on-board SOHO spacecraft and interplanetary scintillation (IPS) images from the Ooty Radio Telescope, supplemented with data from other space missions and ground-based observatories. These events originated in the longitude range of ±45°, between 3 and 10 November 2004, at the active region AR696. The study suggests that the strong magnetic field of the coronal hole can deflect the magnetic cloud associated with the CME, which in turn vary the intensity of the geo-effectiveness.
[P.K. Manoharan, K. Mahalakshmi, and K. Prabhu, and P. Revathi].

Effects of GLE Associated CMEs in the Inner Heliosphere: Interplanetary effects of intense flares/coronal mass ejections (CMEs), which are associated with ground level enhancements (GLE) of cosmic ray at the Earth have been investigated. Ooty measurements indicate that these CME events: (1) produce significantly enhanced level of turbulence in the inner heliosphere, (2) decelerate rapidly with heliospheric distance, and (3) produce intense shock at 1AU. Further, Ooty measurements provide the shape of the density turbulence spectrum associated with the propagating CME.
[P.K. Manoharan and G. Agalya].

Solar Wind Interaction and Geoeffectiveness: In an attempt to quantify the relationship between the severity of geomagnetic storm and propagation characteristics of coronal mass ejections (CMEs), 59 intense geo-storms events associated with halo CMEs of solar cycle 23 have been investigated using scintillation measurements from Ooty. These results suggest that the energy exerted/deposited by the CME in the sheath portion of the shock (i.e., the required dynamic pressure) has been provided by the expansion of the magnetic flux rope embedded in the CME.
[P.K. Manoharan, K. Mahalakshmi, K. Prabhu, and P. Revathi].

Our Galaxy

Age constraints in the double pulsar system J0737-3039: We investigate the age constraints that can be placed on the double pulsar system using models for the spin-down of the first-born 22.7-ms Pulsar A and the 2.77-s Pulsar B with characteristic ages of 210 and 50 Myr, respectively. Standard models assuming dipolar spin-down of both pulsars suggest that the time since the formation of Pulsar B is ~50 Myr, that is, close to Pulsar B's

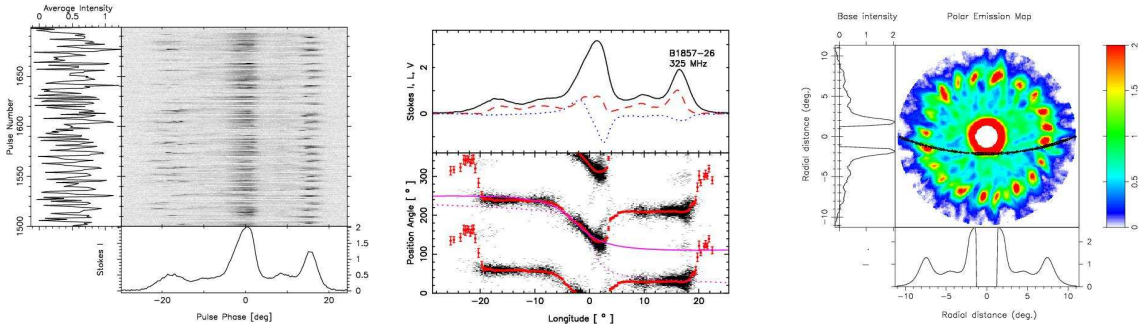
characteristic age. However, adopting models which account for the impact of Pulsar A's relativistic wind on Pulsar B's spin-down, we find that the formation of Pulsar B took place either 80 or 180 Myr ago, depending on the interaction mechanism. Formation 80 Myr ago, closer to Pulsar B's characteristic age, would result in the contribution from J0737-3039 to the inferred coalescence rates for double neutron star binaries increasing by 40 per cent. The 180 Myr age is closer to Pulsar A's characteristic age and would be consistent with the most recent estimates of the coalescence rate.
[B.C. Joshi with Lorimer, D. R.; Freire, P. C. C.; Stairs, I. H.; Kramer, M.; McLaughlin, M. A.; Burgay, M.; Thorsett, S. E.; Dewey, R. J.; Lyne, A. G.; Manchester, R. N.; D'Amico, N.; Possenti, A.]

**Are `Partial Cones' Aberrated Cones?:** `Partial cones' are classified as pulsars where the steepest gradient (SG) of the polarization-position angle (PPA) traverse lies towards one edge of the pulse profile. Here we present single pulse polarimetric observations of various `partial cones' observed with the GMRT and the Arecibo Observatory. We find several interesting emission properties for this class of pulsars: (a) in some cases we find sudden flarings where the dimmer part of the pulse profile becomes brighter; (b) We see evidence for drifting, signifying that the emission from this pulsar is possibly centered around the magnetic axis; and (c) the SG of the PPA tends to be towards the trailing edge of the profile. We conclude that the emission properties of partial cones are consistent with the relativistic beaming model of BCW, where the lagging PA traverse with respect to the total intensity profile is a natural prediction of the model.
[Dipanjan Mitra and S. Sarala with Rankin, Joanna M.]

Exploring the Absolute Orthogonal Polarization-Mode Geometry of Outer-Edge Conal Emission: Although orthogonal polarization mode (OPM) emission has been detected in most pulsars, heretofore no means has been available to fix its absolute direction. Were we thus able to distinguish the OPM orientation, one or the other could be associated with the O or X propagation mode and the implications explored physically. We expand on these various circumstances and show how they can be applied in practice.
[Dipanjan Mitra with Rankin, Joanna M.]

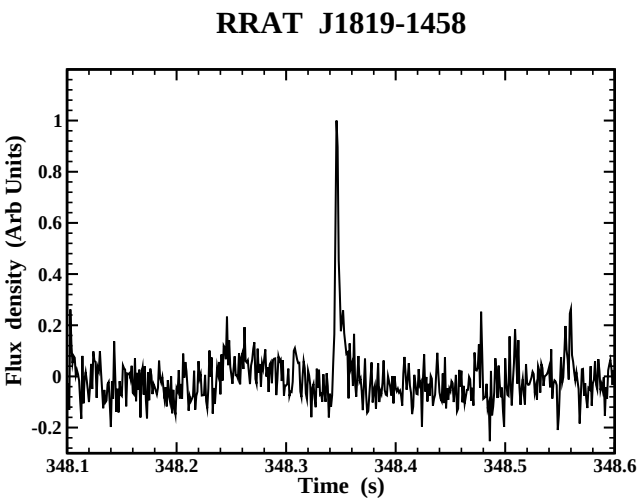
Multifrequency integrated profiles of pulsars: We have observed a total of 67 pulsars at five frequencies ranging from 243 to 3100 MHz. Observations at the lower frequencies were made at the GMRT and those at higher frequencies at the Parkes Telescope in Australia. We present profiles from 34 of the sample with the best signal-to-noise ratio and the least scattering. The general `rules' of pulsar profiles are seen in the data; we hypothesize that the location of pulsar emission within the magnetosphere evolves with time as the pulsar spins down.
[Dipanjan Mitra and Yashwant Gupta with Johnston, Simon; Karastergiou, Aris.]

Subpulse Modulation and Carousal Circulation Time of PSR B1857-26: New GMRT observations of the five-component pulsar B1857-26 provide insight into its pulse-sequence modulation phenomena. The outer conal components exhibit a 7.4-rotation-period longitude-stationary modulation. Several lines of evidence indicate a carousel circulation time of about 147 stellar rotations, characteristic of a pattern with 20 beamlets.
[Dipanjan Mitra with Rankin, Joanna M.]



The leftmost panel shows a sequence of the pulsar B1857−26 observed with GMRT at 325 MHz. The pulsar shows regular longitude stationary amplitude modulation. The middle panel shows the position angle histogram of the pulsar. The upper panels show the aggregate total power, total linear and circular polarisation and the lower panel gives the polarization-angle (PA). The PA values are plotted twice for clarity, and the two curves indicate negative-going RVM fits to the PA traverse. One RVM fit (dotted curve) assumes that both sides of the profile represent the PPM and, clearly, it fails to describe the >180□ extent of this apparent PA rotation. A second RVM fit assumes that different OPMs predominate in the leading and trailing parts of the profile. The longitude origin is taken near the zero-crossing point of the antisymmetric Stokes *V* signature. The rightmost panel shows the carousal model of the pulsar where around 20 sparks rotate in a roughly regular pattern around the polar cap.

The effect of pulse profile evolution on pulsar dispersion measure: We describe extensive simulations to investigate the effect of pulse profile evolution on pulsar DM estimates. We find that it is only for asymmetric pulse shapes that the DM estimate is significantly affected due to profile evolution with frequency. Using multifrequency data sets, we have carried out systematic analyses of PSR B0329+54, PSR B1642−03 and PSR B1133+16. We show that in such a case, amplitude of the observed DM variations can be attributed to profile evolution with frequency. We suggest that genuine DM variations with frequency could arise due to propagation effects through the interstellar medium and/or the pulsar magnetosphere.
[Dipanjan Mitra and Y. Gupta with Ahuja, A. L.]



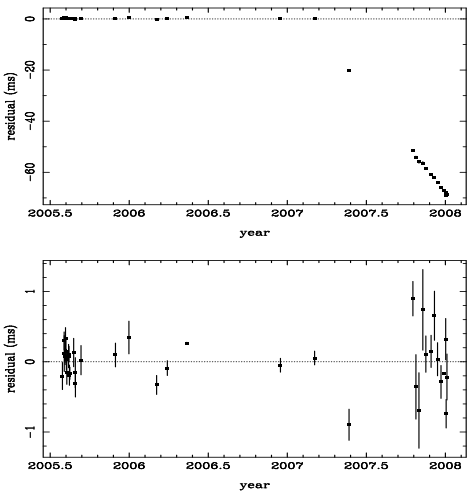
A strong burst from RRAT J1819-1458 observed using GMRT at 1 GHz

Observations of Rotating Radio Transients: Rotating Radio Transients (RRATs) are a newly discovered class of transient radio sources, which exhibit single dispersed bursts having durations between 2 and 30 ms, spaced by intervals ranging between 4 min to 3 hours. Although RRATs are believed to be associated with other classes of isolated neutron stars observed at X-ray and γ–ray wavelengths, their exact nature is still debatable. Simultaneous multi-frequency observations of three RRATs were carried out using GMRT this year. Strong bursts from J18199–1458 were detected at 1GHz, but lower frequency observations indicate large scattering of bursts and probably a flatter spectrum providing both a useful probe of inter-stellar medium and a constraint on the emission mechanism for RRATs.

[B. C. Joshi and V Gajjar with M. McLaughlin, D. Lorimer, M. Burgay , A. Possenti]

Search for radio emission from the X-ray Dim Isolated Neutron Stars: Seven of the nearby isolated neutron stars, distinguished by a blackbody-like spectrum and lack of associated binary companion or supernova remnant, are known as "Magnificent Seven" or X-ray dim isolated neutron stars (XDINSs). Six show clear X-ray pulsations, but no radio detection has been reported for most sources except two where weak radio pulsation at 111 MHz was reported. A deep search for pulsation or transient behaviour using GMRT at 341 MHz was carried out last year. These observations set an upper limit of 1 mJy on the flux density for these pulsars, which together with the flux density measurements at 111 MHz suggests a very steep spectrum (alpha –3.5), unusual for normal radio pulsars, and imply a radio emission mechanism different from normal pulsars as well as RRATs.

[B. C. Joshi with M. Burgay, A. Possenti, S. B. Popov, R. Turolla]



TOA residuals for J1833-1034 from Jul 2005 to Jan 2008 from GMRT observations at 610 MHz; top panel shows residuals obtained after fitting the first 8 months of data, clearly illustrating the occurence of the glitch at ~2007.2; bottom panel shows residuals after fitting the entire data stretch, including a model for the glitch; best fit glitch model yeilds a fractional change in rotational frequency (F) of 3 x 10-9, and a negligible change in dF/dt; the best determination of the epoch of the glitch is MJD 54164.250640; a significant second derivative is also part of the model fit, both before and after the glitch.

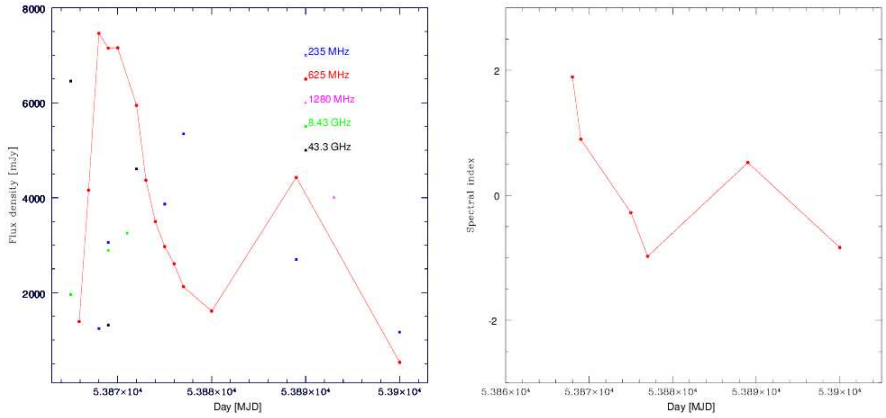
Orbital parameters of binary pulsars: We present a simple method for determination of the orbital parameters of binary pulsars, using data on the pulsar period at multiple observing epochs. We demonstrate the technique on (a) the highly eccentric binary pulsar PSR J0514–4002 (the first known pulsar in the globular cluster NGC 1851) and (b) 47 Tuc T, a binary pulsar with a nearly circular orbit. Our result agrees with the earlier determination of the orbital parameters of the binary pulsars.

[Bhaswati Bhattacharyya and Rajaram Nityananda]

Timing of pulsars: New results were obtained from over 2 years of timing data for the young pulsar J1833–1034 in the supernova remnant G21.5–0.9. This pulsar was discovered with the GMRT in 2005 and has been regularly

timed with the GMRT at 610 MHz. The timing data from around March to April 2007 show clear evidence for the occurrence of a timing glitch in this pulsar. Our best fit model for the glitch yields a fractional change in rotation frequency ($\delta f/f$) of 3×10^{-9}.
[Jayanta Roy and Yashwant Gupta, with W. Lewandowski]

RXTE observation of 2S 1553-542: RXTE PCA has observed the transient X-ray pulsar 2S 1553-542, almost every day, from 6th January 2008, after Swift/BAT detected an increased activity from it. The fitted flux between 2 and 10 keV is varying between 9.6276e–10 ergs/cm^2/s and 2.2155e–09 ergs/ cm^2/s excepting on 9th Jan 2008 (Observation Id 93426-01-02-03) when the flux was found to be 3.4483e–09 ergs/cm^2/s.
[Sabyasachi Pal with Pahari, Mayukh]



Study of the single pulse properties of PSR B0818–41: We report the discovery of a remarkable subpulse drift pattern at 325 MHz: simultaneous occurrence of three drift regions with two different drift rates: an inner region with steeper apparent drift rate flanked on each side by a region of slower apparent drift rate. The closely spaced drift bands always maintain a constant phase relationship. We also report somewhat different subpulse drifting at 244 and 610 MHz. We interpret the unique drift pattern of this pulsar as being created by the intersection of our line of sight (LOS) with two conal rings on the polar cap of a fairly aligned rotator.
[Bhaswati Bhattacharyya and Yashwant Gupta with Janusz Gil]

Unique nulling properties of PSR B0818–41: We identify a strong trend in the intensity fluctuations of the individual pulses before and after nulling for PSR B0818–41: pulse energy gradually goes down and then the pulsar starts nulling. The mean energy of last few active pulses before nulling is about factor of two less the than the mean energy of first few active pulses just after nulling. We also report that the first few active pulses just after nulling are stronger by about a factor of two than the mean active state energy of the nearby pulses that follow. These findings should help

understand the relation between the pulsar radio emission and the phenomenon of nulling.
[Bhashwati Bhattacharyya and Yashwant Gupta with Janusz Gil]

Polarization study of PSR B0826–34: We observed PSR B0826–34 in full polarization mode with the GMRT, at 325 and 610 MHz. We see several interesting features including two orthogonal polarization mode jumps near the edge of the main pulse at 325 MHz. At 610 MHz, we see all the features seen in 325 MHz plus two orthogonal polarization mode jumps near the edge of the inter pulse window. We have attempted to model these features.
[Bhaswati Bhattacharyya and Yashwant Gupta with Janusz Gil].

Giant flare in Cygnux X-3: The Galactic microquasar Cygnus X-3 was observed with GMRT during the giant flare of 2006 May-June, which was one of the largest are in its recorded history. By combining the published results from VLA and RATAN, the radio spectrum of the source is obtained during both rising and the fading phases of the flare. It is found that the radio spectrum is showing absorption towards lower frequency and the turn-over frequency is shifting towards lower frequency region with time. Applying the synchrotron self absorption model, the velocity of the expansion of the blob is estimated to be in the range 0.02c to 0.17c, assuming the magnetic field strength in the range 0.1 to 1 Gauss, in broad agreement with the known expansion velocities of other micro-quasars.
[Sabyasachi Pal, C. H. Ishwara-Chandra and A. Pramesh Rao]

Nova RS Ophiuchi: First detection of emission at radio frequencies <1.4 GHz: The first low radio frequency (<1.4 GHz) detection of the outburst of the recurrent nova RS Ophiuchi is presented. Radio emission was detected at 0.61 GHz on day 20 with a flux density of ~48 mJy and at 0.325 GHz on day 38 with a flux density of ~44 mJy. This is in contrast with the 1985 outburst, when it was not detected at 0.327 GHz even on day 66. The emission at low radio frequencies is clearly nonthermal. The overlying wind densities in 2006 are estimated to be only ~30% of those in 1985.
[N.G. Kantharia, with Anupama, G. C.; Prabhu, T. P.; Ramya, S.; Bode, M. F.; Eyres, S. P. S.; O'Brien, T. J.]

Magnetic field near the central region of the Galaxy: We determine the properties of the Faraday screen and the magnetic field near the central region of the Galaxy. We measured the Faraday rotation measure (RM) towards 60 background extragalactic source components through the -6° <l<6°, –2° <b<2° region of the Galaxy using the 4.8 and 8.5 GHz bands of the ATCA and VLA. Here we use the measured RMs to estimate the systematic and the random components of the magnetic fields. The strength

of the random field in the region is estimated to be ~20 μG. Given the highly turbulent magnetoionic ISM in this region, the strength of the systematic component of the magnetic fields would most likely be close to that of the random component.
[Subhashis Roy, and A. Pramesh Rao, with Subrahmanyan, R.]

Radio recombination lines from the largest bound atoms in space: The detection of a series of radio recombination lines (RRLs) in absorption near 26 MHz arising from the largest bound carbon atoms detected in space is reported. These atoms, which are more than a million times larger than the ground-state atoms, are undergoing delta transitions (n ~ 1009, Δn = 4) in the cool tenuous medium located in the Perseus arm in front of the supernova remnant, Cassiopeia A (Cas A). We also report high signal-to-noise ratio detections of α, ß and γ transitions in carbon atoms arising in the same clouds.
[N.G. Kantharia with Stepkin, S. V.; Konovalenko, A. A.; Udaya Shankar, N.]

Galactic H II Region Sh 2-294: We present the observational results of Galactic H II region Sh 2-294, using optical photometry, narrowband imaging, and radio continuum mapping at 1280 MHz, together with archival data from the 2MASS, MSX, and IRAS surveys. We identified the ionizing source of the H II region, and spectral type estimates are consistent with a star of spectral type ~B0 V. The morphological correlation between the ionized and molecular gas, along with probable timescale involved between the ionizing star, evolution of H II region, and small cluster, indicates that the star formation activity observed at the border is probably triggered by the expansion of H II region.
[V.K. Kulkarni with Samal, M. R.; Pandey, A. K.; Ojha, D. K.; Ghosh, S. K.; Bhatt, B. C.]

The ultracompact HII region associated with IRAS 20178+4046: We present a multiwavelength study of the ultra compact HII region associated with IRAS 20178+4046. This enables us to probe the different components associated with this massive star-forming region. The radio emission from the ionized gas was mapped at 610 and 1280 MHz using the GMRT. The multiwavelength study of this star-forming complex reveals an interesting scenario where we possibly see different evolutionary stages in star formation.
[V.K. Kulkarni with Tej, A.; Ghosh, S. K.; Ojha, D. K.; Verma, R. P.; Vig, S.]

Evolution of Protoplanetary to Debris Disks: We present radiative transfer models for the 21 cm emission from circumstellar disks and use them to convert observed upper limits on the 21 cm flux to limits on the total disk gas mass. We also present fresh upper limits for the 21 cm emission of the disks around HD 135344, LkCa 15, and HD 163296, obtained with the GMRT. Our observations and models span a range of

disk types, from young protoplanetary disks to old debris disks. The models self-consistently calculate the gas chemistry (H/H2 balance) and the thermal structure of UV irradiated disks. [*Jayaram N. Chengalur with Kamp, I.; Freudling, W.*]

Low-frequency radio monitoring of microquasars: Microquasars are radio-emitting X-ray binaries (REXBs) with a radio morphology like quasars and high X-ray luminosity. Sixteen known microquasar candidates were extensively monitored for the first time at low radio frequencies using the GMRT between 6-June 2003 and 22-Jan. 2005 at 0.235/0.61 (simultaneous) and 1.28 GHz. Nine out of sixteen sources were detected positively by the GMRT including all six high-mass X-ray binaries (HMXBs) and three low-mass X-ray binaries (LMXBs). Among the nine sources emitting at low frequencies, six are persistent in radio and three are transient at radio wavelengths. This work provides a general review of the main observational results obtained up to now, as well as different models for the production of low-frequency radio emissions from these sources.
[A. Pramesh Rao and C.H. Ishwara Chandra with Pandey, M.; Durouchoux, P.; Manchanda, R. K.]

Turbulence measurements from HI absorption spectra: The millennium Arecibo 21-cm is used for absorption-line survey measurements to examine the issue of the non-thermal contribution to the observed Galactic HI linewidths. We use the estimates of the non-thermal contribution to the linewidth to determine corrected HI kinetic temperature. The new limits that we obtain imply that a significantly smaller (~40 per cent as opposed to 60 per cent) fraction of the atomic interstellar medium in our Galaxy is in the warm neutral medium phase.
[Nirupam Roy and Jayaram N. Chengalur with Peedikakkandy, Leshma;]

Nearby Galaxies

NGC 4438 and its environment: We present multifrequency radio continuum and HI observations of NGC 4438, the highly disturbed, active galaxy in the Virgo cluster, with the VLA and the GMRT. High-resolution observations of the central 1 kpc with the VLA show the presence of an inverted- spectrum radio nucleus located between the highly asymmetric lobes of radio emission. The HI observations show an elongated structure which is displaced by ~4.1kpc on the western side of NGC 4438 and has a size of ~9.8 kpc and a mass of 1.8×10^8 $M_\odot$. The velocity field suggests systematic rotation. These observations also detect HI emission from the disc of the galaxy with a mass of 1.2×10^8 $M_\odot$. We detect a faint HI tail towards the north of NGC 4438 close to a stellar tail seen earlier in deep optical observations. We discuss the different structures in light of different

models which have been suggested for this disturbed galaxy, namely ram pressure stripping, tidal and interstellar medium SM-ISM interactions.
[Ananda Hota, and D.J. Saikia with Irwin, Judith A.]

FIGGS: Faint Irregular Galaxies GMRT Survey: The primary goal of FIGGS is to provide a comprehensive and statistically robust characterization of the neutral interstellar medium properties of faint, gas-rich dwarf galaxies. The FIGGS galaxies represent the extremely low mass end of the dwarf irregular galaxies population, with a median M_B~−13.0 and median HI mass of ~$3 \times 10^7 M_\odot$. To a good approximation, the discs of gas-rich galaxies, ranging over three orders of magnitude in HI mass, can be described as being drawn from a family with fixed HI average surface density.
[Jayaram N. Chengalur with Begum, Ayesha; Karachentsev, I.D.; Sharina, M.E.; Kaisin, S.S]

Baryonic Tully-Fisher relation for extremely low mass Galaxies: We study Tully-Fisher (TF) relations for a sample that combines extremely faint ($M_B < -14$) galaxies along with bright (i.e. ~L*) galaxies. Accurate (~10 per cent) distances, I-band photometry and B -V colours are known for the majority of the galaxies in our sample. The faint galaxies are drawn from FIGGS and we have HI rotation velocities derived from aperture synthesis observations for all of them. If we assume that there is an intrinsic BTF and try to determine the baryonic mass by searching for prescriptions that lead to the tightest BTF, we find that scaling the HI mass leads to a much more significant tightening than scaling the stellar mass-to-light ratio.
[Jayaram Chengalur with Begum, Ayesha; Karachentsev, I. D.; Sharina, M. E.]

Anomalous HI in NGC 2997: We present the results of over 100 hours worth of HI observations of the isolated, inclined spiral galaxy, NGC 2997, to search for HI clouds analogous to the High Velocity Clouds (HVCs) seen around the Milky Way. There is evidence of a "lagging disk" as well as counter-rotating HI that does not appear to be associated with either the thin disk or the lagging disk. Just as in our own Milky Way, multiple processes, including accretion, may be necessary to explain the location of this high velocity HI.
[Jayaram N. Chengalur with Hess, Kelley M.; Pisano, D.; Wilcots, E.]

The pair of galaxies NGC 6907 and 6908: NGC6908, an S0 galaxy situated in the direction of NGC6907, was only recently recognized as a distinct galaxy, instead of only a part of NGC6907. We present 21-cm radio synthesis observations obtained with the GMRT and optical images and spectroscopy obtained with the Gemini-North telescope of this pair of interacting galaxies. The emission lines observed in the direction of NGC6908, not typical of S0 galaxies, have the same velocity expected for the NGC6907 rotation curve. Some emission lines are superimposed on a

broader absorption profile, which suggests that they were not formed in NGC6908. Finally, the HI profile exhibits details of the interaction, showing three components: one for NGC6908, another for the excited gas in the NGC6907 disc and a last one for the gas with higher relative velocities left behind NGC6908 by dynamical friction, used to estimate the time when the interaction started in $(3.4 \pm 0.6) \times 10^7$ yr ago.
[Nirupam Roy with Scarano, S.; Madsen, Felipe R. H.; Lépine, J. R. D.]

HI power spectrum of the spiral galaxy NGC628: We have measured the HI power spectrum of the nearly face-on spiral galaxy NGC628 (M74) using a visibility-based estimator. The power spectrum is well fitted by a power law with a slope which indicates a transition from three-dimensional turbulence at small scales to two-dimensional turbulence in the plane of the galaxy disc at length-scales larger than the HI scaleheight of the galaxy. [*Jayaram N. Chengalur with Dutta, Prasun; Begum, Ayesha; Bharadwaj, Somnath*]

Very metal-poor dwarfs: We have conducted a multi-wavelength (including optical/NIR morphology/ photometry, HI imaging, and H-alpha-line kinematics) of a sample of such XMD BCGs (AB) and find in a large fraction of them clear evidences that strong interactions or mergers with low-mass objects, provide a trigger mechanism for their observed starbursts. We present about 20 such XMD BCGs arranged in a Toomre-like sequence and also the first results of detailed studies of several individual objects from this sample.
[Ekta and Jayaram N. Chengalur with Pustilnik, S. A.; Kniazev, A. Y.; Vanzi, L.]

An extremely gas rich dwarf: We present an analysis of HI, Hα and oxygen abundance data for NGC3741, one of the `darkest' dwarf irregular galaxies known. Our new high-resolution HI images of the galaxy show evidence for a large-scale (purely gaseous) spiral arm and central bar. The galaxy has an integrated star formation rate (SFR) of $\sim 0.0034 M_\odot\ yr^{-1}$. We find that the SFR is consistent with that expected from the observed correlations between HI mass and SFR and the global Kennicutt-Schmidt law, respectively. The effective oxygen yield of NGC3741 is consistent with recent model estimates of closed-box yields.
[Jayaram N. Chengalur with Begum, Ayesha; Kennicutt, Robert C.; Karachentsev, Igor D.; Lee, Janice C.]

Neutral Hydrogen Gas in Star Forming Galaxies at z=0.24: GMRT observations are used to measure the atomic hydrogen gas content of star-forming galaxies at z = 0.24 (i.e. a lookbacktime of ~3 Gyr). To measure the HI 21 cm emission signal we stack the signal from 121 galaxies with known optical positions and redshifts. We find an average HI mass for the galaxies of $(2.26 \pm 0.90) \times 10^9\ M_\odot$.We translate this HI measurement into a cosmic

density of neutral gas at z=0.24, which is consistent with that estimated from damped Lyα systems around this redshift.
[Jayaram N. Chengalur with Lah, Philip; Briggs, Frank H.; Colless, Matthew; de Propris, Roberto; Pracy, Michael B.; de Blok, W. J. G.; Fujita, Shinobu S.; Ajiki, Masaru; Shioya, Yasuhiro; Nagao, Tohru; Murayama, Takashi; Taniguchi, Yoshiaki; Yagi, Masafumi; Okamura, Sadanori]

Lenticular Galaxy Formation: Possible Luminosity Dependence: The correlation between the bulge effective radius (re) and disk scale length (rd) in the near-infrared K band for lenticular galaxies in the field and in clusters is investigated. It is found that they have markedly different relations between the two parameters as a function of luminosity, indicating that they formed through different mechanisms.
[Yogesh Wadadekar with Barway, Sudhanshu; Kembhavi, Ajit; Ravikumar, C. D.; Mayya, Y. D.]

AGN in Low Surface Brightness Galaxies: Preliminary results of a study of the low frequency radio continuum emission from the nuclei of Giant Low Surface Brightness (LSB) galaxies are presented. Low frequency GMRT observations of 3 galaxies are presented; PGC 045080, UGC 1922 and UGC 6614. Radio cores as well as extended structures were detected and mapped in all three galaxies. Although these galaxies are optically dim, their nuclei can host AGN that are bright in the radio domain.
[N.G. Kantharia with Das, M.; McGaugh, S. S.; Vogel, S. N.]

AGN and Gas in Low Surface Brightness Galaxies: Millimetre and centimetre observations of the gas disks and AGN emission in a sample of low surface brightness (LSB) galaxies are presented. The observations thus show that LSB galaxies may have significant amounts of molecular gas in their disks as well as HI gas. Although they appear less evolved than regular spirals, they harbour radio bright AGN that may be active even at millimetre wavelengths.
[N.G. Kantharia with Das, M.; O'Neil, K.; Vogel, S. N.; McGaugh, S. S.]

Low surface brightness galaxy PGC045080: We present radio observations and optical spectroscopy of the giant low surface brightness (LSB) galaxy PGC045080 (or 1300+0144) PGC045080, a moderately distant galaxy having a highly inclined optical disc and massive HI gas content. We find that a weak or hidden AGN may be present in PGC045080. The extended radio emission represents lobes/jets from the AGN. These observations show that although LSB galaxies are metal poor and have very little star formation, their centres can host significant AGN activity. The HI disc extends well beyond the optical disc and appears warped. The rotation curve has a flat rotation speed of ~190kms^{-1}.
[N.G. Kantharia with Das, M.; Ramya, S.; Prabhu, T. P.; McGaugh, S. S.; Vogel, S. N.]

The Local Group dwarf Leo T: HI on the brink of star formation: We present GMRT and WSRT observations of the Local Group dwarf galaxy, Leo T. The peak HI column density is measured to be $7 \times 10^{20} cm^{-2}$, and the total HI mass is $2.8 \times 10^5 M_\odot$, based on a distance of 420 kpc. Leo T has both cold (~500 K) and warm (~6000 K) HI at its core, with a global velocity dispersion of 6.9 kms^{-1}, from which we derive a dynamical mass within the HI radius of $3.3 \times 10_6 M_\odot$, and a mass-tolight ratio of >50.
[Sabyasachi Pal with Ryan-Weber, Emma V.; Begum, Ayesha; Oosterloo, Tom; Irwin, Michael J.; Belokurov, Vasily; Evans, N. Wyn; Zucker, Daniel B.]

Radio monitoring of SN 2007gr: GMRT Observations of SN 2007gr in the L-band has been report. Radio emission from the SN was not detected in this observation with a 2 sigma upper limit of 220 microJansky (uJy) at the position of the SN.
[Nirupam Roy with Chakraborti, Sayan; Chandra, Poonam; Ray, Alak]

Clusters of Galaxies

Radio Observations of cD Galaxies: We present a radio morphological study and spectral analysis of a sample of 13 cD galaxies in rich and poor clusters of galaxies based on new high sensitivity GMRT observations. We found a variety of morphologies and linear sizes, as typical for radio galaxies in the radio power range sampled here (low to intermediate power radio galaxies). The radiative ages and growth velocities are consistent with previous findings that the evolution of radio galaxies at cluster centres is affected by the dense external medium. We suggest that the dominant galaxies in A 2622 and MKW 03s are dying radio sources, while the spectacular source at the centre of A 2372 might be a very interesting example of a restarted radio galaxy.
[R. Athreya and D.J. Saikia with Giacintucci, S.; Venturi, T.; Murgia, M., Dallacasa, D.; Bardelli, S.; Mazzotta, P.]

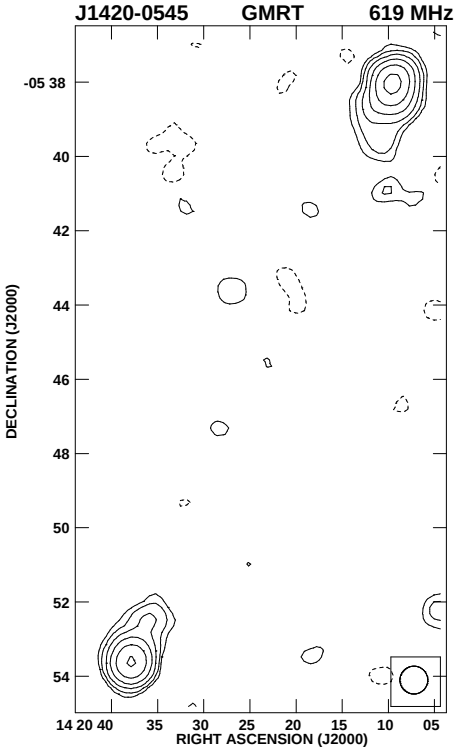
Shock acceleration in A521: We present new high sensitivity observations of the radio relic in A 521 carried out using the GMRT and the VLA. The integrated spectrum of the relic is consistent with a single power law; the spectral index image shows a clear trend of steepening going from the outer portion of the relic toward the cluster centre. Our results are consistent with acceleration of relativistic electrons by a shock in the intracluster medium.
[R. Athreya with Giacintucci, S.; Venturi, T.; Macario, G.; Dallacasa, D.; Brunetti, G.; Markevitch, M.; Cassano, R.; Bardelli, S]

The Cluster AWM4: We present a detailed radio morphological study and spectral analysis of the wide-angle tail radio source 4C +24.36 associated with the dominant galaxy in the relaxed galaxy cluster AWM 4. The wide-angle tail morphology can be reasonably explained by adopting a simple

hydrodynamical model. The radiative age of the source of is ~160 Myr. The cluster X-ray-emitting gas has a relaxed morphology and short cooling time. We find that it is not possible for the central source to eject the requisite energy in the intracluster gas in terms of the enthalpy of buoyant bubbles of relativistic fluid, without creating discernible large cavities in the existing X-ray XMM-Newton observations.

[R.M. Athreya with Giacintucci, Simona; Vrtilek, Jan M.; Murgia, Matteo; Raychaudhury, Somak; O'Sullivan, Ewan J.; Venturi, Tiziana; David, Laurence P.; Mazzotta, Pasquale; Clarke, Tracy E.]

Radio Galaxies and Quasars



GMRT image of the largest giant radio galaxy.

J1420-0545: Largest giant radio galaxy: The discovery of the largest giant radio galaxy yet, J1420-0545: a FR type II radio source with an angular size of 17.4', identified with an optical galaxy at z=0.3067 is reported. Thus, the projected linear size of the radio structure is 4.69 Mpc. New radio observations with the 100 m Effelsberg telescope and the GMRT, as well as optical identification with a host galaxy and its optical spectroscopy with the William Herschel Telescope, are reported. The source is characterized by the exceptionally low density of the surrounding IGM and an unexpectedly high expansion speed of the source along the jet axis. All of these may suggest a large inhomogeneity of the IGM.

[D.J. Saikia with Machalski, J.; Koziel-Wierzbowska, D.; Jamrozy, M.]

X-shaped radio sources: GMRT data at 240 and 610 MHz have been obtained for almost all the known X-shaped radio sources and studied the distribution of the spectral indices across the sources. While the radio morphologies of all the sources at 240 and 610 MHz show the characteristic X-shape, the spectral characteristics of the X-shaped radio sources seem to fall into three categories. The implications of the new observational results have been discussed.

[A. Pramesh Rao with Lal, Dharam Vir]

A multifrequency study of giant radio sources: Multifrequency observations with the GMRT and the VLA are used to determine the spectral breaks in consecutive strips along the lobes of a sample of selected giant radio sources (GRSs) in order to estimate their spectral ages. The maximum spectral ages estimated for the detected radio emission in the lobes of our sources range from ~6 to 46Myr with a median value of ~23Myr using the classical equipartition fields. These ages are significantly older than smaller sources. The injection spectral indices range from ~0.55

to 0.88 with a median value of ~0.6. We discuss these values in the light of theoretical expectations, and show that the injection spectral index appears to be correlated with luminosity and/or redshift as well as with linear size.
[C. Konar and D.J. Saikia with Jamrozy, M.; Machalski, J.]

Intra-night optical variability of radio-quiet quasars: Here we present the results for a sample of 11 radio-quiet quasars RQQs monitored by us on 19 nights. On 5 of these nights a given RQQ was monitored simultaneously from two well separated observatories. In all, two clear cases and two probable cases of intra-night optical variability INOV events were detected. From these data, we estimate an INOV duty cycle of ~8% for RQQs which would increase to 19% if the `probable variable' cases are also included, consistent with earlier studies.
[Gopal Krishna with Goyal, Arti; Sagar, Ram; Anupama, G. C.; Sahu, D.]

The blazar OJ 287 in 2005: Two guest-observer XMM-Newton pointings of the blazar OJ 287 in 2005 are presented along with part of the radio, mm, near-IR, and optical data obtained during a coordinated and intensive WEBT campaign, during longer-term monitoring observations performed by teams of the ENIGMA network, and during other independent observing programs (like VLBA observations). In that year OJ 287 showed an interesting variable behavior in the optical band. X-ray data indicates different flux levels, spectral slopes, and emission components, and VLBA radio maps are consistent with a jet precession model.
[Gopal Krishna with Ciprini, S.; Raiteri, C. M.; Rizzi, N.; Agudo, I.; Foschini, L.; Fiorucci, M.; Takalo, L. O.; Villata, M.; Ostorero, L.; Sillanpää, A.; Valtonen, M.; Tosti, G.; Wagner, S. J.; Aller, H.; Aller, M. F.; Arai, A.; Arkharov, A. A.; Bakis, V.; Bagaglia, M.; Böttcher, M.; Buemi, C.; Carosati, D.; Chen, W. P.; Efimov, Y.; Emmanoulopoulos, D.; Erdem, A.; Fuhrmann, L.; Frasca, A.; Fullhart, M.; Goyal, A.; Heidt, J.; Hovatta, T.; Hroch, F.; Ibrahimov, M. A.; Jilková, L.; Joshi, M.; Kamada, M.; Katsuura, M.; Kinoshita, D.; Kostov, A.; Kotaka, D.; Kovalev, Y. Y.; Krejcová, T.; Krichbaum, T.; Kurosaki, M.; Kurtanidze, O.; Lahteenmaki, A.; Lanteri, L.; Larionov, V.; Lee, C.-U.; Letho, H.; Leto, P.; Li, J.; Lindfors, E.; Münz, F.; Marilli, E.; Matsubara, Y.; Mizoguchi, S.; Mondal, S.; Nakamura, K.; Nieppola, E.; Nilsson, K.; Nishiyama, S.; Nucciarelli, G.; Ogino, A.; Ohlert, J.; Oksanen, A.; Ovcharov, E.; Pak, S.; Pasanen, M.; Pullen, C.; Pursimo, T.; Ros, J. A.; Sadakane, K.; Sadun, A. C.; Sagar, R.; Sohnk, B.-W.; Sumitomo, N.; Tanaka, K.; Trigilio, C.; Torniainenk I.; Tornikoski, M.; Umana, G.; Ungerechts, H.; Valtaoja, E.; Volvach, A.; Webb, J. R.; Wu, J.; Yim, H.-S.; Zhang, Y.]

Quasar Radio Loudness Dichotomy: The origin of the dichotomy of radio loudness among quasars can be explained using recent findings that the mass of the central supermassive black hole (SMBH) in extended radio-loud quasars is systematically a few times that of their counterparts in radio-quiet quasars. The great majority of jets launched by less massive BHs, however, will be truncated in the vicinity of the SMBH due to mass loading

from this stellar debris. This scenario also can naturally explain the remarkable dearth of extended radio structures in quasars showing broad absorption line spectra.
[Gopal-Krishna with Mangalam, A.; Wiita, Paul J.]

Superdiscs in radio galaxies: Taking a clue from their sharp-edged (strip-like) morphology observed in several cases, a new mechanism is proposed for the formation of the emission gaps seen between the radio lobes of many powerful extragalactic double radio sources. A simple analytical scheme is presented to explore the plausibility of the sideways confinement of the thermal wind by the radio lobe pair, which would `freeze' pancake-shaped conduits in the space, along which the hot, metal-enriched wind from the AGN can escape (roughly orthogonal to the radio axis). Some other possible consequences of this scenario are pointed out.
[Gopal-Krishna; Wiita, Paul J.; Joshi, Santosh]

Gamma Ray Bursts

GRB 030329 radio afterglow: The physics behind one of the brightest radio afterglows ever, GRB 030329, is explored at late times when the jet is non-relativistic. The GRB 030329 radio afterglow is observed with the Westerbork Synthesis Radio Telescope and GMRT at frequencies from 325 MHz to 8.4 GHz, spanning a time range of 268-1128 days after the burst. All the available radio data are modeled and the physical parameters have been derived.
[C.H.Ishwara Chandra with van der Horst, A. J.; Kamble, A.; Resmi, L.; Wijers, R.A.M.J.; Bhattacharya, D.; Scheers, B.; Rol, E.; Strom, R.; Kouveliotou, C.; Oosterloo, T.;]

The X-ray rich (XRR) GRB 050408. Together with optical X-ray, millimetre and radio observations the most complete multiband coverage of an XRR burst afterglow to date is compiled. The optical and X-ray light curve is characterised by an early flattening and an intense bump peaking around 6 days after the burst onset. The former is explained by an off-axis viewed jet, in agreement with the predictions made for XRR by some models, and the latter with an energy injection equivalent in intensity to the initial shock.
[C.H. Ishwara Chandra with de Ugarte Postigo, A.; Fatkhullin, T. A.; Jóhannesson, G.; Gorosabel, J.; Sokolov, V. V.; Castro-Tirado, A. J.; Balega, Yu. Yu.; Spiridonova, O. I.; Jelínek, M.; Guziy, S.; Pérez-Ramírez, D.; Hjorth, J.; Laursen, P.; Bersier, D.; Pandey, S. B.; Bremer, M.; Monfardini, A.; Huang, K. Y.; Urata, Y.; Ip, W. H.; Tamagawa, T.; Kinoshita, D.; Mizuno, T.; Arai, Y.; Yamagishi, H.; Soyano, T.; Usui, F.; Tashiro, M.; Abe, K.; Onda, K.; Aslan, Z.; Khamitov, I.; Ozisik, T.; Kiziloglu, U.; Bikmaev, I.; Sakhibullin, N.; Burenin, R.; Pavlinsky, M.; Sunyaev, R.; Bhattacharya, D.; Kamble, A. P.; Trushkin, S. A.]

HI absorption

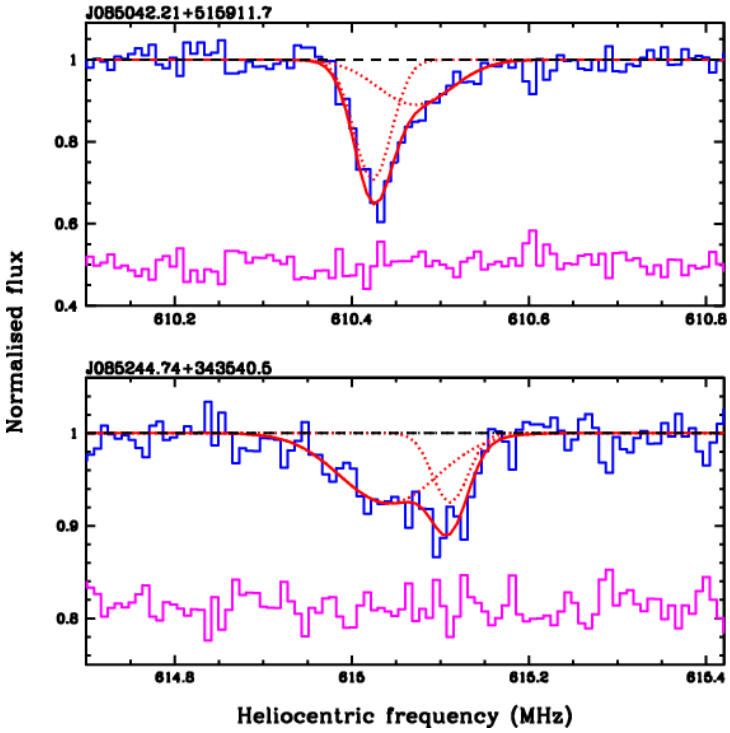
A Search for H I 21 cm Absorption toward the Highest Redshift (z~5.2) Radio-loud Objects: We have searched for HI 21 cm absorption toward the two brightest radio AGNs at high redshift, J0924-2201 at z=5.20 and J0913+5919 at z=5.11, using the GMRT. These data set an upper limit to absorption of <30% at 40 km s^{-1} resolution for the 30 mJy source J0913+5919, and <3% for the 0.55 Jy source J0924-2201 at 20 km s^{-1} resolution. These data rule out any cool, high column density H I clouds within roughly ±1000 km s^{-1} of the galaxies.
[Jayaram N. Chengalur with Carilli, C. L.; Wang, Ran; van Hoven, M. B.; Dwarakanath, K.; Wyithe, Stuart]

HI 21-cm absorption at z ~ 3.39 towards PKS 0201+113: We report the GMRT detection of HI 21-cm absorption from the z ~ 3.39 damped Lyman α absorber (DLA) towards PKS 0201+113, the highest redshift at which 21-cm absorption has been detected in a DLA. The absorption is spread over ~115 km s^{-1} and has two components, at z = 3.387144(17) and z = 3.386141 (45). The large mismatch between peak 21-cm and optical redshifts and the complexity of both profiles makes it unlikely that the z ~ 3.39 DLA will be useful in tests of fundamental constant evolution.
[Jayaram N. Chengalur with Kanekar, N.; Lane, W. M.]

Outflowing atomic and molecular gas at z ~ 0.67 towards 1504 + 377: We report the detection of OH 1667-MHz and wide HI 21-cm absorption at z ~ 0.67 towards the red quasar 1504 + 377, with the Green Bank Telescope and the GMRT. The HI 21-cm absorption extends over a velocity range of ~600kms^{-1} blueward of the quasar redshift (z = 0.674), with the new OH 1667-MHz absorption component at ~-430kms^{-1} , nearly coincident with earlier detections of millimetre-wave absorption at z ~ 0.6715. The atomic and molecular absorption appear to arise from a fast gas outflow from the quasar, possibly as a result of a jet-cloud interaction, followed by rapid cooling of the cloud material.
[Jayaram N. Chengalur with Kanekar, Nissim]

Fundamental Constant Evolution: Radio spectroscopy in the four redshifted 18cm OH lines allows a probe of changes in three fundamental constants, the fine structure constant a, the proton g-factor gp, and the electron-proton mass ratio μ = me/mp. After summarizing the technique, we describe WSRT observations of the conjugate satellite OH lines towards PKS 1413+135, which find weak evidence in support of evolution in the constants, over a lookback time of ˜ 2.7, Gyrs.
[Jayaram N. Chengalur with Kanekar, Nissim; Ghosh, Tapasi]

Dusty 21-cm absorbers at z~1.3: We have discovered two dusty intervening Mg II absorption systems at z~1.3 in the SDSS database. The overall spectra of both QSOs are red and are well modelled by the composite QSO spectrum reddened by the extinction curve from the Large Magellanic Cloud (LMC2) Supershell redshifted to the rest-frame of the Mg II systems. In particular, we detect clearly the presence of the UV extinction bump at 2175 Å. Using the LMC A_V vs. N(HI) relationship we derive N(HI) ~ 6 × 10^{21} cm^{-2} in both systems. Metallicities are close to solar. GMRT observations of these two relatively weak radio loud QSOs (~50 mJy) resulted in the detection of 21-cm absorption in both cases. The spin temperature of the gas is of the order of or smaller than 500K. These systems provide a unique opportunity to search for molecules and diffuse interstellar bands at z>1.



GMRT spectra of J085042.21+515911.7 (top panel) and J085244.74+343540.5 (bottom panel), the two dusty intervening MgII systems at z~1.3

[D.J. Saikia with R. Srianand, N. Gupta, P. Petitjean and P. Noterdaeme]

Deep Fields and Cosmology

The VVDS-VLA deep field III: The low frequency (610 MHz) radio source counts of the VVDS-VLA field are presented and investigation of the radio spectral index properties of the sub-mJy population is made. It is found that evidence of a change of the dominant population of radio sources below 0.5 mJy at 1.4 GHz. A relevant contribution below 0.5 mJy from a population of flat spectrum low luminosity compact AGNs and radio quiet QSOs could explain this effect. The contribution of starburst galaxies becomes important below ~0.2 mJy. Finally we present a sample of 58 candidate ultra-steep sources.

[R.M. Athreya with Bondi, M.; Ciliegi, P.; Venturi, T.; Dallacasa, D.; Bardelli, S.; Zucca, E.; Athreya, R. M.; Gregorini, L.; Zanichelli, A.; Le Fèvre, O.; Contini, T.; Garilli, B.; Iovino, A.; Temporin, S.; Vergani, D.]

Deep ATCA and GMRT Observations of the CDFS: The Chandra Deep Field South (CDFS) is one of the most extensively observed regions of the sky, with some of the deepest multiwavelength coverage ever. Deep radio

observations of the CDFS have been performed at 1.4 GHz and 327 MHz, with the ATCA and the GMRT, respectively. Using the data available at other wavelengths, the nature of the faint radio population is explored in the CDFS, addressing in particular the optically unidentified microJansky radio sources.

[Jayaram N. Chengalur with Afonso, J.; Messias, H.; Mobasher, B.; Koekemoer, A.; Norris, R. P.; Cram, L.; Kanekar, N.; Farrah, D.]

Radio detections towards unidentified variable EGRET sources: A considerable fraction of the γ-ray sources discovered with the Energetic Gamma-Ray Experiment Telescope (EGRET) remain unidentified. A radio exploration of the fields of the selected EGRET sources is carried out using the GMRT interferometer at 21 cm wavelength. A total of 151 radio sources are detected. Among them, a few radio sources are identified whose flux density has apparently changed on timescales of months.

[C.H. Ishwara Chandra with Paredes, J. M.; Martí, J.; Torres, D. F.; Romero, G. E.; Combi, J. A.; Bosch-Ramon, V.; Muñoz-Arjonilla, A. J.; Sánchez-Sutil, J. R.]

Radio Sources in the Field of TeV J2032+4130: This is the first extended very high energy gamma-ray source and has remained enigmatic since its discovery because of the lack of identification. We report here deep radio observations covering the TeV J2032+4130 field and revealing for the first time an extended and diffuse radio emission, as well as a remarkable population of compact radio sources. Some of these radio sources are in positional coincidence with X- ray and optical/IR sources.

[C.H. Ishwara Chandra with Paredes, Josep M.; Martí, Josep; Bosch-Ramon, Valentí]

Ultra Steep Spectrum Radio Sources: We have obtained deep images of two fields with GMRT at 150 MHz with rms noise of 1.2 to 1.5 mJy/beam. A catalogue of ~500 radio sources was produced from these two images, above a flux density of ~10 mJy within the half-power field of view. Cross-correlation of these sources with available catalogues at higher frequencies show that ~5% of the radio sources detected have radio spectra steeper than 1.25, a majority of them are compact and unresolved, which make them good candidates for high-redshift radio sources.

[C. H. Ishwara-Chandra and S. K. Sirothia with Radhika Marathe]

Foregrounds for redshifted 21-cm studies of reionization: GMRT 153-MHz observations: Foreground subtraction is the biggest challenge for future redshifted 21-cm observations to probe reionization. We use a short GMRT observation at 153MHz to characterize the statistical properties of the background radiation across ~1° to subarcmin angular scales, and across a frequency band of 5MHz with 62.5kHz resolution. The statistic we use is the visibility correlation function, or equivalently the angular power spectrum.

[Jayaram N. Chengalur with Ali, Sk. Saiyad; Bharadwaj, Somnath]

Accretion

Spherically symmetrical accretion in fractal media: Fractional integrals is used to generalize the description of hydrodynamic accretion in fractal media. The fractional continuous medium model allows the generalization of the equations of balance of mass density and momentum density. These make it possible to consider the general case of spherical hydrodynamic accretion on to a gravitating mass embedded in a fractal medium. The general nature of the solution is similar to the `Bondi solution', but the accretion rate may vary substantially and the dependence on central mass may change significantly depending on dimensionality of the fractal medium. The theory shows consistency with the observational data and numerical simulation results for the particular case of accretion on to pre-main-sequence stars.
[Nirupam Roy]

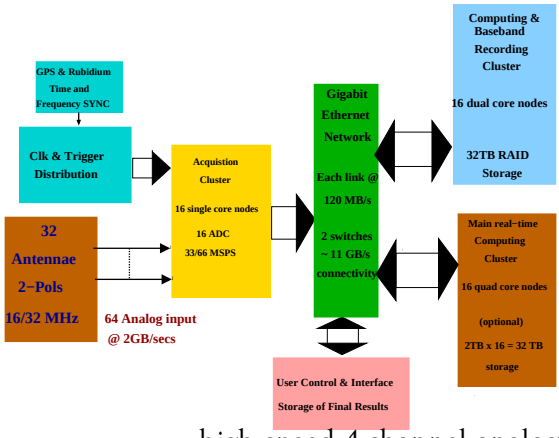
Spherically symmetric transonic accretion of a fractal medium has been studied in both the stationary and the dynamic regimes. The stationary inflow solutions of a fractal medium are as much stable under the influence of linearized perturbations as they are for the fluid continuum.
[Nirupam Roy with Ray, Arnab K.]

Instrumentation & Facilities

GMRT

A software back-end for the GMRT: The full scale version of the 32 antenna, 32 MHz GSB (GMRT software back-end) was developed during this year. Using completely off-the-shelf components, we have implemented a fully real-time back-end for the current requirements of the GMRT. The GSB consists of 48 compute nodes, connected to each other via dual gigabit links (using 2 numbers of 48-port gigabit switches). There are 16 acquisition nodes, which are relatively simple and cheap Intel Xeon computers, each containing a PCI-X based high speed 4-channel analog to digital converter (ADC). The real-time data from these nodes are transferred to a layer of 16 compute nodes which are top-of-the-line dual CPU, quad core Intel Xeon 3 GHz machines. These are programmed to implement a correlator and array combiner for the GMRT. A third layer of 16 nodes (dual CPU, dual core Intel Xeon machines) is used for recording of the raw voltage signals from all antennas to hard disk, or for additional computational support to the compute nodes in the real-time mode. All the code is highly cache-efficient and uses optimized routines and SIMD techniques, in a multi-threaded enviornment to get optimal real-time performance from the GSB. After the initial rounds of testing, work is on to interface the GSB to the main control and monitor chain at the observatory.

BLOCK DIAGRAM OF THE GMRT SOFTWARE BACK–END



[J. Roy, Y. Gupta, J. Chengalur, B. Ajithkumar, J. P. Kodilkar, S. Kudale with Ue-Li Pen (Canadian Institute of Theoretical Astrophysics, Canada) and Jeff Peterson (Carnegie Mellon University, USA)]

RF FRONT-END

130-230 MHz Front-Ends for GMRT: 150 MHZ Frequency Band was upgraded to have enhanced bandwidth coverage from 130 to 230 MHz from the

previous 40 MHz Bandwidth. During this upgrade, Band-reject filters for suppressing the carriers in the 174-181 MHz Terrestrial Television band operating in Pune city. The upgraded Front_ends were installed on all the 30 GMRT antennas.
[Vilas B. Bhalerao]

100-500 MHz Low Noise Amplifier: 100-500 MHz Low Noise Amplifiers (LNA) were designed & developed using high dynamic range Pseudomorphic HEMTs for the GMRT upgrade. They yield noise temperatures of the order of 60 Kelvin and were found to be stable.
[Vilas Bhalerao]

130-280 MHz Dipole: Broadband dipole to cover an enhance frequency range of 130-280 MHz was developed for the GMRT upgrade. VSWR was measured to be less than 2 within the above frequency range.
[Vilas Bhalerao]

Prototype 30-80 MHz Front-Ends for GMRT: Raman Research Institute(RRI), Bangalore have designed and developed 30-80 MHz Feed consisting of a pair of inverted 'V' Dipoles over plane reflector in a boxing ring configuration and Low Noise Front-End with Filters to select either 38 ± 1 MHz, 55 ±2.5 MHz or 30-80 MHz. Also incorporated 85-110 MHz Band-Reject Filters. Four such prototype systems have been installed by the RRI group on four GMRT antennas They are under test & evaluation.
[RRI Group- K.S.Dwarakanath, Udayashankar, R. Somashekhar, Girish, Wences, Shahram Amiri]

550-900 MHz Feeds for GMRT: CSIRO Division of Radiophysics, Australia have designed 550-900 MHz Feed consisting of a Horn and stepped Ortho-Mode-Transducer. Based on the design, fabrication drawings were made and two feeds were fabricated at the Precision Components Division of Godrej & Boyce Manufacturing Company, Mumbai. They were successfully tested.
[G.Sankarasubramaniam, M.N. Karthikeyan, A. Praveen Kumar, Anil Raut, Vilas Bhalerao, S. Ramesh]

550-900 MHz Low Noise Amplifier: 550-900 MHz Low Noise Amplifiers (LNA) were designed & developed using high dynamic range pseudomorphic HEMTs. They yield a noise temperature of about 35 Kelvin over the band They have good stability and repeatability.
[Anil Raut]

200-800 MHz 'Eleven' Feed: Chalmers University of Technology, Sweden have designed, developed and delivered 200-800 MHz 'Eleven' Feed having basic dual dipole (Eleven) configuration with 16 pairs of folded dipoles above finite ground plane. The feed was installed on GMRT and the performance was evaluated.

[Chalmers Group-Prof. Per-Simon Kildal, Yogesh Karandikar) (GMRT- A.Praveen Kumar, G. Sankarasubramaniam, Anil Raut, Subhash Thepane, S.Ramesh, Manisha Parate]

FIBER-OPTICS:

A. DWDM based Broadband Analog Fiber-Optic Links for GMRT Upgrade: Designed, developed a DWDM based broadband analog Fiber-Optic Link having 4 Channel DWDM based Multiplexers and Demulitiplexers having 200 GHz wavelength separation in the 1550 nm optical window. Two channels carry two polarization RF channels from antenna to Central Electronics Building. DFB lasers are used for Transmitters and InGaAs Photodiodes with built in Low Noise Amplifiers were used as receivers. Two such links were installed on GMRT antennas which co-exist with the existing 1300 nm Analog link and have been successfully tested.
[S. Sureshkumar, Vinod Pacharne, Pravin Raybole, Satish Lokhande, M.Gopinathan]

B. CWDM based 4 × 1 GBE Fiber-Optic Link between GMRT site and NCRA-TIFR, Pune: 4 × 1 GBE Fiber-Optic Link working in the 1550 nm window with a capability to expand upto 8 × 1 GBE configuration was worked out with a repeater station at Rajgurunagar. The Project was executed by COMMTEL, Navi Mumbai using Transmode, Sweden subsystems. The Link has been operational satisfactorily.
[S.Suresh Kumar, Pravin Raybole, Satish Lokhande)

C. Fiber-Optic Link for L & T (EMSYS): Larsen & Toubro (L & T) (EMSYS) Mysore executed a project for Shangai Railways to design, develop and install Fiber-Optic Links along railway line carrying signaling information for the Railway Network. All the Sub-systems and links were designed & installed by the consultancy given by us.
[S.Sureshkumar]

Upgrade of Servo system

The servo system for GMRT is currently being upgraded to take care of obsolescence and improve performance. A new solid state interlock system with high reliability was installed on 10 antennas this year. A new PC-104 based digital control card is under development and the existing PASCAL code for servo control was ported for this card in C, which will run under Linux operating system. This is a replacement for obsolete 8086 based CPU board and is currently undergoing field trials. Likewise, a new brushless DC motor has been identified as a replacement for the current Permanent magnet DC brushed motors and is under test currently. In active

collaboration with BARC Reactor control division, a new digital control system is being developed.
[N V Nagaratnam, S Sabhapthy, S K Bagade, S Bhat, B. C. Joshi]

Activities related to Backend Systems of GMRT:

During the year, the various activities related to backend electronics were combined into a single Backend team. The main jobs carried out during the year include development and installation of surge protection circuits in the Antenna Base Receiver (ABR) to Front-end (FE) interface.
[SVPhakatkar and AE Shinde]

Development and installation of additional signal power monitoring at the dishbase using high dynamic range detector circuits. This provides additional support during troubleshooting the systems and reduce the downtime of antennas.
[SV Phakatkar and AjithKumar B]

Development of four antenna correlator using Serendip board with 50 MHz signal bandwidth. The system was developed as a training kit for FPGA development and will be used in testing the broadband fiber link from antennas.
[Mekhala V Muley and SC Choudhury]

Data transfer between FPGA boards and PCs based on ethernet protocol has been implemented and tested. This scheme is currently gettong upgraded to 10GBPS data transfer and will be used in the final correlator design.
[G. Shelton Joseph]

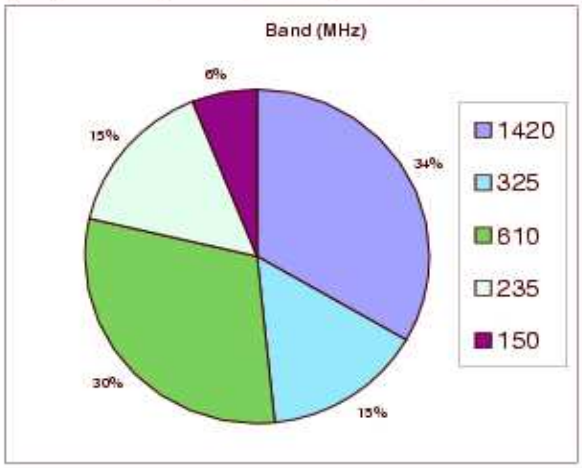
Analog backend circuits for the broadband signal from OF link to generate in-phase and quadrature phase signals is developed and tested . The system is currently used in the test setup of the Serendip boards and will be used later in the 15mtr dish receiver at NCRA campus.
[AjithKumar B and PJ Hande]

GMRT Time Allocation & Observing Archives

Since GMRT was opened to international users in January 2002, thirteen ~5 month observing cycles have been completed. Proposals are invited for two observing cycles of five month duration. One cycle runs from April to September & the other from October to March. On an average, about 60 proposals are screened & reviewed by the GMRT Time Allocation Committee (GTAC) and the time allocation recommendations are made. Observations are then scheduled accordingly.

Cycle 1 to 13 - Statistics of time requested for different frequency bands

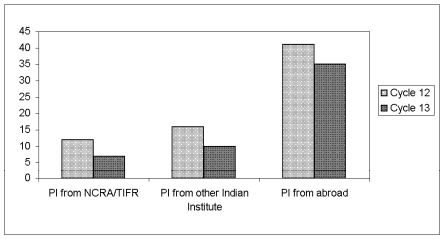
Band (MHz)	1420	325	610	235	150
approx. time (hrs)	9330	4118	8503	4229	1711



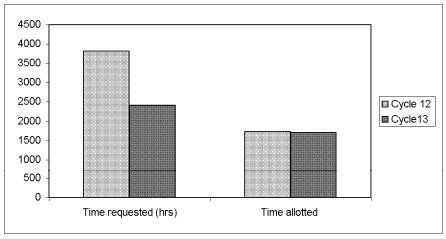
In GMRT observing cycles 12 & 13, 150 MHz observations have become fairly routine with the request being 18% of the total time. The numbers of non-NCRA users and foreign users have increased. Users are required to be present at GMRT for their observation and several user oriented software packages have been developed. Local observing help is provided to first time users. If observations are cancelled or corrupted due to faulty antennas then the observatory makes efforts in rescheduling affected observations. Data are then sent to the Principal Investigator (PI). Under Directors Discretionary Time (DDT) several target of opportunity (TOO) observations are carried out, of highly transient phenomena such as Supernova explosion (SN) & gamma ray bursts (GRB), or of sources of high current scientific interest.

In cycles 12 & 13 we have received 69 and 52 proposals respectively and GTAC allotted time to 61 & 47 respectively.

GMRT Proposal Statistics - Cycle 12 & 13



GMRT Time Requested Statistics - Cycle 12 & 13



No. of Proposals

Category	Cycle 12	Cycle 13
PI from NCRA/TIFR	12	7
PI from other Indian Institute	16	10
PI from abroad	41	35
Total	69	52
Approved	61	47

Time allocation (hrs)

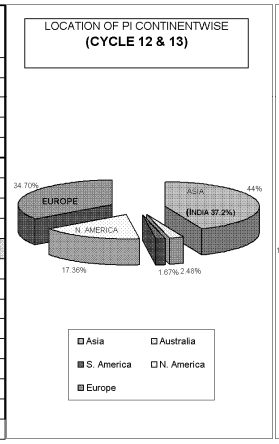
Category	Cycle 12	Cycle13
Time requested	3821	2415
Time allotted	1731	1701
Over subscription factor	2.2	1.4

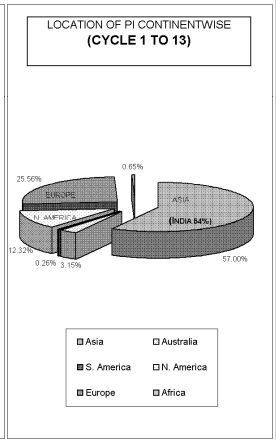
Observing Cycles 1 to 13

Country (PI)	No of Proposals
Argentina	4
Australia	24
Belgium	1
Brazil	5
Canada	17
China	2
Denmark	2
France	33
Germany	15
India	419
Iran	1
Italy	21
Ireland	2
Japan	6
Korea	1
Mauritius	2
Mexico	2
Netherlands	23
Poland	16
Russia	4
Spain	4
Taiwan	10
UK	74
USA	75
Total	**763**

Observing Cycles 12 & 13

Country (PI)	No of Proposals
Argentina	2
Australia	3
Begium	1
Canada	4
China	2
Denmark	2
Mexico	2
Netherlands	6
France	4
Germany	3
India	45
Japan	1
Poland	5
Spain	2
Italy	6
Ireland	1
Taiwan	5
UK	12
USA	15
Total	**121**

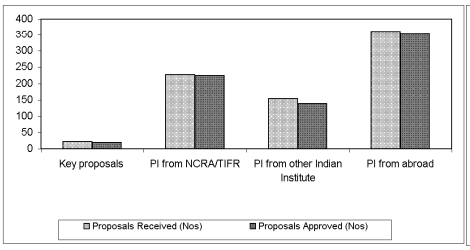


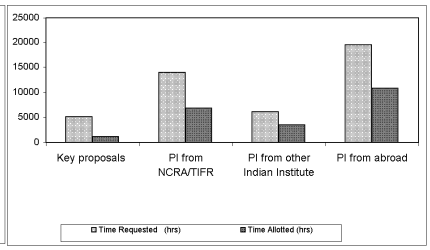


GMRT PROPOSAL STATISTICS - OBSERVING CYCLES 1 TO 13

Categories	Proposals Received (Nos)	Proposals Approved (Nos)	Time Requested (hrs)	Time Allotted (hrs)
Key proposals	22	19	5163	1193
PI from NCRA/TIFR	227	224	13923.5	6874
PI from other Indian Institute	153	139	6094	3512
PI from abroad	361	354	19459	10768
Total	**763**	**736**	**44640**	**22347**

GMRT PROPOSAL STATISTICS - OBSERVING CYCLES 1 TO 13





Radio Physics Laboratory

Group photo of students attending the Radio Astronomy School with 3-m RPL antenna in the background. The antenna was used for hands on training in radio astronomy as part of the school

The Radio Physics Laboratory (RPL), a joint collaborative effort between IUCAA and NCRA, has been functioning in the NCRA East Campus since May 2007 with active co-operation from IUCAA. It aims to provide a platform for teaching Radio Physics and Radio Astronomy techniques and for training students with interest in Radio Astronomy. A memorandum of understanding was signed between IUCAA and NCRA formally setting up the joint laboratory in January 2008. The laboratory provides a 4-m antenna with a two axis control system and 21-cm receivers, a 3-m antenna with a 21-cm receiver and a number of simple radio physics experiments. In the last year, the antennas have been used for providing hands-on training to several students, including two from Muktangana Exploratory program. The laboratory also provided practical training in radio astronomy during the Radio Astronomy School 2007 and was used as a practical component for Introductory Astronomy and Astrophysics course conducted by the Department of Physics, University of Pune and for the NCRA-IUCAA graduate school course.

[B. C. Joshi, D J Saikia, V Gajjar and S. Banthia with J. Bagchi, D Bhattacharya, N.A. Pawar, C. Konar,)

Scientific Information and Resource Centre

Approximately 375 books were purchased and subscriptions to 110 scientific journals were made for both Pune and Khodad campuses. Two new workstations are used for maintaining DSPACE Repository at NCRA/GMRT which currently holds 315 documents ⟨http://ncralib1.ncra.tifr.res.in:8080/jspui⟩. SIRC is also maintaining NCRA Publications database ⟨http://ncralib.ncra.tifr.res.in/ncrapubl/ncrasearch2.php⟩ as well as all GMRT Publications ⟨http://ncralib.ncra.tifr.res.in/gmrtpubl/advancepubsearch.php⟩.

Awards, National & International Involvement, Invited Talks, etc.

Awards

Yashwant Gupta

Shanti Swarup Bhatnagar Award in the Physical Sciences, for the year 2007.

Fellow, National Academy of Sciences, India.

Fellow, Indian Academy of Sciences.

National and International Involvement

Yashwant Gupta

Member, International SKA Science and Engineering Committee (SSEC), representing India

Member, Program Advisory Committee (PAC) on "Plasma, High Energy, Nuclear Physics, Astronomy & Astrophysics and Nonlinear Dynamics" of the Science and Engineering Research Council (SERC), Department of Science and Technology.

C.H. Ishwara Chandra

Member, Scientic Organising Committee, 7th Microqasar workshop, Turkey, September 2008.

Member, Local Organising Commitee, Low Frequency Radio Universe, NCRA–TIFR, Pune, December 2008.

P.K. Manoharan

Chief Convenor, Session on `Propagation of Coronal Mass Ejections' and Session on `Sun, Corona, and Heliosphere', Asia Oceania Geosciences Society (AOGS) Conference, Bangkok, Thailand, July 31Â-August 4, 2007.

Served as co-Chair of Scientific Organizing Committee, IHY workshop on Super Active Regions of Solar Cycle 23 and their Geo-space impact', May 7-11, 2007, ARIES, Nainital.

Editor, P.K. Manoharan served as the Editor for the book `Advances in Geosciences, Volume VIII: Solar Terrestrial Science', World Scientific Publications, Singapore, 2007.

Secretary, Solar and Heliospheric Physics Science Section, Asia Oceania Geosciences Society.

Member, Project Management Board and Co-investigator, RT-2 Experiment onboard Corona-Photon Satellite, TIFR-ISRO Project.

Principal Investigator, 'Operational Space Weather Forecasts', CAWSES-India Programme, ISRO Project.

Principle Investigator, 'Study of Origin of Three-Dimensional Solar Wind and Propagation of Coronal Mass Ejections from Sun to 1 AU', CAWSES-India Programme, ISRO Project.

Co-Investigator, `Space Solar Coronagraph Project', ISRO, Bangalore.

A. Praveen Kumar

Member, Radio Astronomy Frequency Committee for Asia Pacific, (RAFCAP)

D.J. Saikia

Member, Advisory committee for the Space Physics Centre, Kolkata

Associate Editor, Bulletin of the Astronomical Society of India

Guest Editor (along with Kandaswamy Subramanian), Proceedings of the 25th Meeting of the Astronomical Society of India

Member, IFAN (Indo-French Astronomy Network) committee

Member, SOC of the conference on Compact steep-spectrum radio sources, Italy

Chairperson, SOC, The Low-Frequency Universe, to be held in Pune, India

Conference Organised by the Centre

National Space Science Symposium

The 15th National Space Science Symposium, sponsored by Indian Space Research Organisation (ISRO), was held at the Radio Astronomy Centre, Ooty, during February 26-29, 2008. The symposium covered the

following broad areas: (i) Space- and ground-based astronomy and astrophysics, planetary science/exploration, (ii) Solar radiation and its interaction with earth's near and distant environment, (iii) Magnetosphere, ionosphere, thermosphere and middle atmosphere phenomena, (iv) Space-based oceanography, meteorology, and tropospheric studies, and (v) Climate changes and geosphere-biosphere interaction processes. Three parallel sessions and plenary sessions were arranged. Nearly 550 participants attended the symposium and 540 scientific research papers were presented on above areas of space science and astronomy and astrophysics. The symposium set a remarkable high level, in terms of science aspect and logistic arrangements.

In parallel to the symposium, a two-day public outreach program was arranged by the Radio Astronomy Centre in collaboration with the CSI College of Engineering, Ketti (near Ooty) at the above college campus during February 27-28, 2008. A Space Science Exhibition was also arranged at the CSI College auditorium. The exhibition was visited by a large number of students and public in around Nilgiri District.
[P.K. Manoharan]

Radio Astronomy School, NCRA–TIFR, Pune

Radio Astronomy School was organized from mid-May to mid-July 2008 to introduce students and research workers to the techniques of radio astronomy with hands on experience in using GMRT data. The teaching faculty consisted of members from both within and outside the country.
[D.J. Saikia]

Non-DAE Research Projects

J. Chengalur, Y. Gupta, J. Roy
Developing the Swinburne Software Correlator to process data from the GMRT, for enhanced low frequency astrophysics,
Department of Science and Technology,
Jan 2007 – Jan 2010.

P.K. Manoharan
Operational Space Weather Forecasts
CAWSES-India Programme
ISRO Project (2007-2009).

P.K. Manoharan
Study of Origin of Three-Dimensional Solar Wind and Propagation of Coronal Mass Ejections from Sun to 1 AU
CAWSES-India Programme
ISRO Project (2007-2009).

Invited Talks

Yashwant Gupta

Real Time Signal Processing and Computing in Radio Astronomy
Plenary talk, National Conference on Embedded Control, Computing and Communication, International Institute of Information Tehcnology, Pune,
September 19–21, 2007

S. Pal

Multi wavelength radio observations of Cygnus X-3 during the giant flare of May-June 2006
Observational Evidence of Black holes in Universe, Kolkata
February 14, 2008

D.J. Saikia

Galaxies
A Short Summer Course in Physics, Department of Physics, University of Pune
May 21–26, 2007

Periodic feeding of black holes in active galaxies
Measuring spin and mass of Black Holes, Pune.
December 18–21, 2007

Visits

S.A. Barve

National Workshop on Preserving our Scientific Heritage
Indian Institute of Astrophysics, Bangalore
21st - 22nd January 2008.

S.N. Dongare

Libsys Second Level Training Program
Jayakar Library, University of Pune, Pune
18th – 22nd February 2008.

Yashwant Gupta

Casper FPGA Workshop on development of next generation digital back-ends for radio astronomy, Berkeley, California, USA,
June 2007

First meeting of the SKA Science and Engineering Committee, Perth and for collaborative research work with colleagues at Swinburne University of Technology, Melbourne, Melbourne and Perth, Australia March 2008

Developing Applications for GARUDA, JNU, New Delhi, October 4–6, 2007

Third GARUDA Partners Meet organised by CDAC, March 3–4, 2008 Bangalore

C.H. Ishwara Chandra

University of Barcelona
September 2 – 22, 2007

N.G. Kantharia

Visiting Research Scientist, Indian Institute of Astrophysics, Bangalore
September 2007 to March 2008.

National Symposium on Gamma Ray Astronomy
Indian Institute of Astrophysics, Bangalore
23–24 November 2007.

Raman Research Institute, Bangalore
August 2007 & November 2007.

P.K. Manoharan

Space Weather Consequences of Solar Cycle Changes in 3-D Solar Wind
International CAWSES Symposium (SCOSTEP), Kyoto, Japan
October 22-27, 2007.

Solar Wind Effects of Solar Activity Cycle #23
Asia Oceania Geosciences Society (AOGS) Conference, Bangkok, Thailand
July 31–August 4, 2007.

IHY Activities in India and Space Weather Studies at Ooty
Workshop on International Science Years, Indian National Science Academy, New Delhi
October 3, 2007.

Ooty IPS Studies and IPS Network
Toyokawa IPS Workshop, Solar-Terrestrial Environment Laboratory, Toyokawa, Japan
October 30-31, 2007.

Scintillation Study of Propagation of Coronal Mass Ejections in the Inner Heliosphere
Asia Oceania Geosciences Society (AOGS) Conference, Bangkok, Thailand
July 31–August 4, 2007.

IHY Activities in India
UN/ESA/NASA/JAXA Workshop on Basic Space Science and International Heliophysical Year, Tokyo, Japan
June 18-22 2007.

Interaction of IP disturbances with solar wind
Solar-Terrestrial Environment Laboratory, Nagoya University, Japan
June 25, 2007.

Solar Cycle Changes in Three-dimensional Solar Wind - Shocks Associated with CMEs and CIRs
IHY workshop on Super Active Regions of Solar Cycle 23 and their Geo-Space impact, , ARIES, Nainital
May 7-11, 2007

R. Nityananda

Raman Research Institute
September 2007

International School of Photonics, Cochin University, Cochin
November 2007

American College, Madurai
February 2008

D.J. Saikia

Jodrell Bank Observatory, UK
October 2007

Talks given elsewhere

S.A. Barve

DSpace experience at NCRA, Pune
Hewlett Packard, New Delhi
21st August 2007

Open Source Software for Digital Libraries
SDP of Digital Library Management, AICTE Sponsored program,

Sinhgad College of Engineering, Pune
16-27, 2008.

B.C. Joshi

A 610-MHz Galactic Plane Pulsar Search with GMRT
40 YEARS OF PULSARS: Millisecond Pulsars, Magnetars and More, Montreal, Canada
August 12 - 19, 2007

N.G. Kantharia

Galaxies
Indian Institute of Astrophysics, Bangalore
28 February 2008.

Radio Data Analysis
Indian Institute of Astrophysics
18 January 2008.

P.K. Manoharan

Solar Wind Turbulence and Scintillation Studies
First Kodai-Trieste Workshop on Plasma Astrophysics, Indian Institute of Astrophysics, Kodaikanal.
August 27 – September 7, 2007.

Solar Wind Studies in the Inner Heliosphere
Asia-Pacific School of International Heliophysical Year, Indian Institute of Astrophysics, Kodaikanal
December 10–22, 2007.

IPS techniques
Asia-Pacific School of International Heliophysical Year, Indian Institute of Astrophysics, Kodaikanal
December 10–22, 2007.

Three Dimensional Solar Wind and Space Weather Aspects
CAWSES Workshop, NARL, Gadanki
May 21-23, 2007.

Keynote address
Physica-07 Symposium, Karpagam Arts and Science College, Coimbatore,
August 17, 2007.

Recent trends in Solar Physics
State Level Seminar on Advances in Astrophysics and Optics, Lady

Doak College, Madurai
February 6, 2008.

D.J. Saikia

Episodic activity in radio sources
From Planets to Dark Energy: The Modern Radio Universe,
University of Manchester
October 1–5, 2007

Publications

In Journals

Ali, Sk. Saiyad; Bharadwaj, Somnath; **Chengalur, Jayaram N.**
Foregrounds for redshifted 21-cm studies of reionization: Giant Meter Wave Radio Telescope 153-MHz observations
Monthly Notices of the Royal Astronomical Society, **385**, 2166-2174. (2008)

Bagchi, Joydeep; **Gopal-Krishna**; Krause, Marita; Joshi, Santosh
A Giant Radio Jet Ejected by an Ultramassive Black Hole in a Single-lobed Radio Galaxy
The Astrophysical Journal, **670**, L85-L88. (2007)

Barway, Sudhanshu; Kembhavi, Ajit; **Wadadekar, Yogesh**; Ravikumar, C. D.; Mayya, Y. D.
Lenticular Galaxy Formation: Possible Luminosity Dependence
The Astrophysical Journal, **661**, L37-L40. (2007)

Begum, Ayesha; **Chengalur, Jayaram N**.; Karachentsev, I. D.; Sharina, M. E.
Baryonic Tully-Fisher relation for extremely low mass Galaxies
Monthly Notices of the Royal Astronomical Society, **386**, 138-144. (2008)

Begum, Ayesha; **Chengalur, Jayaram N**.; Karachentsev, I. D.; Sharina, M. E.; Kaisin, S. S
FIGGS: Faint Irregular Galaxies GMRT Survey - overview, observations and first results
Monthly Notices of the Royal Astronomical Society, **386**, 1667-1682. (2008)

Begum, Ayesha; **Chengalur, Jayaram N**.; Kennicutt, Robert C.; Karachentsev, Igor D.; Lee, Janice C.
Life in the last lane: star formation and chemical evolution in an extremely gas rich dwarf
Monthly Notices of the Royal Astronomical Society, **383**, 809-816. (2008)

Bhattacharyya, B.; Gupta, Y.; Gil, J.
Results from multifrequency observations of PSR B0826-34
Monthly Notices of the Royal Astronomical Society, **383**, 1538-1550. (2007)

Bhattacharyya, Bhaswati; Nityananda, Rajaram
Determination of the orbital parameters of binary pulsars
Monthly Notices of the Royal Astronomical Society, 387, 273-278. (2008)

Bondi, M.; Ciliegi, P.; Venturi, T.; Dallacasa, D.; Bardelli, S.; Zucca, E.; **Athreya, R.M.**; Gregorini, L.; Zanichelli, A.; Le Fèvre, O.; Contini, T.; Garilli, B.; Iovino, A.; Temporin, S.; Vergani, D.
The VVDS-VLA deep field. III. GMRT observations at 610 MHz and the radio spectral index properties of the sub-mJy population
Astronomy and Astrophysics, **463**, 519-527 (2007)

Carilli, C. L.; Wang, Ran; van Hoven, M. B.; Dwarakanath, K.; **Chengalur, Jayaram N**.; Wyithe, Stuart
A Search for H I 21 cm Absorption toward the Highest Redshift (z~5.2) Radio-loud Objects
The Astronomical Journal, **133**, 2841-2845. (2007)

Chandra, P.; **Chandra, I.;** Gupta, N.
070125 observations with the GMRT.
GRB Coordinates Network, Circular Service, **6102**, 1 (2007)

Ciprini, S.; Raiteri, C. M.; Rizzi, N.; Agudo, I.; Foschini, L.; Fiorucci, M.; Takalo, L. O.; Villata, M.; Ostorero, L.; Sillanpää, A.; Valtonen, M.; Tosti, G.; Wagner, S. J.; Aller, H.; Aller, M. F.; Arai, A.; Arkharov, A. A.; Bakis, V.; Bagaglia, M.; Böttcher, M.; Buemi, C.; Carosati, D.; Chen, W. P.; Efimov, Y.; Emmanoulopoulos, D.; Erdem, A.; Fuhrmann, L.; Frasca, A.; Fullhart, M.; Goyal, A.; Heidt, J.; Hovatta, T.; Hroch, F.; Ibrahimov, M. A.; Jilková, L.; Joshi, M.; Kamada, M.; Katsuura, M.; Kinoshita, D.; Kostov, A.; Kotaka, D.; Kovalev, Y. Y.; Krejcová, T.; Krichbaum, T.; **Krishna, G.**; Kurosaki, M.; Kurtanidze, O.; Lahteenmaki, A.; Lanteri, L.; Larionov, V.; Lee, C.-U.; Letho, H.; Leto, P.; Li, J.; Lindfors, E.; Münz, F.; Marilli, E.; Matsubara, Y.; Mizoguchi, S.; Mondal, S.; Nakamura, K.; Nieppola, E.; Nilsson, K.; Nishiyama, S.; Nucciarelli, G.; Ogino, A.; Ohlert, J.; Oksanen, A.; Ovcharov, E.; Pak, S.; Pasanen, M.; Pullen, C.; Pursimo, T.; Ros, J. A.; Sadakane, K.; Sadun, A. C.; Sagar, R.; Sohnk, B.-W.; Sumitomo, N.; Tanaka, K.; Trigilio, C.; Torniainenk I.; Tornikoski, M.; Umana, G.; Ungerechts, H.; Valtaoja, E.; Volvach, A.; Webb, J. R.; Wu, J.; Yim, H.-S.; Zhang, Y.
Prominent activity of the blazar OJ 287 in 2005. XMM-Newton and multi-wavelength observations
Memorie della Societa Astronomica Italiana, **78**, (2007)

Culhane, J. L.; Pohjolainen, S.; van Driel-Gesztelyi, L.; **Manoharan, P. K.;** Elliott, H. A.

Study of CME transit speeds for the event of 07-NOV-2004
Advances in Space Research, **40**, 1807-1814. (2007)

Das, M.; **Kantharia, N.;** Ramya, S.; Prabhu, T. P.; McGaugh, S. S.; Vogel, S. N.
The AGN and gas disc in the low surface brightness galaxy PGC045080
Monthly Notices of the Royal Astronomical Society, **379**, 11-20. (2007)

de Ugarte Postigo, A.; Fatkhullin, T. A.; Jóhannesson, G.; Gorosabel, J.; Sokolov, V. V.; Castro-Tirado, A. J.; Balega, Yu. Yu.; Spiridonova, O. I.; Jelínek, M.; Guziy, S.; Pérez-Ramírez, D.; Hjorth, J.; Laursen, P.; Bersier, D.; Pandey, S. B.; Bremer, M.; Monfardini, A.; Huang, K. Y.; Urata, Y.; Ip, W. H.; Tamagawa, T.; Kinoshita, D.; Mizuno, T.; Arai, Y.; Yamagishi, H.; Soyano, T.; Usui, F.; Tashiro, M.; Abe, K.; Onda, K.; Aslan, Z.; Khamitov, I.; Ozisik, T.; Kiziloglu, U.; Bikmaev, I.; Sakhibullin, N.; Burenin, R.; Pavlinsky, M.; Sunyaev, R.; Bhattacharya, D.; Kamble, A. P.; **Ishwara Chandra, C. H.;** Trushkin, S. A.
Extensive multiband study of the X-ray rich GRB 050408. A likely off-axis event with an intense energy injection
Astronomy and Astrophysics, **462**, L57-L60 (2007)

Dutta, Prasun; Begum, Ayesha; Bharadwaj, Somnath; **Chengalur, Jayaram N**.
HI power spectrum of the spiral galaxy NGC628
Monthly Notices of the Royal Astronomical Society: Letters, 384, L34-L37. (2007)

Freire, P.C.C.; Ransom, S.R.; Gupta, Y.
Timing the eccentric binary millisecond pulsar in NGC 1851
ApJ, **662**, 1177 (2007)

Gavrilenko, V. G.; Nechaeva, M. B.; Pushkarev, A. B.; Molotov, I. E.; Tuccari, G.; Chebotarev, A. S.; Gorshenkov, Yu. N.; Samodurov, V. A.; Hong, X.; Quick, J.; Dougherty, S.; **Ananthakrishnan, S**.
Results of theoretical and experimental studies of solar wind and active galactic nuclei on LFVN VLBI network using S2 recording system
Radiophysics and Quantum Electronics, **50**, 253-273 (2007)

Giacintucci, S.; Venturi, T.; Macario, G.; Dallacasa, D.; Brunetti, G.; Markevitch, M.; Cassano, R.; Bardelli, S.; **Athreya, R**.
Shock acceleration as origin of the radio relic in A 521?
A&A, **486**, 347 (2008)

Giacintucci, S.; Venturi, T.; Murgia, M.; Dallacasa, D.; **Athreya, R.M**; Bardelli, S.; Mazzotta, P.; **Saikia, D. J.**
Radio morphology and spectral analysis of cD galaxies in rich and poor galaxy clusters
Astronomy and Astrophysics, **476**, 99-119 (2007)

Giacintucci, Simona; Vrtilek, Jan M.; Murgia, Matteo; Raychaudhury, Somak; O'Sullivan, Ewan J.; Venturi, Tiziana; David, Laurence P.; Mazzotta, Pasquale; Clarke, Tracy E.; **Athreya, Ramana M**.
A Giant Metrewave Radio Telescope Multifrequency Radio Study of the Isothermal Core of the Poor Galaxy Cluster AWM 4
ApJ, **682**, 186 (2008)

Gopal-Krishna; Mangalam, A.; Wiita, Paul J.
Stellar Disruption by Supermassive Black Holes and the Quasar Radio Loudness Dichotomy
The Astrophysical Journal, **680**, L13-L16 (2008)

Gopal-Krishna; Wiita, Paul J.; Joshi, Santosh
Superdiscs in radio galaxies: jet-wind interactions
Monthly Notices of the Royal Astronomical Society, **380**, 703-711 (2007)

Goyal, Arti; **Gopal-Krishna**, Sagar, Ram; Anupama, G. C.; Sahu, D.
Further evidence for intra-night optical variability of radio-quiet quasars
Bulletin of the Astronomical Society of India, **35**, 141-154 (2007)

Hota, Ananda; **Saikia, D. J**.; Irwin, Judith A.
NGC 4438 and its environment at radio wavelengths
Monthly Notices of the Royal Astronomical Society, **380**, 1009-1022. (2007)

Jamrozy, M.; Konar, C.; Machalski, J.; **Saikia, D. J**.
A multifrequency study of giant radio sources - II. Spectral ageing analysis of the lobes of selected sources
Monthly Notices of the Royal Astronomical Society, **385**, 1286-1296. (2008)

Johnston, Simon; Karastergiou, Aris; **Mitra, Dipanjan; Gupta, Yashwant**
Multifrequency integrated profiles of pulsars
Monthly Notices of the Royal Astronomical Society, Online Early (2008)

Joshi, B. Manoharan, P.K. , Veronig, A.M., Pant, P., Pandey, K.
Multi-wavelength Analysis of an X2.7 Flare on 3 November 2003 from Active Region NOAA 10488
Sun and Geosphere, **1**, 17 (2007)

Kamp, I.; Freudling, W.; **Chengalur, Jayaram N.**
H I 21 cm Emission as a Tracer of Gas During the Evolution from Protoplanetary to Debris Disks
The Astrophysical Journal, 660, 469-478. (2007)

Kanekar, N.; **Chengalur, J. N.;** Lane, W. M.
HI 21-cm absorption at z ~ 3.39 towards PKS 0201+113
Monthly Notices of the Royal Astronomical Society, **375**, 1528-1536 (2007)

Kanekar, Nissim; **Chengalur, Jayaram N.**
Outflowing atomic and molecular gas at z ~ 0.67 towards 1504 + 377
Monthly Notices of the Royal Astronomical Society: Letters, **384**, L6-L10. (2008)

Kantharia, N. G.; Anupama, G. C.; Prabhu, T. P.; Ramya, S.; Bode, M. F.; Eyres, S. P. S.; O'Brien, T. J.
Giant Metrewave Radio Telescope Observations of the 2006 Outburst of the Nova RS Ophiuchi: First Detection of Emission at Radio Frequencies <1.4 GHz
The Astrophysical Journal, **667**, L171-L174. (2007)

Kantharia, N. G.; Goss, W. M.; Roshi, D. Anish; Mohan, Niruj R.; Viallefond, Francois
GMRT and VLA Observations at 49 cm and 20 cm of the HII Region near l = 24.8°, b = 0.1°
Journal of Astrophysics & Astronomy, **28**, 41-53 (2007)

Kantharia, N. G.; Rao, A. Pramesh; Sirothia, S. K.
Low radio frequency signatures of ram pressure stripping in Virgo spiral NGC 4254
Monthly Notices of the Royal Astronomical Society, **383**, 173-182 (2008)

Konar, C.; Jamrozy, M.; **Saikia, D. J.**; Machalski, J.
A multifrequency study of giant radio sources - I. Low-frequency Giant Metrewave Radio Telescope observations of selected sources
Monthly Notices of the Royal Astronomical Society, **383**, 525-538. (2008)

Lah, Philip; **Chengalur, Jayaram N.;** Briggs, Frank H.; Colless, Matthew; de Propris, Roberto; Pracy, Michael B.; de Blok, W. J. G.; Fujita, Shinobu S.; Ajiki, Masaru; Shioya, Yasuhiro; Nagao, Tohru; Murayama, Takashi; Taniguchi, Yoshiaki; Yagi, Masafumi; Okamura, Sadanori
The HI content of star-forming galaxies at z = 0.24
Monthly Notices of the Royal Astronomical Society, **376**, 1357-1366. (2007)

Lal, Dharam Vir; **Rao, A. Pramesh**
Giant Metrewave Radio Telescope observations of X-shaped radio sources
Monthly Notices of the Royal Astronomical Society, **374**, 1085-1102, (2007)

Lal, Dharam; **Pramesh Rao**, A.; Cheung, C. C.; Bhatnagar, Sanjay
Nature of X-shaped radio sources: A statistical approach
Astronomische Nachrichten, **328**, 669 (2007)

Lorimer, D. R.; Freire, P. C. C.; Stairs, I. H.; Kramer, M.; McLaughlin, M. A.; Burgay, M.; Thorsett, S. E.; Dewey, R. J.; Lyne, A. G.; Manchester, R. N.; D'Amico, N.; Possenti, A.; **Joshi, B. C.**
Age constraints in the double pulsar system J0737-3039
Monthly Notices of the Royal Astronomical Society, **379**, 1217-1221. (2007)

Machalski, J.; Koziel-Wierzbowska, D.; Jamrozy, M.; **Saikia, D. J.**
J1420-0545: The Radio Galaxy Larger than 3C 236
The Astrophysical Journal, **679**, 149-155. (2008)

Martí, J.; Paredes, J. M.; **Ishwara Chandra, C. H.**; Bosch-Ramon, V.
Deep radio images of the HEGRA and Whipple TeV sources in the Cygnus OB2 region
Astronomy and Astrophysics, **472**, 557-564 (2007)

Mitra, Dipanjan; Rankin, Joanna M.
On the subpulse modulation, polarization and sub-beam carousel configuration of pulsar B1857-26
Monthly Notices of the Royal Astronomical Society, **385**, 606-613. (2008)

Mitra, Dipanjan; Rankin, Joanna M.; **Gupta, Yashwant**
Absolute broad-band polarization behaviour of PSR B0329+54: a glimpse of the core emission process
Monthly Notices of the Royal Astronomical Society, **379**, 932-944 (2007)

Paredes, J. M.; Martí, J.; **Ishwara-Chandra, C. H.;** Torres, D. F.; Romero, G. E.; Combi, J. A.; Bosch-Ramon, V.; Muñoz-Arjonilla, A. J.; Sánchez-Sutil, J. R.
Radio detections towards unidentified variable EGRET sources
Astronomy and Astrophysics, **482**, 247-253 (2008)

Pohjolainen, S.; van Driel-Gesztelyi, L.; Culhane, J. L.; **Manoharan, P. K.**; Elliott, H. A.
CME Propagation Characteristics from Radio Observations
Solar Physics, **244**, 167-188 (2007)

Possenti, A., Rea, N., McLaughlin, M.A., Camilo, F., Kramer, M., Burgay, M., **Joshi, B.C.**, and Lyne, A.G.

The Very Soft X-Ray Spectrum of the Double Pulsar System J0737-3039
Astrophysical Journal, **680**, 654, 2008,

Roy, Nirupam
On spherically symmetrical accretion in fractal media
Monthly Notices of the Royal Astronomical Society: Letters, **378**, L34-L38. (2007)

Roy, Nirupam; Manoharan, P. K.; Chakraborty, Pavan
Occultation Observation to Probe the Turbulence Scale Size in the Plasma Tail of Comet Schwassmann-Wachmann 3-B
The Astrophysical Journal, **668**, L67-L70. (2007)

Roy, Nirupam; Peedikakkandy, Leshma; **Chengalur, Jayaram**
Turbulence measurements from HI absorption spectra
Monthly Notices of the Royal Astronomical Society: Letters, **387**, L18-L22. (2008)

Roy, Nirupam; Ray, Arnab K.
Critical properties of spherically symmetric accretion in a fractal medium
Monthly Notices of the Royal Astronomical Society, **380**, 733-740, (2007)
j

Roy, S.; Pramesh Rao, A.; Subrahmanyan, R.
Magnetic field near the central region of the Galaxy: rotation measure of extragalactic sources
Astronomy and Astrophysics, **478**, 435-442 (2008)

Ryan-Weber, Emma V.; Begum, Ayesha; Oosterloo, Tom;
Pal, Sabyasachi; Irwin, Michael J.; Belokurov, Vasily;
Evans, N. Wyn; Zucker, Daniel B.
The Local Group dwarf Leo T: HI on the brink of star formation
Monthly Notices of the Royal Astronomical Society, **384**, 535-540. (2008)

Samal, M. R.; Pandey, A. K.; Ojha, D. K.; Ghosh, S. K.;
Kulkarni, V. K.; Bhatt, B. C.
A Multiwavelength Study of Galactic H II Region Sh 2-294
The Astrophysical Journal, **671**, 555-570. (2007)

Scarano, S.; Madsen, Felipe R. H.; **Roy, Nirupam**; Lépine, J. R. D.
H I aperture synthesis and optical observations of the pair of galaxies NGC 6907 and 6908
Monthly Notices of the Royal Astronomical Society, **386**, 963-972. (2008)

Srianand, R.; Gupta, N.; Petitjean, P.; Noterdaeme, P.; **Saikia, D. J**.
Detection of the 2175Å extinction feature and 21-cm absorption in

two MgII systems at z ~ 1.3
MNRAS, in press (arXiv 0809.0919)

Subramanian, P.; White, S. M.; Karlický, M.; Sych, R.; Sawant, H. S.; **Ananthakrishnan, S.**
Electron acceleration in a post-flare decimetric continuum source
Astronomy and Astrophysics, **468**, 1099-1102 (2007)

Tej, A.; Ghosh, S. K.; **Kulkarni, V. K.;** Ojha, D. K.; Verma, R. P.; Vig, S.
A multiwavelength study of the ultracompact HII region associated with IRAS 20178+4046
Astronomy and Astrophysics, **468**, 1001-1008 (2007)

Tej, A.; Ghosh, S. K.; **Kulkarni, V. K.**; Ojha, D. K.; Verma, R. P.; Vig, S.
IRAS 20178+4046 maps at 610 and 1280MHz (Tej+, 2007) VizieR On-line Data Catalog: J/A+A/468/1001.
Astronomy and Astrophysics, **468**, (2007)

van der Horst, A. J.; Kamble, A.; Resmi, L.; Wijers, R. A. M. J.; Bhattacharya, D.; Scheers, B.; Rol, E.; Strom, R.; Kouveliotou, C.; Oosterloo, T.; **Ishwara-Chandra, C. H.**
Detailed study of the GRB 030329 radio afterglow deep into the non-relativistic phase
Astronomy and Astrophysics, **480**, 35-43 (2008)

van der Horst, A. J.; Kamble, A.; Wijers, R. A. M. J.; Resmi, L.; Bhattacharya, D.; Rol, E.; Strom, R.; Kouveliotou, C.; Oosterloo, T.; **Ishwara-Chandra, C. H.**
GRB 030329: 3 years of radio afterglow monitoring
Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, **365**, 1241-1246 (2007)

In Proceedings

Afonso, J.; Messias, H.; Mobasher, B.; Koekemoer, A.; Norris, R. P.; Cram, L.; Kanekar, N.; Farrah, D.; **Chengalur, J.**
Deep ATCA and GMRT Observations of the CDFS
At the Edge of the Universe: Latest Results from the Deepest Astronomical Surveys *ASP Conference Series*, 380, 9-13 October, 2006 Sintra, Portugal. Ed. José Afonso, Henry C. Ferguson, Bahram Mobasher, and Ray Norris., 243

Barve, Sunita
File formats in digital preservation
In Proceedings of the International Conference on Digital Libraries

(ICSD), organised by DRTC, Bangalore p. 239-248, 2007.
https://drtc.isibang.ac.in/handle/1849/312

Benz, A.O., Monstein, C., Meyer, H., Manoharan, P.K., Ramesh, R., Altyntsev, A.
Lara, A. Paezm J. Cho, K.-S. A World-wide Net of Solar Radio Spectrometers - e-CALLISTO
United Nations Scientific and Technical Report, February 2008

Bhattacharyya, B.; Gupta, Y.; Gil, J.; Sendyk, M.
Discovery of a remarkable subpulse drift pattern in PSR B0818-41
Proc. of the 25th meeting of the ASI, BASI, **25** p 34 2007

Das, M.; McGaugh, S. S.; **Kantharia, N.**; Vogel, S. N.
Radio Observations of AGN in Low Surface Brightness Galaxies
Dark Galaxies and Lost Baryons, *Proceedings IAU Symposium*, **244**, 352-353, 2007

Das, M.; O'Neil, K.; **Kantharia, N.;** Vogel, S. N.; McGaugh, S. S.
Radio Observations of the AGN and Gas in Low Surface Brightness Galaxies
Galaxy Evolution Across the Hubble Time, Edited by F. Combes and J. Palous, *Proceedings of the IAU Symposium #235*, 14-17 August, 2006 Prague, Czech Republic. Cambridge: Cambridge University Press, 2007. 90-90

Debnath, D., Nandi, A., Chakrabarti, S.K., Rao, A.R., **Manoharan, P.K.** Solar science using RT-2 payloads aboard Coronas-photon satellite
Proc. 25th meeting of ASI, p.82, 2007.

Freire, P.C.C.; Ransom, S.R.; Gupta, Y.
The eccentric binary millisecond pulsar in NGC 1851
AIP Conference Proc. **983** p 491 2008

Giacintucci, S.; Venturi, T.; Bardelli, S.; Dallacasa, D.; Mazzotta, P.; **Saikia, D. J.**
High Sensitivity Low Frequency Radio Observations of cD Galaxies
Heating versus Cooling in Galaxies and Clusters of Galaxies, *ESO Astrophysics Symposia*, Springer-Verlag Berlin Heidelberg, 2007, 130

Gonzalez-Esparza, A., Andrade, E., Carrillo, A., Kurtz, S., Jeyakumar, S., Perez-Enriquez, R., Sierra, P., Vazquez, S., **Manoharan, P.K.**
MEXART: Interplanetary Scintillation Array in Mexico in the IHY2007
American Geophysical Union, **33A**, 398, (2007)

Gray, Meghan; Aragon-Salamanca, A.; Bacon, D.; Balogh, M.; Barazza, F. D.; Barden, M.; Bell, E.; Beswick, R.; Boehm, A.; Caldwell, J. A.

R.; Gallazzi, A.; Gilmour, R.; Green, D. A.; Haeussler, B.; Heiderman, A.; Heymans, C.; Jahnke, K.; Jogee, S.; van Kampen, E.; Koposov, S.; Lane, K. P.; Marinova, I.; Meisenheimer, K.; McIntosh, D. H.; Papovich, C.; Peng, C. Y.; Rix, H.; **Saikia, D. J.;** Sanchez, S. F.; Somerville, R. S.; Taylor, A. N.; Van Waerbeke, L.; Wisotzki, L.; Wolf, C.; Zheng, X.
STAGES: Space Telescope A901/902 Galaxy Evolution Survey
American Astronomical Society Meeting #211, **Abstract 21113220** (2007)

Hess, Kelley M.; Pisano, D.; Wilcots, E.; **Chengalur, J. N**.
Anomalous HI in NGC 2997 and the Search for High Velocity Cloud Analogs
American Astronomical Society, AAS Meeting #211, #13.13

Ishwara-Chandra, C. H.; Marathe, R.
Results from GMRT 150 MHz Radio Observations: Search for Steep Spectrum Radio Sources
At the Edge of the Universe: Latest Results from the Deepest Astronomical Surveys *ASP Conference Series*, **380**, 9-13 October, 2006 Sintra, Portugal. Ed. José Afonso, Henry C. Ferguson, Bahram Mobasher, and Ray Norris., 237

Ishwara-Chandra C. H., Pal, S., Pramesh Rao, A.
Low Frequency GMRT Observations of Microquasar V4641 Sgr.
VI Microquasar Workshop: Microquasars and Beyond. Proceedings of Science.

Jamrozy, M.; Konar, C.; Machalski, J.; Mack, K.-H.; **Saikia, D. J.;** Siemiginowska, A.; Stawarz, L.
Recurrent Activity in Radio Galaxies in Extragalactic Jets: Theory and Observation from Radio to Gamma Ray;
ASPC, **386**, 125 (2008)

Joshi, Bhuwan, Pant, P., Manoharan, P.K.
On the periodic behaviour of Sunspot activity during Solar cycle 23
Proc. 25th meeting of ASI, **40**, 2007.

Joshi, B.; Pant, P.; **Manoharan, P. K.;** Pandey, K.
North–South Asymmetry of Solar Activity during Cycle 23
The Physics of Chromospheric Plasmas *ASP Conference Series*, **368**, 9-13 October, 2006 University of Coimbra, Portugal. Ed. P. Heinzel, I. Dorotovil, and R. J. Rutten. San Francisco: *Astronomical Society of the Pacific*, 2007., 539

Joshi, B. C.; McLaughlin, M. A.; Kramer, M.; Lyne, A. G.; Lorimer, D. R.; Ludovici, D. A.; Davies, M.; Faulkner, A.
A 610-MHz Galactic Plane Pulsar Search with the Giant Meterwave

Radio Telescope
40 YEARS OF PULSARS: Millisecond Pulsars, Magnetars and More. AIP Conference Proceedings, **983**, 616-617 (2008).

Kanekar, Nissim; **Chengalur, Jayaram N**.; Ghosh, Tapasi
Probing Fundamental Constant Evolution with Redshifted OH Lines
Precision Spectroscopy in Astrophysics, Proceedings ESO/Lisbon/Aveiro Conference Aveiro, Portugal, 11-15 September 2006. Ed. N.C. Santos, L. Pasquini, A.C.M. Correia, and M. Romanielleo. Garching, Germany, 2008 109-112

Lah, Philip; **Chengalur, Jayaram N**.; Briggs, Frank H.; Colless, Matthew; De Propris, Roberto; Pracy, Michael B.; de Blok, W. J. G.
Neutral Hydrogen Gas in Star Forming Galaxies at z=0.24
Dark Galaxies and Lost Baryons, Proceedings IAU Symposium, **244**, 366-367

Mitra, Dipanjan; Rankin, Joanna M.
On the Subpulse Modulation and Carousal Circulation Time of PSR B1857-26
40 YEARS OF PULSARS: Millisecond Pulsars, Magnetars and More. *AIP Conference Proceedings*, **983**, 109-111 (2008).

Mitra, Dipanjan; Rankin, Joanna M.; **Gupta, Yashwant**
Absolute Broadband Polarization of PSR B0329+54: A Glimpse of the Core Emission Process
40 YEARS OF PULSARS: Millisecond Pulsars, Magnetars and More. *AIP Conference Proceedings*, **983**, 136-138 (2008).

Mitra, Dipanjan; Rankin, Joanna M.; Sarala, S.
Are `Partial Cones' Aberrated Cones?
40 YEARS OF PULSARS: Millisecond Pulsars, Magnetars and More. *AIP Conference Proceedings*, **983**, 106-108 (2008).

Pal, Sabyasachi; Ishwara-chandra; Rao, Pramesh
Multi wavelenght radio observations of Cygnus X-3 during the giant flare of May-June 2006;
Observational Evidence of Black holes in Universe (2007)

Pustilnik, S. A.; **Ekta**; Kniazev, A. Y.; **Chengalur, J. N.;** Vanzi, L.
Interaction/merger-induced starbursts in local very metal-poor dwarfs: link to the common SF in high-z young galaxies
Triggered Star Formation in a Turbulent ISM, Edited by B. G. Elmegreen and J. Palous. *Proceedings IAU Symposium #237*, 14-18 August, 2006, Prague, Czech Republic. Cambridge: Cambridge University Press, 2007., 466-466

Rankin, Joanna M.; **Mitra, Dipanjan**
Exploring the Absolute Orthogonal Polarization-Mode Geometry of Outer-Edge Conal Emission
40 YEARS OF PULSARS: Millisecond Pulsars, Magnetars and More. *AIP Conference Proceedings*, **983**, 139-141 (2008).

Roy, Subhashis; Hyman, Scott; **Pal, Sabyasachi**; Lazio, T. Joseph W.; Ray, Paul S.; Kassim, Namir E.; Bhatnagar, Sanjay
New results on radio emission from the transient bursting source GCRTJ 1745-3009
BASI, **25**, 44, ASI (2007)

Telegrams and GCN Circulars

Chakraborti, Sayan; Chandra, Poonam; **Roy, Nirupam**; Ray, Alak
Radio monitoring of SN 2007gr by GMRT in the L-band
The Astronomer's Telegram, **#1222**

Kamble, A.; **Pal, S.;** Bhattacharya, D.; **Chandra, I.**,
XRF 080109/SN2008D : GMRT upper limit at 1.28 GHz.,
GCN, **73**, 30 (2008)

Pal, Sabyasachi; Rao, A. Pramesh
GMRT Low frequency radio observation of Cyg X-3 at the time of flare
The Astronomer's Telegram, **#1100, 1 (2008)**

Pal, S.; Basu, A.
GRB GRB 070610: GMRT upper limit of GRB 070610/SWIFT J195509.6+261406 in 610 MHz.
GRB Coordinates Network, Circular Service, **6559**, 1 (2007)

Pal, S.; Ishwara-Chandra, C. H.; Bhattacharya, D.; Kamble, A. P.
GRB070612A: radio upper limit from GMRT.
GRB Coordinates Network, Circular Service, **6714**, 1 (2007)

Pal, S.; Kamble, A.; Bhattacharya, D.,
XRF 080109 / SN 2008D: GMRT radio observation at 1280 MHz.,
GCN, 7201, 1 (2008)

Pal, Sabyasachi; Pahari, Mayukh
RXTE observation of 2S 1553-542 at the time of recent flare
The Astronomer's Telegram, **#1373, 1 (2008)**

Pal, Sabyasachi; Trushkin, S. A.; **Chandra, Ishwara**
GMRT low frequency radio observation of the giant flare from Cygnus X-3
The Astronomer's Telegram, **#1486**, 1 (2008)

In Books

P.K. Manoharan
Radio Observations of Sun and Solar Wind
American Institute of Physics, **919**, 314-346 (2007).

Technical Reports

Vinod Pacharne, S. SureshKumar, A. Praveen Kumar
Tested Performance of DWDM based Broadband Analog Fiber-Optic Link,
GMRT Library

S. Sureshkumar
Co-existence of Broadband Analog Fiber-Optic Link with existing GMRT Fiber-Optic Link
GMRT Library

S. Sureshkumar, Vinod Pacharne
Group delay and propagation delay performance of a broadband analog fiber-optic link
GMRT Lirbary

Lectures at NCRA

Astronomy and Instrumentation Seminars

Reji Thomas, *IIA, Bangalore*: Emission of Radiation in Pulsar Magnetosphere Owing to Charged Acceleration
11-Jun-07

Marta Burgay, *INAF, Italy*: On the nature of Roatating Radio Transiets – RRATs
25-Jun-07

Judith Croston, *University of Hertfordshire, UK*: Interacting radio galaxies groups and clusters
17-Jul-07

Joseph M. Paredes, *University of Barcelona, Spain*: Search of radio counterparts of high energy and very-high energy gamma-ray sources
26-Jul-07

Stephen Serjeant, *The Open University, UK*: The link between the cosmic near-IR background and the sub-mm background: recent results from SHADES
1-Aug-07

Tom Dwelly, *University of Southampton, UK*: The 13H and 1H deep Fields
3-Aug-07

Sabyasachi Pal: Anomalous X-ray pulsar SWIFT1626.6-5156: A study
10-Aug-07

Adam Deller, *Swinburne University, Australia*: Software Correlators: Implementation and Applications
7-Sep-07

Ramesh Bhatt, *Swinburne University, Australia*: Testing theories of gravity using a unique binary pulsar
7-Sep-07

Aris Karastergiou, *University of Oxford, UK*: An Empirical model for the beams of radio pulsars
11-Sep-07

Simon Johnston, *CSIRO, Australia:* Science with the Australian Square Kilometre Array Pathfinder
11-Sep-07

H. Paul Shuch, *IAA SETI Permanent Study Group, USA:* Shouting in the Jungle: the SETI transmission debate
20-Sep-07

Simon Pustilnik, *SAO, Russia*: Very metal-poor gas-rich galaxies
2-Nov-07

Chandreyee Sengupta: HI deficiency of galaxies in groups
4-Jan-08

Sukanta Panda, *Institute of Theoretical Physics, Madrid, Spain:* Radio Detection of Ultra High Energy Cosmic Rays
7-Jan-08

Anna Scaife, *Cavendish University, UK:* Cosmology from SZ cluster surveys
21-Jan-08

Lewis Ball, *ATNF, Australia:* ASKAP Australian SKA Pathfinder
1-Feb-08

Jayanta Dutta, *HRI, Allahabad*:
Finite volume effects in cosmological N-body simulations
4-Feb-08

Gregg Hallinan, *NUI Galway;* Looking for a Pulse: The Search for Radio Emission from Brown Dwarfs and Extrasolar Planets
22-Feb-08

Felix Mirabel, *European Southern Observatory, Chile:* Black Holes in the Universe and Micorquasars
22-Feb-08

Gabariella Castelletti, *Institute of Astronomy and Space Science, Argentina:* Radio observations of SNRs: morphological and spectral studies
7-Mar-08

Hemant Shukla, *Space Science Lab (UC Berkelely), USA:* Simulating the Supernova/Acceleration Probe (SNAP) Mission
11-Mar-08

Informal Discussion Group

Jayaram Chengalur: Star Formation Thresholds, based on astro-ph/0708.3366
31-Aug-07

Sudipta Sarkar, *IUCAA, Pune:* Based on the papers 1. Sean P. Robinson, Frank Wilczek, Relationship between Hawking Radiation and Gravitational Anomalies, Phys.Rev.Lett.95 (2005) 011303, [gr-qc/0502074] 2. Saurya Das, Sean P. Robinson, Elias C. Vagenas, Gravitational anomalies: a recip
31-Aug-07

D. J. Saikia: A triple-double radio galaxy & High-frequency peakers
14-Sep-07

Mudit Srivastava, *IUCAA, Pune*: Spectoscopy on Extremely LargeTelescopes: MEMS-based Speckle Spectrometer
14-Sep-07

Atish Kamble: Soft equations of state for neutron-star matter ruled out by EXO 0748 – 676
28-Sep-07

Rajesh Gopal, *IUCAA, Pune*: Resistance without resistors: An anomaly
28- Sep-07

Visweshwar Ram Marthi: Toward empirical constraints on the global redshifted 21 cm brightness temperature during the epoch of reionization
23-Nov-07

Himan Mukhopadhyay, *IUCAA, Pune*: Pulsational pair instability as an explanation for the most luminous supernovae
23-Nov-07

Ph.D Thesis/Synopsis Seminar

Neeraj Gupta: Probing AGN Environments using Absorption Lines
20-Apr-07, 17-Aug-07

Chiranjib Konar: Giant radio sources and episodic activity in radio galaxies
28-Jan-08

Student Seminar

Vishal Gajjar: Small Centimeterwave Radio Telescope
18-Jul-07

Jose Manuel, *Pont Sarmiento ESIEA, France:* GOOA - GMRT Online observing application
20-Aug-07

Jayanta Dutta, *HRI Allahabad:* Generating a database of Low Frequency Calibrator Fields
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VSRP Seminar

Abhimanyu Chawla, *Punjab University, Chandigarh:* GMRT observations of Jupiter
6-Jul-07

Rahul Datta, *NIT, Durgapur*: A possible rejuvenated radio galaxy
6-Jul-07

Kshitija Deshpande, *COEP, Pune*: GMRT data Simulator
6-Jul-07

P. Leshma, *Cochin University of Science and Technology*: Study of properties of ISM using 21 cm neutral hydrogen spectrum
6-Jul-07

Dipan Sengupta, *Jawaharlal Nehru University, New Delhi:* Sub-pulse drifting
6-Jul-07

Jitty James Vadakken, *IIT, Roorkee*: A study of SS433
6-Jul-07

Chandreyee Maitra, *West Bengal University of Technology*: Low Frequency Observations near the Galactic centre and search for radio transients
19-Jul-07

Lectures / Lecture Courses given elsewhere

Yashwant Gupta

GMRT Data Processing Applications on GARUDA
CDAC workshop on Developing Applications for GARUDA,
Oct 6 2007, Jawaharlal Nehru University, New Delhi

The GMRT: Soaring with Garuda?
Third GARUDA Partners Meet, CDAC, Bangalore.
March 3, 2008

The GMRT: Current Status and Future Plans
CASPER FPGA Workshop, Berkeley, USA
June 27 2007

R. Nityananda

PCA, SVD, CMB and RFI,
RRI, Bangalore
24 September 2007

Polarisation States
International School of Photonics, Cochin University
5 November 2007

Adaptive Optics
International School of Photonics, Cochin University
6 November 2007

Radiative transfer: from Clouds to galaxies
International School of Photonics, Cochin University
7 November 2007

Frontiers of Radio Astronomy
Nehru Centre's Hall of Culture, Mumbai
8 December 2007

Statistical Physics in Astronomy
University of Pune
8 January 2008

Quantum Theory: Do we still need duality
Fergusson College
10 January 2008

Introduction to Astrophysics
American College
4 February 2008

Graduate School Courses

Jayaram Chengalur

Interstellar Medium

Gopal Krishna

Introduction to Astronomy and Astrophysics 1

B.C. Joshi

Introduction to Astronomy and Astrophysics II

Rajaram Nityananda

Electrodynamics and Radiative Processes II

D. J. Saikia

Astronomical Techniques II

Ph.D. Theses / M.Sc. Theses

Nachiketa Chakraborty, M.Sc. Thesis: Frequency Imaging of the field of RXCJ1516.3+0015
(Guide: J.N. Chengalur)

Neeraj Gupta, Ph.D. Thesis: Probing the environments of the central regions of active galaxies.
(Guides: D.J. Saikia & R. Srianand)

VSRP Projects / Training of College Students

Mayukh Pahari, University of Pune:
X-ray data analysis of galactic compact objects
M.Sc. Project (Guide: S. Pal)

Veeresh Singh, Rupak Roy and Amrita Purkayastha
Multi-wavelength radio observation of high mass black hole Cyg X-3, at the time of flare
Radio Astronomy School and VSRP Project (Guide: S. Pal)

M.C.Ramadevi, Manabendra Lahkar, Chandrayee Maitra
Search of transient radio sources in the Galactic centre region

Radio Astronomy School and VSRP (Guides: S Pal & A. Pramesh Rao)

Jitty James
VLBI observation of galactic black hole SS 433
VSRP Project (Guides: S. Pal & V.K. Kulkarni)

Soumo Ghosal, *Institute of Radio Physics & Electronics, Calcutta:* Design & Development of DC-2.5 GHz SP4T RF Switch, Mid-Term B.Tech Project, (Guide: A. Praveen Kumar)

Himanshu Madan, *College of Engineering, Pune:* Design of Microstrip Bandpass Filters, STP 2007, (Guide: A. Praveen Kumar)

Vishakha V. Pendse, *College of Engineering, Pune:* Design & Characterisation of Radio Astronomy Feeds, M.Tech Project, (Guide: A. Praveen Kumar)

Ajaysinh K. Jadeja, Studies of Space Weather Phenomena, Ph.D. Thesis, Saurashtra University, Rajkot *(Guide: P.K. Manoharan)*

M. Bendict Lawrance, The American College, Madurai: Study of Properties of Mars, M.Phil. Thesis *(Guide: P.K. Manoharan)*

G. Agalya, Mother Teresa Women's University, Kodaikanal: Study of fast and slow coronal mass ejections. M.Phil. Thesis, *(Guide: P.K. Manoharan)*

Nisha Katyal, Hansraj College, Delhi: Study of Radio Antennas and Detection of Cosmic Microwave Background Radiationm M.Sc. Project, *(Guide: P.K. Manoharan)*

M. Selva Shanthi and Malathi, Lady Doak College, Madurai: Period Evolution of Pulsars, M.Sc. Projects, *(Guide: P.K. Manoharan)*

Payaswinee Arvikar Fergusson College, Pune: Data Analysis of Crab Pulsar and Calibration of data using standard calibrators M.Sc project *(Guide: B.C. Joshi)*

Trupti Ranka, College of Engineering, Pune: System Identification for Motion control of GMRT B.E. Project *(Guide: B.C. Joshi)*

Rahul Datta, West Bengal; Sagar Godambe, BARC, Mumbai; **Nadia Kudryavtseva**, MPIfR, Bonn; **Nikhil Pawar**, Pune University; **Akash Pirya**, ARIES Nainital; RAS-2007 students: Relic lobes of radio galaxies.
(Guides: D.J. Saikia & Chiranjib Konar)

About 40 students [B.E., M.Sc. (Physics), B.Sc.(Physics)] from various engineering and science colleges all over Tamil Nadu attended one-

week training programme conducted at RAC, during June 2007 *(P.K. Manoharan)*.

Popular Science Articles /Lectures

P.K. Manoharan

Science and Everyday Life

Vivekananda Memorial Matriculation School, M. Palada, Nilgiri
April 7, 2007,

Radio Astronomical techniques

CSI College of Engineering, Ketti, Nilgiri
March 12, 2008.

The Influence of Sun on Earth

TAHAR Magazine, **16**, 16, 2007.