IGO DISCOVERIES

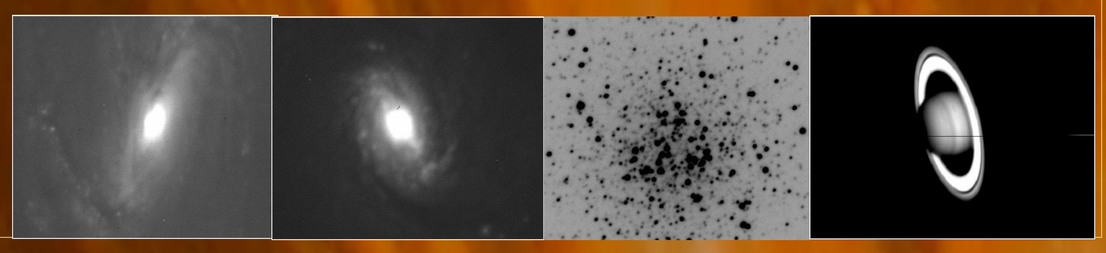
Work done @ IUCAA

IUCAA GIRAWALI OBSERVATORY (*IGO*)

The IUCAA 2-metre optical and near-infrared telescope was dedicated to the astronomical community in India by Professor Yash Pal on May 13, 2006 at the Chandrasekhar Auditorium in IUCAA.

This was preceded by the inauguration of the IUCAA-Girawali Observatory which houses the telescope, and is located about 80 km/s from Pune near Junnar.
The telescope is being used by the faculty and students in IUCAA and in various university departments and colleges, as well as by astronomers in research institutions and observatories. The telescope is a first class research instrument with which objects within our galaxy as well as the extra-galactic universe can be observed.

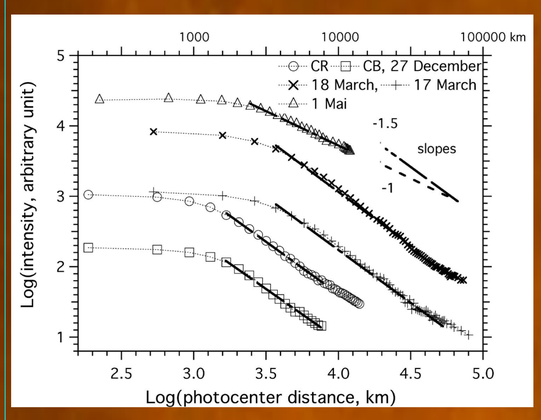
Instruments : The main instrument for observations at the telescope at the present time is IFOSC, which is a versatile instrument which can be used for obtaining images as well as spectroscopic and polarimetric observations. This instrument was developed for IUCAA at Copenhagen University Observatory, and again people from IUCAA were closely involved with the project at all its stages. The calibration unit for IFOSC was developed at IUCAA. There are also instruments like a CCD camera available for observations, and other sophisticated instruments, including an infrared imager, will be made available soon.



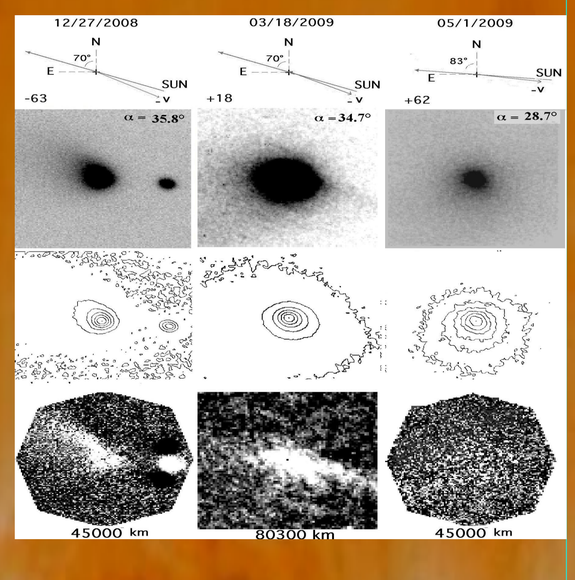
Polarimetric observations of the comet 67P/Churyumov-Gerasimenko at Observatoire de Haute-Provence (France) and *IUCAA Girawali Observatory* (India) during its 2008-2009 apparition.

E. Hadamcik, A.K. Sen, A.C. Levasseur-Regourd, ***R. Gupta***, J. Lasue

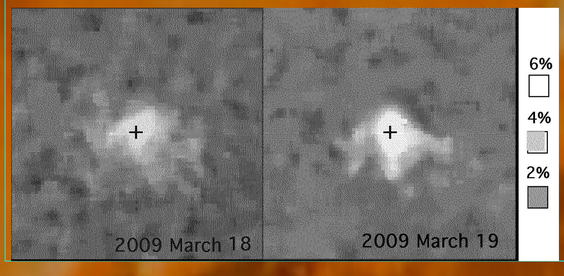
Remote observations of the light scattered by comet 67P/Churyumov-Gerasimenko dust coma are of major importance to determine the physical properties of the particles and prepare the rendezvous with the ESA/Rosetta spacecraft in 2014.



Light scattering and especially linear polarization Observations allow comparison between coma regions and with other comets which dust properties were partially studied in-situ. The aim was oriented towards retrieving physical properties of the dust particles and characterizing their evolution around perihelion passage.



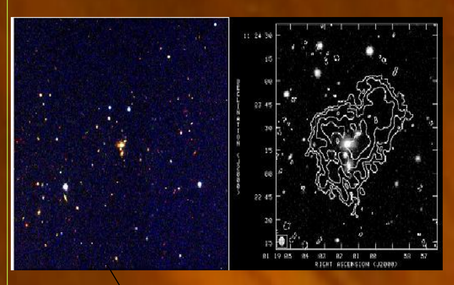
Dust coma of 67P/C-G in the 2008-2009 apparition pre and post-perihelion.
Horizontal panel 1 (upper): orientation with Sun and stars movements and days to perihelion.
Panel 2: Intensity images (negative).
Panel 3: Isophotes for intensities with the same log scale for images.
Panel 4 (lower) Rotational gradient treated images.
Some relatively faint stars appear on the images



Polarization maps in March 2009.
FOV: 40000 km. '+' = photocenter with P close to 6%. Scale: white (4-6) %, dark grey 2%.

Probing *Black Hole Activity* in a Distant Cluster of Galaxies
IGO + GMRT

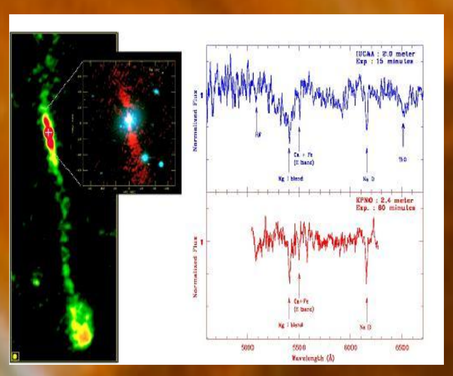
Bagchi, Joydeep et al.



Galaxy Cluster, MRC 0116+111, contains many elliptical and disk like galaxies at the center

The GMRT radio image of the cluster taken at the frequency of 1300 MHz, reveals a mysterious giant bubble of diffuse radio emission, spanning across some 8,00000 light years right at the center

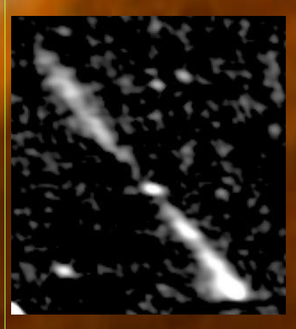
Optical color image taken by ***IGO*** being made using three filter B, V, and R.



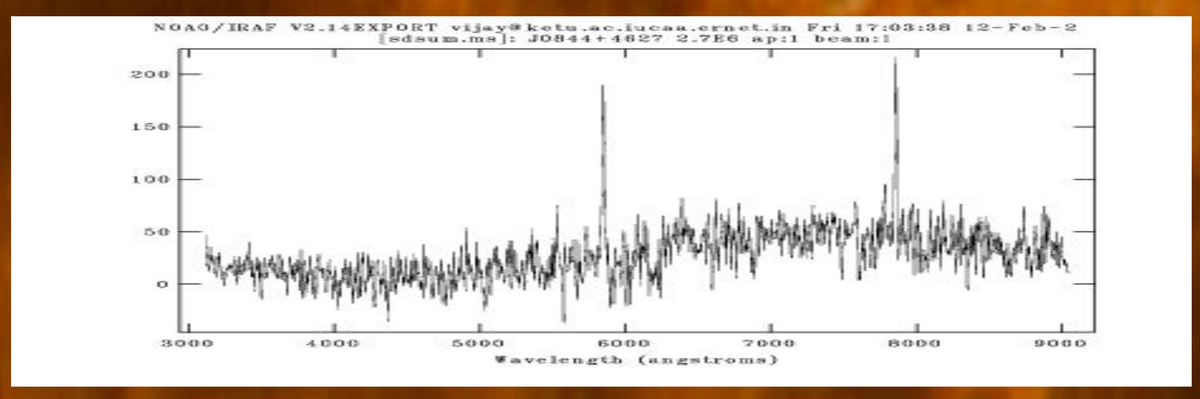
Intergalactic particle beam (a radio wave emitting jet), stretching for more than a **million light years**, is the longest ever seen.

The beam emerges from a large elliptical galaxy called CGCG 049-033, which is about *600 million light years away*. The GMRT 1300 MHz radio map (on the left) shows a strongly collimated , high energy particle jet (yellow-green) emerging from the galactic nucleus (blue optical image on the small inset) and ending in a 'hot spot' *1.4 million light years away.* If this jet sprang instead from the centre of the Milky Way, it would loom over us like a skyscraper and would stretch halfway to the Andromeda galaxy! *Only* ultra massive black holes luring at the centers of galaxies are capable of emitting such powerful particle jets. The spectrum of the nuclear region using **IFOSC** instrument on IUCAA 2 meters optical telescope was taken (on the right). The mass of the central black hole was found to be about *2 billion times* the mass of sun, which is also one of the largest known in astronomy. *It is still unclear how black holes manage to create such stupendous particle jets which somehow survive for such astronomical distances.*

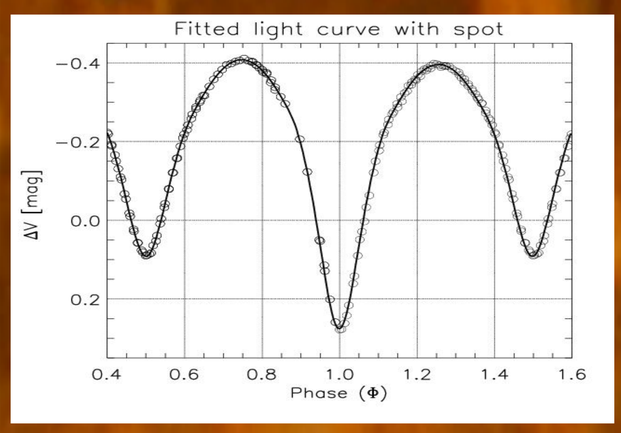
IGO measures the distance to the rare **Giant Radio Source** discovered with GMRT.



A large angular sized radio source was discovered with GMRT in one of the deep fields. The available photometric redshift indicated that it is likely to be one of the rare, distant large radio source at a redshift of about 0.6. Though the optical counterpart is very faint, **IGO** has measured the redshift to this object very accurately, thanks to the expert team. The accurate distance measurement from IGO puts this GRS the farthest one larger than 2 Mpc.



CCD photometric study of the newly discovered contact binary ASAS 134738+0410.1



Light curve analysis of the star ASAS 134738+0410.1 using V band Photometric observations from ***IGO***

The star was selected from the *δ Scuti* database of All Sky Automated Survey. This analysis using ***IGO*** reveals that the star ***is not a δ Scuti variable*** but is in fact a W Uma type contact binary.