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Founder's Day at IIA

Anil Kakodkar garlanding the bust of Vainu Bappu on the occasion of Founder's Day.

Birthday of Vainu Bappu, the 10th of August, is celebrated every year as the Founder's day at IIA.This year, as has been the custom, all members of IIA gathered in the Library at 10:00 am to remember and reflect on the long-term vision of Vainu Bappu and the progresses made. The Director (Acting) of IIA, Bhanu Pratap Das, led the gathering and garlanded a picture of Bappu. This was followed by a public lecture at 11:00 am. The lecture was by the renowned nuclear physicist and former Chairman of the Atomic Energy Commission of India, Anil Kakodkar. Currently he is DAE Homi Bhabha Chair Professor at the Bhabha Atomic Research Center (BARC).

Kakodkar spoke on "Management of Mega Science Programmes", a topic of relevance and importance to IIA, which has recently assumed leading roles in a few mega-science projects in the country and at the international level. Kakodkar paid tributes to Dr. Vainu Bappu, who pioneered building up major research programmes around indigenously built large size experimental facilities, and stated that the Vainu BappuTelescope and Vainu Bappu Observatory stood testimony to this visionary effort. He noted that such Mega Science initiatives had implications well beyond the immediate science objectives that trigger them. Kakodkar reasoned that, although many times it is argued that engaging in such efforts causes disproportionate distraction to competitive research, on the whole such initiatives do lead to greater gains not only in terms of greater access to front line research capability both at home

Bhanu Das, Director (Acting) of IIA, greeting Anil Kakodkar with a bouquet of flowers before the lecture.

and abroad, but also much larger technology spin off benefits for the country. Apart from addressing questions on the cost benefit aspects of large investments made in Mega Science initiatives, he noted that implementing them would be a major challenge, considering the technological complexities and large body of expertise that would be necessary. Kakodkar saw such challenges as those which would bring in opportunities to transform S & T scene in the country. He stressed and concluded that it was necessary to be able to discuss and clearly understand these and related issues from an overall national perspective.

Anil Kakodkar (born on 11th November, 1943) joined the Bhabha Atomic Research Centre (BARC) in 1964, following the one year post graduate training with top rank in

Anil Kakodkar

Nuclear Science and Technology in the then Atomic Energy Establishment. He became the Director of BARC in the year 1996 and was the Chairman, Atomic Energy Commission and Secretary to the Government of India, Department of Atomic Energy, during the years 2000 -2009. Currently he is DAE Homi Bhabha Chair Professor at BARC.Kakodkar holds several important advisory positions in the Government and in corporate bodies that manage sectors like, power, education, societal development and others.

- S. P. Rajaguru

Bicentennial Public Lecture

The origins of the Indian Institute of Astrophysics is traced back to the year 1786 when the astronomical observations made at Madras by William Petrie, an enlightened officer of the East India Company, led to the setting up of the Madras Observatory. The Bicentennial Public Lectures were instituted in 1987 to commemorate the heritage of 200 years of Astronomy that IIA proudly possesses. The 22nd Lecture in this series was held on the 14th of December, 2012 and it was delivered by Raghavendra Gadagkar, Professor and JC Bose National Fellow at the Centre for Ecological Sciences, Indian Institute of Science (IISc), Bangalore. Professor Gadagkar's lecture was titled 'War and Peace: Conflict and Coopertaion in an Insect Society'. The content of his lecture, masterfully and beautifully delivered, derived from the pioneering research that he set up over the past 25 years at

Raghavendra Gadagkar

the IISc in the area of Animal Behaviour, Ecology and Evolution. The origin and evolution of cooperation in animals, especially in social insects, such as ants, bees and wasps, is a major goal of his research. By identifying and utilizing crucial elements in India's biodiversity, he has added a special Indian flavour to his research.

In his Lecture, Gadagkar elaborated on how some species of insects such as ants, bees and wasps organize themselves into colonies with social organization and integration, division of labour and caste systems that parallel if not better human societies. He then presented his research team's findings on studying the workings of a tropical wasp society, and derived parallels to reflect on how we, the human societies, conduct our affairs.One of the interesting findings by Gadagkar's team was that these wasps were extremely aggressive to, and highly intolerant of, other members of

their species which did not belong to their colonies. However, the wasps were highly tolerant of each other and display almost no aggression to colony members even when there was considerable conflict. Gadagkar described and contrasted such war• towards foreigners and peace•with insiders. He also illustrated his team's research methodology that permitted an understanding of these insect societies.

A tropical wasp society extremely aggressive and highly intolerant of other members of their species which did not belong to their colonies.

Professor Gadagkar obtained B.Sc (Hons) and M.Sc. in Zoology from Bangalore University and Ph.D. in Molecular Biology from the Indian Institute of Science, Bangalore. Gadagkar is now SN Bose Research Professor of the Indian National Science Academy and JC Bose National Fellow at the Centre for Ecological Sciences, Indian Institute of Science, Chairman, Centre for Contemporary Studies, IISc, Honorary Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Non-Resident Permanent Fellow of the Wissenschaf tskolleg (Institute for Advanced Study) in Berlin and Honorary Professor, Indian Institute of Science Education and Research, Kolkata. He is, or has been, a member of a number of national and international professional scientific bodies and government and non government advisory committees including the Scientific Advisory Committee to the Cabinet, Government of India. As the founder chair of the Centre for Contemporary Studies, Gadagkar has initiated a new experiment that endeavours to engage some of the best practitioners of different disciplines in the human sciences, such as philosophy, sociology, economics, law, literature, poetry, art, music, cinema etc. and aims to forge meaningful interaction between the natural and human sciences with special focus on understanding the diverse research methodologies of different disciplines and create opportunities to rethink the foundations of our own disciplines.

-S. P. Rajaguru

Directorship (Acting) of B. P. Das

Following the end of tenure of the Directorship of Sirajul S. Hasan in June 2012, the Department of Science and Technology (DST, Government of India) appointed Bhanu Pratap Das, Senior Professor, as Acting Director of IIA starting from the 1st of July, 2012 for a period of six months. This position of B.P. Das was further extended in late December, 2012 as the appointment of a new director selected by the DST-appointed Search-cum-Selection Committee took time.

B.P. Das joined IIA in 1993 as Professor to lead the Non-Accelerator Particle Physics Group at IIA. Das has worked extensively on physics beyond the Standard Model of particle physics, focussing on various atomic systems deriving theoretical limits on signatures of effects beyond the Standard Model. He was promoted to Senior Professor in 2002.Recently he was elected as the Fellow of the American Physical Soociety, a rare honour accorded to an Indian physicist in recent times. As Acting Director, Das has been focussing on effectively addressing the various pressing scientific and administrative needs of the members of IIA, especially those studied and recommended by the Scientific Advisory Committee (SAC) of IIA, which finalised its recommendations following its second visit in March 2012.

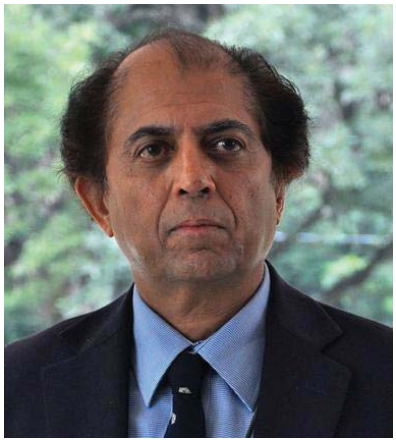
-S. P. Rajaguru

B. P. Das Elected as APS Fellow

Bhanu Pratap Das was elected as a **Fellow of the American Physical Society (APS)** in 2012, following a nomination by the Forum on International Physics.APS fellowship is a distinct honor signifying recognition by one's professional peers, who use the criterion of exceptional contributions to the physics enterprise. The citation for B.P. Das reads: *'For his seminal contributions to the theory of parity and time-reversal violations in atoms in the context of probing the Standard Model of particle physics, and for his leadership in promoting international collaborations in frontier areas of atomic, molecular and optical physics'.*

G. C. Anupama has been elected as a Fellow of **The National Academy of Sciences, India, Allahabad** in 2012**.**

S. S. Hasan Appointed Distinguished Professor



Professor S. S. Hasan was appointed Distinguished Professor at IIA for two years with effect from 1 July 2012.This position was awarded to him on completion of his tenure as the Director of IIA, a post that he held from Jan. 2006 to June 2012. Hasan's directorship at IIA saw several important milestones, especially in regard to IIA taking up leadership roles in several large developmental projects at the national and international levels and the initiation of the integrated Ph.D. programs. in his current position as distinguished professor, Hasan will focus on his research in solar physics involving studies of the solar atmosphere in addition to continuing to lead the National Large Solar Telescope (NLST) project, which he initiated early in his tenure as director.

Fermi detected Narrow-Line Seyfert 1 galaxies show no differences to blazars

Some galaxies have a compact nucleus that outshines the total light coming from the billions of stars in it. They are referred to as Active Galactic Nuclei (AGN). Several galaxies were known to have such compact and luminous nuclei during the early 1900s. However, a systematic study of a sample of such galaxies was first done by Carl Seyfert in 1943, wherein, he used the data from the archives of the Mt. Wilson Observatory. Some of the features of this particular group of galaxies studied by Carl Seyfert were that, they all contained a luminous nucleus outshining their host galaxy. The optical spectra of those bright nuclei showed intense and broad emission lines, contrary to normal galaxies, whose spectra showed absorption lines due to stars. Galaxies with such peculiar characteristics are now known as Seyfert galaxies.Detailed spectroscopic investigation of these Seyfert galaxies during 1970s revealed that they come under two categories, namely Seyfert 1 and Seyfert 2 galaxies. Seyfert 1 galaxies have broad permitted emission lines(with velocity widths of the order of 10,000 km/sec) and narrow forbidden emission lines. Seyfert 2 galaxies on the other hand have narrow permitted and forbidden lines with velocity widths of the order of 1000 km/sec.The hosts of Seyfert 1 and Seyfert 2 galaxies have a spiral structure.

About 25 years ago, in 1985, Osterbrock & Pogge found a new class of AGN similar to Seyfert galaxies, called Narrow Line Seyfert 1 (NLSy1) galaxies. These sources have permitted emission lines (having widths of ~2000 km/sec) that are narrower than the usual permitted lines of Seyfert 1 galaxies. About 7% of these NLSy1 galaxies also emit large amounts of radio-waves, while, the remaining percentage emit feeble/no radio-waves. The recent discovery by the *Fermi* Gamma-ray Space Telescope has raised many important questions on the nature of NLSy1 galaxies. Since its launch in 2008, high energy(E > 100 MeV) variable gamma-ray radiation have

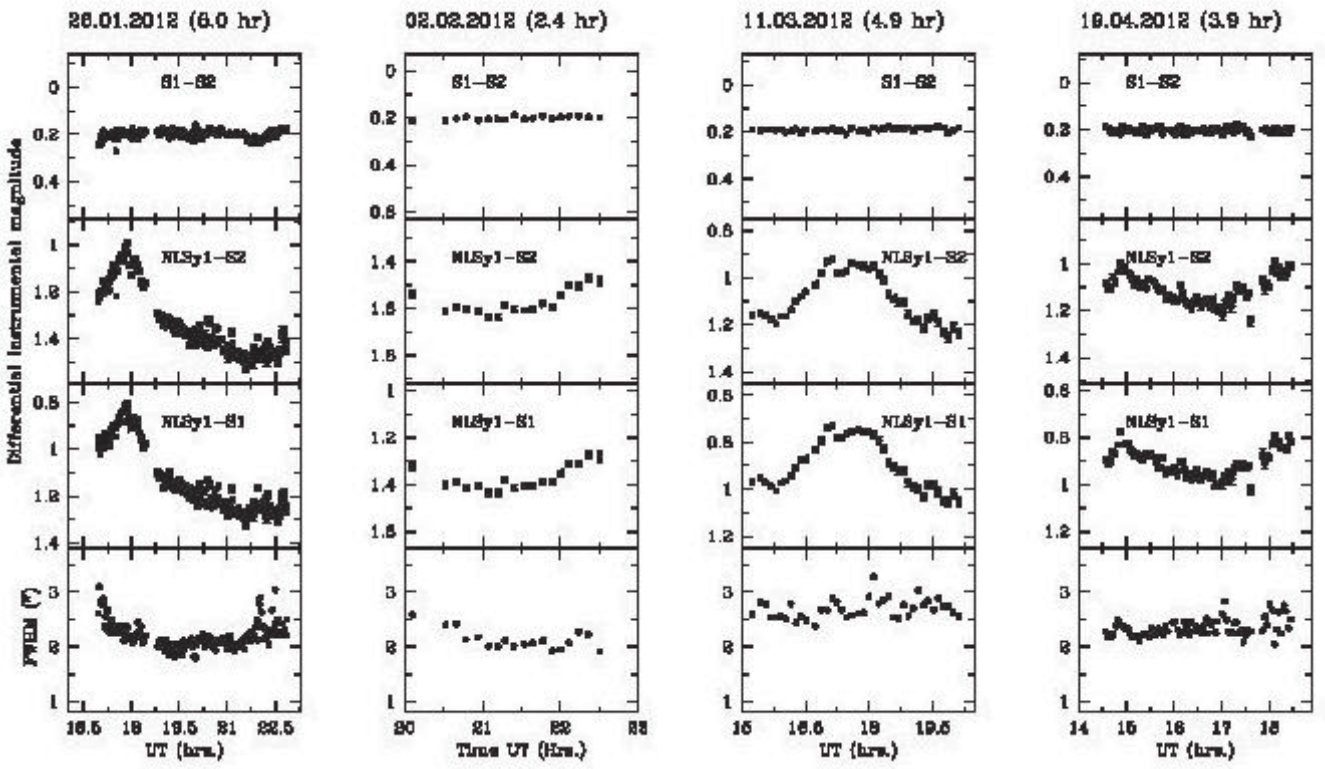


Figure1. Intranight differential light curve (DLC) for the γ-emitting NLSy1 galaxy PMN J0948+0022. The top panel shows the DLC relative to two comparison stars present in the same CCD frame as PMN J0948+0022,the next two panels show the DLCs of PMN J0948+0022 relative to the two comparison stars and the bottom panel shows the variation of FWHM over the course of the night. The date and duration of observations are given at the top of each panel.

been found in 5 NLSy1 galaxies. These 5 sources are also now known to have compact radio morphology as well as show superluminal motion, thereby, giving enough proof that they emit jets of highly energetic particles like protons, electrons and positrons. An independent check for the presence of such relativistic jets in these sources is to see if they show rapid and large amplitude optical flux variations within a night.

Towards this aim, intra-night optical flux variability observations were carried out using the newly commissioned 130 cm Telescope by the Aryabhatta Research Institute of Observational Sciences (ARIES) at Devasthal, Nainital. A sample of three *Fermi* detected NLSy1 galaxies were monitored for a total of 10 nights during January - May 2012. For our monitored sources, we found intra-night optical variability (INOV) duty cycle (fraction of time a source is variable) as large as 85%. For one source, we found amplitude of variation as large as 52 %. Also, our high temporal sampling observations using the EMCCD (Electron-Multiplying Charge Coupled Device) have led to the clear detection of " *mini-flares*" superimposed on the flux variations observed during the night with timescales as short as 12 minutes. The optical flux variability nature of these three *Fermi* detected NLSy1 galaxies are thus **similar to that known for the blazar class of AGN**. We show in Fig. 1 the INOV light curves for one source PMN J0948+0022. Our optical monitoring observations, thus, indirectly argues that these sources emit relativistic jets of energetic particles and also these jets are closely aligned to the observers line of sight.

The detection of INOV, compact radio structure, presence of superluminal motion and emission of high energy gamma-rays, show that the three NLSy1 galaxies observed by us, have energetic relativistic jets. It is generally thought that elliptical galaxies are only able to launch relativistic jets of particles. If this is true, and if these gamma-ray emitting NLSy1 galaxies are also found to be hosted by spiral galaxies, then there is a definite need to *revisit the paradigm of jets being associated with elliptical galaxies*. However, we note that, quite recently, there are detections of radio galaxies in spiral hosts. Further systematic and detailed multi-wavelength observations of these *Fermi* detected NLSy1 sources in the future can only unravel their mystery. *These findings have recently been accepted for publication in MNRAS (Vaidehi S. Paliya et al. 2012, MNRAS, in press).*

- C. S. Stalin & Vaidehi S. Paliya

Quantum-Physical Effects of Scattering Polarization on the Sun

The linearly polarized spectrum of the Sun is formed due to coherent scattering processes in which quantum interference phenomena plays a vital role. In an atom, the hyperfine states (F-states) result from the coupling of the total electronic angular momentum *J* to the nuclear isospin *I*. Figure 1 shows an example of hyperfine states in a two-level atom. The interference between the *F* states is an important effect in the interpretation of the polarized solar line spectrum.In this work the redistribution matrix for the *F*-state interference process is derived and incorporated in the polarized radiative transfer equation.The atmospheric slab is assumed to be an isothermal constant property media. The emergent Stokes profiles are computed for hypothetical line transitions arising due to hyperfine structure splitting (HFS) of the upper $J = 3/2$ and lower $J = 1/2$ levels of a two-level atom model with nuclear spin $I_s=3/2$. Due to the hyperfine interactions the upper *J*-state splits into four *F*-states with F_b=0,1,2,3, and the lower *J*-state splits into F_a=1,2. Owing to the selection rule Δ F=0,±1, these F-states produce six radiative transitions (see Table1*).*

Figure 2 shows the emergent Stokes profiles computed for different optical thicknesses.The black line in this figure is computed by neglecting hyperfine structure splitting (HFS).This is the standard two-level atom case which results in a single radiative transition. The red line is computed with HFS but without interference between the *F*-states. In this case the six radiative transitions arising due to HFS are treated independently. The green line is computed taking account of the *F* state interference. This comprises of six interfering radiative transitions between the *F*-states. The three lines in this figure are quite similar to each other in shape but differ prominently in amplitude.

In the line core, the green and red lines nearly coincide whereas the black line differs from these two. This shows that the depolarization in the line core is purely due to HFS, irrespective of the interference effects between the *F*-states being included. In the wings, the green line and the black line coincide whereas the red line differs significantly. Upon comparing the green and red lines,it is evident that the interference effects show up in the line wing PRD peaks.

The theory developed in this paper finds application in the interpretation of the observed linearly polarized spectra of several solar lines (for e.g., Na II D_2, Ba II D_2 4554 Å ScII 4247 Å lines). Necessary observations are already acquired. The modeling is in progress. This work is published in Smitha et al. 2012.

Smitha, H. N., Sowmya, K., Nagendra, K. N., Sampoorna, M., Stenflo, J. O., 2012, ApJ, 758, 112

	$F_b = 0$	$F_b = 1$	$F_b = 2$	$F_b = 3$
$F_a = 1$	5000.96093	5000.96075	5000.96036	Not allowed
$F_a = 2$	Not allowed	5000.98125	5000.98086	5000.98018

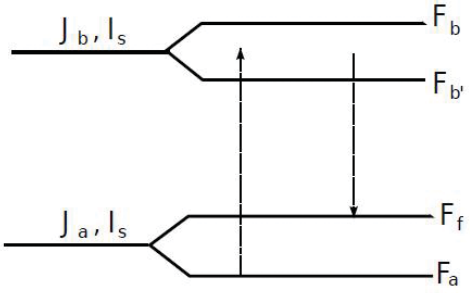


Figure1. Level diagram showing hyperfine states in a two-level atom.

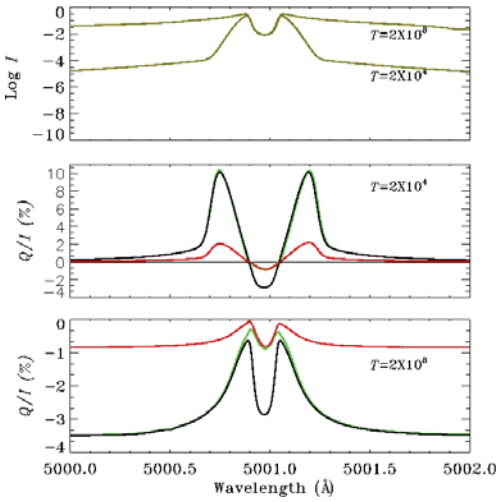
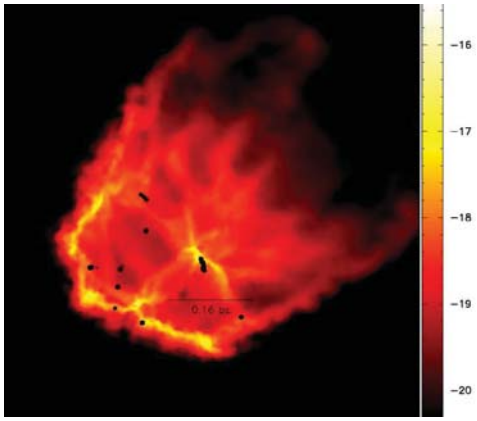


Figure 2. Effects of F-state interference.

-K. Sowmya

A Numerical Investigation into an Aspect of Triggered Star-Formation

Quiescent Molecular Clouds (MCs) are dynamically stable and are likely to survive for several million years during which they may exhibit little star-formation activity. Gas within MCs is turbulent and turbulence, as is common knowledge, dissipates quickly on a timescale comparable to the sound-crossing time. However, turbulence also distributes gas unevenly within MCs and some of the densest regions may become sufficiently massive as to spawn stars. Decaying turbulence, it might be thought, is therefore likely to support star-formation.



The interstellar shocks, often driven by energetic feedback from proto/stellar outflows and jets profoundly affect the stability and therefore the evolution (i.e. the star-formation history), of MCs. In the present work we performed full 3-d hydrodynamic simulations to examine the effects of turbulence injected by radiation-driven shocks. Simulations were repeated for sources emitting different fluxes of ionising radiation, varying from a typical B-type star to a cluster of massive young stars. The position of the ionisation-front generated by the radiated flux was calculated using a sophisticated ray-tracing algorithm, while the gas-dynamics were treated with the smoothed particle hydrodynamics algorithm.

Our simulations successfully reproduce several recently observed features of irradiated clouds. These include the distribution of gas in the dense phase and the structural morphology of shocked gas. The power-spectrum of the shocked gas closely resembles the Kolmogorov-spectrum, although the slope derived in this work was considerably higher than the former. A snapshot from the sequence generated in a simulation is shown. This column density plot shows a relatively advanced phase of evolution of an irradiated cloud in a realisation, where asterisks represent young protostars that preferably form along dense filamentary regions within the cloud.

-Sumedh Anathpindika

Publications

September - December 2012

(1) **Krishna Prasad, S., Banerjee, D., Singh, J.** 2012. *Oscillations in Active Region Fan Loops: Observations from EIS/ Hinode and AIA/SDO. Solar Physics 281,67-85.*

(2) **Resmi, L., Anupama, G. C., Sahu D. K.,** along with 13 coauthors 2012. *Comprehensive multiwavelength modelling of the afterglow of GRB 050525A. MNRAS,427, 288-297.*

(3) Parvathi, V. S., Sofia, U.J., **Murthy, J.,** Babu, B. R. S. 2012. *Probing the Role of Carbon in Ultraviolet Extinction along Galactic Sight Lines. ApJ, 760, 36.*

(4) Garcia-Hernandez, D. A., **Kameswara Rao, N.,** Lambert, D. L. 2012. *High-resolution Optical Spectroscopy of DY Cen: Diffuse Interstellar Bands in a Proto-fullerene Circumstellar Environment?. ApJ 759, L21.*

(5) Mallick, K. K., Ojha, D. K., Samal, M. R., Pandey, A. K., **Bhatt, B. C.,** Ghosh, S. K., Dewangan, L. K., Tamura, M. 2012. *Star Formation Activity in the Galactic H II Region Sh2-297. ApJ, 759, 48.*

(6) Lebzelter, T., **Goswami, A.** along with 25 coauthors 2012. *Comparative modelling of the spectra of cool giant stars. A&A,* 547, A108.

(7) **Gupta, G. R., Subramanian, S., Banerjee, D.,** Madjarska, M. S., Doyle, J. G. 2012. *Nature of Quiet Sun Oscillations Using Data from the Hinode, TRACE, and SOHO Spacecraft. Solar Physics, 247.*

(8) **Ramya, P., Reddy, B. E.,** Lambert, D. L. 2012. *Chemical compositions of stars in two stellar streams from the Galactic thick disc. MNRAS, 425, 3188-3200.*

(9) **Smitha, H. N., Sowmya, K., Nagendra, K. N., Sampoorna, M.,** Stenflo, J. O. 2012. *Polarized Line Transfer with F-state Interference in a Non-magnetic Medium: Partial Frequency Redistribution Effects in the Collisionless Regime. ApJ, 758, 112.*

(10) **Gupta, G. R.,** Teriaca, L., Marsch, E., Solanki, S. K., **Banerjee, D.** 2012. *Spectroscopic observations of propagating disturbances in a polar coronal hole: evidence of slow magneto-acoustic waves. Astronomy and Astrophysics 546, A93.*

(11) **Krishna Prasad, S., Banerjee, D.,** Van Doorsselaere, T., Singh, J. 2012. *Omnipresent long-period intensity oscillations in open coronal structures. A&A, 546, A50.*

(12) **Kumar, Amit,** Ghosh, S. K., **Kamath, P. U.,** Postma, Joe; **Kathiravan, S., Mahesh, P. K., Nagbhushana, S.,** Navalgund, K. H., Rajkumar, N., Rao, M. N., Sarma, K. S., **Sriram, S., Stalin, C. S., Tandon, S. N.** *Tests and calibration on ultra violet imaging telescope (UVIT). Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series 8443, .*

(13) **Kumar, Amit, Ghosh,** S. K., Hutchings, J.,**Kamath, P. U., Kathiravan, S., Mahesh, P. K., Murthy, J.,Nagbhushana, S.; Pati, A. K.,** Rao, M. N., **Rao, N. K., Sriram, S.,Tandon, S. N.** 2012. *Ultra Violet Imaging Telescope (UVIT) on ASTROSAT. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series 8443, .*

(14) **Javaraiah, J. 2012.** *The G-O Rule and Waldmeier Effect in the Variations of the Numbers of Large and Small Sunspot Groups. Solar Physics 204.*

(15) Roy, N., Kantharia, N. G., Eyres, S. P. S., **Anupama, G. C.** Bode, M. F., **Prabhu, T. P.,** O'Brien, T. J. 2012. *An H I shell-like structure associated with nova V458 Vulpeculae?. MNRAS L532.*

(16) **Gupta, A.C., and Mohan, P., Mangalam, A.,** *along with 31 coauthors 2012. Multiwavelength intraday variability of the BL Lacertae S5 0716+714. MNRAS, 425, 1357-1370.*

(17) Wade, G.A., and **J. Jose** along with 17 coauthors 2012. *NGC 1624-2: a slowly rotating, X-ray luminous Of?cp star with an extraordinarily strong magnetic field. MNRAS 425, 1278-1293.*

(18) Ishigaki, M.N., Parthasarathy, M., **Reddy, B.E.,** Garcia-Lario, P., Takeda, Y., Aoki, W., Garcia-Hernandez, D.A., Manchado, A. *2012. The chemical composition of the post-asymptotic giant branch F supergiant CRL 2688. MNRAS 425, 997-1006.*

(19) **Nagendra, K. N., Sampoorna, M. 2012.** *Polarized Partial Frequency Redistribution in Subordinate Lines. II. Solution of the Transfer Equation with Rayleigh Scattering. ApJ, 757, 33.*

(20) Fleming, S.W., and **T. Sivarani** along with 60 coauthors 2012. *Very Low Mass Stellar and Substellar Companions to Solar-like Stars from MARVELS. II. A Short-period Companion Orbiting an F Star with Evidence of a Stellar Tertiary and Significant Mutual Inclination APJ,144, 72.*

(21) Bramich, D. M., Arellano Ferro, A., Jaimes, R. F., **Giridhar, S.** 2012. *Investigation of variable star candidates in the globular cluster NGC 5024 (M53). MNRAS, 424, 2722-2732.*

(22) **Jose, J.,** and 10 coauthors 2012. *Optical and near-infrared survey of the stellar contents associated with the star-forming complex Sh2-252. MNRAS 424, 2486-2503.*

(23) **Muthumariappan, C., Reddy, B. E.** *2012. 1D radiative transfer models of 21 and 30 {mu}m emission features in proto-planetary nebulae. IAU Symposium 283, 456-457.*

(24) **Chingangbam, P.,** Park, C., Yogendran, K.P., van de Weygaert, R. 2012. *Hot and Cold Spot Counts as Probes of Non-Gaussianity in the Cosmic Microwave Background. ApJ 755, 122.*

(25) **Vigeesh, G.,** Fedun, V., **Hasan, S. S.,** Erdelyi, R. 2012. *Three-dimensional Simulations of Magnetohydrodynamic Waves in Magnetized Solar Atmosphere. ApJ 755, 18.*

(26) Louis, R. E., **Ravindra, B.,** Mathew, S. K., Bellot Rubio, L. R., Raja Bayanna, A., Venkatakrishnan, *P. 2012. Analysis of a Fragmenting Sunspot Using Hinode Observations. ApJ, 755, 16.*

(27) Rodriguez-Ledesma, M.V., Mundt, R., Ibrahimov, M., Messina, S., **Parihar, P.,** Hessman, F.V., Alves de Oliveira, C., Herbst, W. *2012. An unusual very low-mass high-amplitude pre-main sequence periodic variable. A&A, 544, A112.*

(28) Goyal, A., Gopal-Krishna, Wiita, P. J., **Anupama, G. C., Sahu, D.K.,** Sagar, R., Joshi, S. 2012. *Intra-night optical variability of core dominated radio quasars:the role of optical polarization. A&A, 544, A37.*

(29) Labeyrie, A., Mourard, D., Allouche, F.,Chakraborthy, R., Dejonghe, J., **Surya, *A.*,** *Bresson, Y.,* Aime, C., Mary, D., Carlotti, A. 2012. *Concept study of an Extremely Large Hyper Telescope (ELHyT) with 1200m sparse aperture for direct imaging at 100 micro-arcsecond resolution. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series 8445, .*

(30) Labeyrie, A., Allouche, F., Mourard, D., Bolgar, F., Chakraborty, R., Maillot, J., Palitzyne, N., Poletti, J. R.,Rochaix, J.-P., Prud'homme, R., Rondi, A., Roussel, M., **Surya, A.** 2012. *Construction of a 57m hypertelescope in the Southern Alps. Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series 8445, .*

(31) **Chandrashekhar, K., Krishna Prasad, S., Banerjee, D., Ravindra, B.,** Seaton, D. B. 2012. *Dynamics of Coronal Bright Points as Seen by Sun Watcher Using Active Pixel System Detector and Image Processing (SWAP), Atmospheric Imaging Assembly (AIA), and Helioseismic and Magnetic Imager (HMI). Solar Physics 155.*

(32) **Das, M.,** Sengupta, C., **Ramya, S.,** Misra, K. *2012. Star formation in bulgeless late-type galaxies: clues to their evolution. MNRAS 423, 3274-3284.*

(33) **Sowmya, K., Nagendra, K.N., Sampoorna, M.** 2012. *Blend lines in the polarized spectrum of the Sun. MNRAS, 423, 2949-2956.*

(34) **Kumar, D., Gangadhara, R.T.** 2012. *Influence of the Polar Cap Current on Pulsar Polarization. ApJ, 754, 55.*

(35) Mathew, B., Banerjee, D. P. K., **Subramaniam, A.,** Ashok, N.M. 2012. *A Study of the Role of Ly{$beta$} Fluorescence on O I Line Strengths in Be Stars. ApJ, 753, 13.*

(36) **Chaudhuri, R. K.**, Chattopadhyay, S., Mahapatra, U. S., 2012, *Spectral lines behavior of Be I and Na I isoelectronic sequence in Debye plasma environment. Physics of Plasmas, Vol. 19, No. 8, pp. 82701-7*

(37) Sahoo, B. K., **Das., B. P.**,2012 *Ba+ quadrupole polarizabilities: theory versus experiment.Physical Review A, Vol. 86, No. 2, 22506*

(38) **Banyal, R. K., Ravindra, B.,** 2012*, Development of a temperature controller for the order-sorting interference filters, IIA Technical Report Series No. 10*

(39) **Pravabati, C.,** Park, C., Yogendran, K. P., van de Weygaert, R 2012*, Hot and cold spot counts as probes of non-gaussianity in the cosmic wave background, ApJ, 755, No. 2, 122*

(40)**Supriya, H. D., Nagendra, K. N., Sampoorna, M., Ravindra, B.,** 2012,*The effect of electron scattering redistribution on atomic line polarization, MNRAS, 425, No. 1, pp. 527–539*

(41) **Rajaguru, S. P.**, Couvidat, S., Sun, Xudong, Hayashi, K., Schunker, H., 2012, *Properties of High-Frequency Wave Power Halos Around Active Regions: An Analysis of Multi-height Data from HMI and AIA Onboard SDO Solar Physics, Online First, Nov 2012.*

(42) Tanti, K. K., **Jayashree Roy**, Duorah, K., 2012, *Spectral energy distributions and age estimates of 40 massive young stellar objects, Advances in Astronomy & Space Physics, Vol. 2, pp. 139-142*

(43) **Anathpindika, S., Bhatt, H. C .,** 2012,*On the evolution of irradiated turbulent clouds: a comparative studybetween modes of triggered star formation, MNRAS, 427, No 2, pp. 1713–1724*

(44) Kains, N., Bramich, D. M., Figuera Jaimes, R., Arellano Ferro, A., **Giridhar, S., Kuppuswamy, K.,** 2012, *Constraining the parameters of globular cluster NGC 1904 from its variable star population, A&A, 548, A92*

**** Names in bold-faces are authors from IIA***
$ IIA Repository

Ph D Awarded

Akondi Vyas successfully defended his thesis titled Advanced wavefront sensing algorithms in astronomical adaptive optical systems on 26th of September, 2012 at the Indian Institute of Science, Bangalore. He was guided by B. Raghavendra Prasad, IIA, Bangalore and Tarun Deep Saini, IISc, Bangalore

The thesis deals with improving the accuracy of centroiding algorithms while trying to find the location of the centroid in a noisy Shack Hartmann wavefront sensor spot pattern image. Significant contributions of the thesis include development of novel centroiding algorithms in the likes of thresholded Zernike reconstructor based centroiding, iterative addition of random numbers based iteratively weighted centroiding algorithm. In comparison with a few other algorithms, it was shown that these methods improve the accuracy of centroiding in cases of very low signal to noise ratio. Iteratively weighted centroiding algorithm was applied in the case of Thirty Meter Telescope truth-wavefront sensor for reducing the effects of fluctuations in the sodium layer profile, and was shown to be more accurate and consistent for different spot sizes. Also, it was shown that the accuracy of wavefront sensing in a Shack Hartmann wavefront sensor can be improved by the use of a controlled dithering lenslet array. Prediction of wavefronts in the future helps in reducing the servo lag error in adaptive optics. The thesis addresses this problem by using a novel data mining approach.

IRES Programme

Faculty members (from left) Firoza K. Sutaria, Jadev Singh and B. P. Das with IRES students John R. Hodgson, James P. Mason, Stephenie L. Fiorenza and April Broaden.

Under the International Research Experience for US Graduate Students (IRES) program, sponsored by the National Science Foundation of USA, IIA hosted the following students during the summer (June 13 - August 08) of 2012.

The IRES program, which is for graduate students of the United States to study astrophysics in India, is administered by the National Solar Observatory, Tucson, USA, and is currently co-ordinated by Kiran Jain from NSO, herself an alumnus of IIA. The program aims to expose potential researchers to an international setting at an early stage in their careers. After completing an initial three year period of successful running, this program received a positive review and continued funding from the NSF and 2012 is the sixth year of the program at IIA. The students associate with a faculty member at IIA for a research project, and also undertake visits to IIA's observatories and field stations. *The students who participated were Ms S. L. Fiorenza, Ms A. Broaden, Mr J. P. Mason and MR. J. R. Hodgson II. They collaborated with T. Sivarani, A. Satya Narayanan, J.Singh and F. K. Sutaria form IIA respectively.*

Dedication of MGK Menon Lab

Dedication Ceremony of M. G. K. Menon Laboratory for Space Sciences happened at the CREST campus of IIA, on the 29th of June, 2012. Dr. K. Kasturirangan, Member of the Planning Commission and Chairman of the Governing Council unveiled a plaque of dedication in the presence of S. S. Hasan, the then Director of IIA.

UVIT - a report

UVIT payload is to be launched on ASTROSAT and would make images in 28' field with a resolution < 2" in Far-UV (130-180 nm), Near-UV (200-300 nm), and Visible (320-550 nm). Testing and calibration of the two telescopes was completed. A photograph of the two telescopes shown above.

-S. N. Tandon

भारतीय खगोल वेधसाला, हैनले – लद्धाख

2-मी हिमालय चन्द्रा दूरबीन के प्रथम 10 वर्ष के सफलतापूर्वक संचालन के अवसर पर हम भारतीय खगोल वेधशाला, हैनले-लद्धाख -पर एक विस्तृत श्रृंखला का प्रकाशन पिछले 3 अंक से प्रकाशित कर रहे हैं। इस अंक में लेख का समापन भाग है।

दूरबीन स्थापना के साथ साथ यह भी सोचा गया कि जब दूरबीन राष्ट्रीय/अन्तर्राष्ट्रीय स्तर पर खगोल शास्त्रियों के लिये उपलब्ध होगी तो उन्हें लेह/हैनले की कठिन परिस्थीतियों एवम् वातावरण का सामना पड़ेगा और आवश्यक स्वास्थ्य अनुकूलन के लिये लेह में अतिरिक्त समय गुजारना होगा। इस प्रकार से 2 दिवसीय दूरबीन प्रेक्षण के लिये प्रेक्षक को 10 दिनों का समय निकालना होगा। दूरबीन संचालन की तकनीक में यह सम्भव था कि हैनले की 2 मी दूरबीन की सभी कम्प्यूटरों संचालन प्रणालियों को हम आधुनिक उपग्रह संचार व्यवस्था द्वारा 3 हजार किमी दूर बंगलोर से भी सकिय कर सकते हैं। इस स्थिति में न्यूनतम समय में दूरबीन एवम् प्रेक्षक की पूर्ण क्षमता का अधिकतम उपयोग सुनिश्चित सम्भव प्रतीत हुआ। इस प्रकार से भारतीय तारा भौतिकी संस्थान के बंगलौर परिसर से लगभग 40 किमी दूरी पर स्थित होसकोटे नगर के पास 1999-2000 में विज्ञान एवम् तकनीकी शोध-शिक्षण केन्द्र की स्थापना की । इस केन्द्र में उपग्रह दूर संचार प्रणाली से सम्बन्धित उपकरणों की स्थापना की गयी और हैनले दूरबीन का सुदूर संचालन एवम् नियन्त्रण केन्द्र का निर्माण हुआ। दूरबीन की स्थापना होने के बाद इसकी तकनीक को उपग्रह दूर संचार प्रणाली से जोड़ा गया। इस प्रणाली का हैनले और होसकोटे से गहन पीरक्षण किया गया और यह पाया गया कि दूरबीन एवम् अन्य उपकरणों का संचालन हैनले स्थित नियन्त्रण कक्ष और होसकोटे के सुदूर केन्द्र से समान रूप से सूक्ष्मतम् समयान्तराल में सफलतापूर्वक किया जा सकता है। इस प्रकार 2 मी हिमालयी चन्द्रा दूरबीन और इसकी सुदूर नियन्त्रण प्रणाली का हैनले से माननीय मुख्यमन्त्री जम्मू कश्मीर राज्य जनाब् फारूखअब्दुल्ला द्वारा 2 जून 2001 को लोकर्पण किया गया।

वर्ष 2001-2002 में फोकल तल के लिये नये उपकरण हैनले पहुँचे। दृश्य वर्णक्रम के परावैंगनी से लाल प्रकाश वर्णक्रम में खगोलीय पिन्डों के अध्ययन हेतु प्रतिबिम्ब निर्माण एवम् वर्णक्रम विवर्तन के श्प्रेक्षणों के लिये हैनले क्षीण प्रकाशिक वर्णक्रमलेखी बिम्बक नामक उपकरण को दूरबीन के साथ जोड़ा गया और इस उपकरण की क्षमता का भी गहन परीक्षण किया गया। वर्तमान प्रकाशीय दूरबीन को निकट अवरक्त वर्णक्रम प्रेक्षणों के अनुकूल भी बनाया गया था इसलिये तदन्तर में एक अवरक्त प्रेक्षण बिम्बक भी संस्थान में ही विकसित कर दूरबीन के फोकस तल में लगाया गया। दूरबीन की स्वचालित सुक्ष्म अनुगामी कार्यविधि को भी दूरबीन की सन्चालन प्रणाली जोडा गया। इस अवधि में स्थानीय और होसकोटे सन्चालन केन्द्रों से दूरबीन की क्षमात, डोम स्व-संचालन और फोकस तल उपकरणों से सम्बन्धित सभी कार्यप्रणालियों का गहन परीक्षण किया गया। इस प्रकार सम्पूर्ण 2 मी हिमालयी चन्द्रा दूरबीन संयन्त्र की अनवरत् कार्यक्षमता की विश्वनीयता स्थापित होने के बाद मई 2003 से विश्व के खगोलविदों के प्रयोग के लिये प्रारम्भ कर दिया।

2 मीटर हिमालयन चन्द्र दूरबीन-एक राष्ट्रीय सुविधा: यह दूरबीन एक राष्ट्रीय सुविधा घोषित की गयी और एक दूरबीन समय आंबटन समिति का गठन किया गया। समिति द्वारा साल में चार महीनों के तीन चकों, प्रथम जनवरी-अप्रेल, द्वितीय मई-अगस्त सितम्बर और तृतीय सितम्बर-दिसम्बर के लिये क्रमश: नवम्बर, मार्च, एवम. जुलाई की पहली तारीख तक दूरबीन द्वारा प्रेक्षणों की वैज्ञानिक आवश्यकता के लिये निर्धारित प्रारूप में आवेदन आमन्त्रित किये जाते हैं। इन वैज्ञानिक प्रारूपों को सम्बन्धित विषय विशेषज्ञों के पास भेजा जाता है और योग्यता के आधार पर सम्पूर्ण चक के लिये रात्रिकालीन समय अनुसंधानकर्ताओं को आवंटित किया जाता है। सम्बन्धित अनुसंधानकर्ता/प्रेक्षक होसकोटे स्थित सुदूर संचालन-नियंन्त्रण केन्द्र जाकर हैनले स्थित दूरबीन से आवश्यक प्रेक्षण लेते हैं। इस क्रम में यह जानना जरूरी है कि हैनले वेधशाला में इन्जीनियर और तकनीशियन हमेशा उपलब्ध रहते हैं और सम्बन्धित सभी कार्यप्रणालियों को तैयार रखते हैं। प्रत्येक दोपहर बाद फोकस तल के सीसीडी कैमरा उपकरणों को निम्न तापमान में रखने के लिये द्रवीकृत नत्रजन भरते हैं। तत्पश्चात शाम को सूर्यास्त के बाद दूरबीन के सीसीडी कैमरा के मानकीकरण हेतु सायंकालीन आकाश की मद्धिम रोशनी के विभिन्न प्रेक्षण लेते हैं। फिर अँधेरा होते ही सम्पूर्ण दूरबीननियन्त्रण होसकोटे स्थित आगन्तुक प्रेक्षक को स्थानान्तरित कर दिया जाता है। इस प्रकार होसकोटे से दूरबीन को घुमाकर आकाश में खगोलीय पिन्ड की ओर लक्ष्य किया जाता है। डोम के खुले द्वार को भी इसी दिशा में घुमाकर विभिन्न उपकरणों का संचालन कर आवश्यक प्रेक्षण एकत्रित किये जाते हैं। होसकोटे नियन्त्रण कक्ष में स्थित कम्प्यूटर मॉनीटरों पर खगोलीय प्रतिबिम्ब एवम् वर्णक्रम विवर्तन भी देख सकते हैं। इनकी तीक्षणता का परीक्षण कर दूरबीन के फोकस तन्त्र को चलाकर श्रेष्ठ गुणवत्ता के प्रेक्षण एकत्रित करते हैं। प्रेक्षणों के एकत्रित करने का यह कार्य अनवरत् पूरी रात्रि चलता है। इस दौरान हांलाकि सम्पूर्ण नियन्त्रण होसकोटे के पास रहता है, हैनले स्थित तकनीशियन दूरबीन संचालन एवम् उपग्रह संचार

पर पूरी से निगाह रखते हैं। हैनले होसकोटे के बीच में त्वरित उपग्रह वाक् सम्पर्क हमे शाक कायम रहता है। मौसम के बारे में लगातार होसकोटे को अवगत कराते हैं। हैनले में स्थित दिन और रात के लिये अलग अलग स्थापित कैमरा उपकरण आसमान में बादलों की स्थिति की तत्कालीन जानकारी बिना किसी विलम्ब के होसकोटे स्थित प्रेक्षकों को लगातार देते हैं। इस तरह होसकोटे प्रेक्षक अपने खगोलीय प्रेक्षण नियोजित कर पातेहै। आपात स्थिति में हैनले स्थित तकनीशियन दूरबीन का नियन्त्रण होसकोट बिना अवगत कराये दूरबीन के सम्पूर्ण सन्चालन को रोक कर किसी भी प्रकार की हानि को रोक सकते हैं।

इस प्रकार से भारतीय खगोल वेधशाला हैनले लद्धाख स्थित 2 मी हिमालयन चन्द्रा दृश्य और निकट अवरक्त वर्णक्रम दूरबीन और विज्ञान एवम् तकनीकी शोध शिक्षण केन्द्र होसकोटे स्थित सुदूर संचालन नियंत्रण प्रणाली भारतीय खगोलिकी में एक मील का पत्थर साबित हुए। सफल संचालन के विगत् दशक के दौरान इस दूरबीन से कार्य हेतु समय आबन्टन के लिये देशी-विदेशी आवेदनों में काफी स्पर्द्धा रही है। दूरबीन विश्व मानचित्र में स्थिति भी काफी महत्वपूर्ण रही। पूर्व में आस्ट्रेलिया की साइडिंग स्प्रिंगवेधशाला के बाद एक लम्बे देशान्तर अन्तराल में उत्तम वेधशालाओं में मात्र भारतीय 2 मीटर चन्द्र दूरबीन ही कार्यरत् है। तत्पश्चात पश्चिम में यूरोपीय वेधशालाएं हैं। इस प्रकार हमारी दूरबीन कतिपय खगोलीय पिन्डों की सतही संरचना से सम्बन्धित विक्षोभ के समय के साथ अनवरत् पूर्णकालिक प्रेक्षणों को प्राप्त करने में महत्वपूर्ण भूमिका निभाती है। यह जानकारी देना आवश्यक है कि इस दूरबीन के प्रारम्भिक परीक्षण के दौरान ही 21 -23 फरवरी 2001 में एक अन्तराष्ट्रीय सूचना के आधार पर एक गामाकिरण प्रस्फोट घटना का प्रकाशिक अनुगमन किया गया जो अपने आप में एक दुर्लभ एवम् महत्वपूर्ण प्रेक्षण श्रृंखला रही और इस घटना पर 2 मी दूरबीन का प्रथम शोध पत्र प्रकाशित हुआ। तदन्तर में इस दूरबीन से बहुत सारी गामा किरण प्रस्फोट घटनाओं का प्रेक्षण किया गया और इन प्रेक्षणों का राष्ट्रीय एवम् अन्तराष्ट्रीय संयुक्त अध्ययनों में महत्वपूर्ण योगदान रहा। सुदेर अन्रिक्ष में स्थित आकाशीय पिन्डों के खगोलीय अध्ययन हेतु इस दूरबीन में लगाये गये हैनले क्षीण प्रकाशिक वर्णक्रमलेखी विम्बक दृष्य प्रकाशीय एवम् निकट अवरक्त प्रकाशिक प्रेक्षण विम्बको से पप्रेक्षण लेकर विभिन्न खगोलीय विषयों में शोध एवम् अनुसन्धान किये गये जिनका संक्षिप्त विवरण इस प्रकार से है।

अपनी गृह आकाश गंगा स्थित कई जातरा पुंजों के भौतिक गुणों की गणना और इन गुणों के आधार पर तारों का निर्माण एवम् कमिक विकास, इस तारा पुंजों में छोटे युवा तारों की सम्भवना, तारा पुंजों की आकाशगंगा में स्थिति एवम् आकाशगंगा की संरचना, अन्तरतारकीय गैस-धूल-बादल से नवजात तारों का उद्भव और इन की संरचना का अध्ययन। कई विशिष्ट तारों की संरचना एवम् उसमें उपस्थित रासायनिक तत्वों/अवयवों की खोज और अध्ययन, तारों की रचना में कतिपय भौतिक कारकों/कियाओं की महत्ता इत्यादि। कुछ विशेष प्रकार के तारोंमें विस्फोट जनित प्रकाशीय ऊर्जा का आंकलन और उसकी स्थिति की समीक्षा। अन्य ग्रहाकार नीहारिका एवम् वलय युग्म तारों नवतारों सुनवतारे एवम् वामन तारों का अध्ययन।

परागांगेय मन्दाकिनियों में तारों का निर्माण एवम् इनमें सुनवतारा स्फुटिक घटना, विभिन्न मन्दाकिनियों की संरचना, मन्दाकिनी पुंज, सक्रिय गांगेय नाभिक, क्वासर और गामा किरण स्फोट घटना का खगोलीय अध्ययन।

धुमकेतु टेम्पेल एक में नासा द्वारा किये गहन आघात घटना के पहले और बाद की धूमेतु की सतह संरचना एवम् घूर्णीय अवस्था में परिवर्तन के अध्ययन के लिये विश्व के विभिन्न भागों में स्थित वेधशालाओं से धूमकेतु की अनवरत प्रेक्षण श्रृंखला में 2 मी दूरबीन के प्रकाशीय प्रेक्षणों ने काफी महत्वपूर्ण योगदान किया। इसी प्रकार वैश्विक अनवरत् प्रेक्षण श्रृंखला में शुक ग्रह के अन्धेरे भाग के अवरक्त वर्णक्रम में प्राप्त प्रेक्षणों से शुक ग्रह के गतिमान वायुमन्डल का अध्ययन किया।

इस प्रकार विगत् वर्षों में 2 मीटर दूरबीन द्वारा प्राप्त प्रेक्षणों के आधार पर कई महत्पपूर्ण शोध सामने आये लगभग 100 से ज्यादा शोध पत्र राष्ट्रीय-अन्तर्राष्ट्रीय मानक शोध पत्रिकाओं/ ग्रन्थों में प्रेकाशित हो चुके हैं और दस से ज्यादा विद्यार्थियों को तैयार शोध प्रबन्धों पर डॉक्टोरेट की उपाधियॉ प्रदान की गयी हैं। वर्तमान में भी दूरबीन अपनी पूरी क्षमता से सफलतापूर्वक कार्य कर रही है। विगत् 26 सितम्बर 2010 को इस दूरबीन द्वारा प्रथम प्रकाश पुंज प्रेक्षण की दशवीं वर्षगॉठ हैनले में मनायी गयी और लेह-हैनले के इन्जीनियरों/ कर्मचारियों एवम् होसकोटे सं कतिपय वैज्ञानिकों ने इसमें भाग लिया। हम आशा करते हैं कि यह दूरबीन एक लम्बे समय तक भारतीय खगोलिकी को अपनी सेवाएं देती रहेगी और इसका खगोलीय शोध एवम् अनंसंधान में अविस्मरणीय योगदान रहेगा।

इस सन्दर्भ में यह जानना आवश्यक है कि 2 मीटर दूरबीन की स्थापना के दौरान भी स्थल परीक्षण मानकों का एकत्र करना जारी रहा और हमारे पास लगातार पिछले 15 सालों से अधिक की महत्वपूर्ण सूचना उपलब्ध है। हॉ छोटी दूरबीन की अनुपलब्धता एवम् 2 मी दूरबीन की स्थापना में व्यस्तता से युगल किरण पुन्ज विधि द्वारा प्रतिबिम्ब निर्माण में वायुमन्डलीय विक्षोभ के प्रकाशिक

प्रेक्षणों का लगातार संकलन नहीं हो पाया। बाद में इन प्रेक्षणों को 2 मीटर दूरबीन के साथ 10 इन्च मीड दूरबीन से भी लिया गया है। स्थल परीक्षण में अभी तक एकत्रित आकड़ों की मदद लेकर इनका विस्तार किया जा रहा है। वातावरण की खगोलीय विशेषताओं की जानकारी अन्य कई स्वचालित स्वलेखी उपकरणों का विकास किया जा रहा है जिससे कि आकड़ों का अनवरत् संकलन हो सके। अन्त में यह जानकारी देना आवश्यक है कि 2 मीटर दूरबीन के सफलता ने हैनले लद्धाख स्थल के खगोलीय गुणों को नये आयाम दिये हैं। यह स्थल भविष्य की दृश्य एवम् अवरक्त प्रकाशीय बड़े व्यास वाली दूरबीनों की परियोजनाओं के लिये विश्व में एक बड़ी पहचान बनाने की क्षमता रखता है। 2 मीटर दूरबीन के सफल सन्चालन से उत्साहित खगोलविदों ने हैनले क्षेत्र में एक बड़ी 8-10 मीटर व्यास दूरबीन के प्रारूप में कार्यकरनला शुरू किया है।

- भुवन चन्द्र भट्ट

Kannada Rajyotsava Celebrations

The 57th Kannada Rajyotsava was celebrated with great enthusiasm on 7th November 2012 by the Karnataka Rajyotsava Samithi of the Indian Institute of Astrophysics. The celebrations began with the welcome procession by Veeraghasya artists & Kamsale artists, followed by pooja to the Goddess Bhuvaneshwari, after which, the Honourable

Professor Bhanu Pratap Das, Acting Director of IIA, inaugurated the new flagpole, & hoisted the Karnataka flag.

Veeraghasya artists who performed during the 57th kannada Rajyosatava Day.

Nada Geethe was sung by Ms Shweta B. Joshi & Group

The Office Bearers & EC members of Karnataka Rajyotsava Samithi along with the Veeraghasya artists.

Kamsale artists who performed during the 57th Kannada Rajyotsava

chief Guest Professor Bhanu Pratap Das, Acting Director of IIA, inaugurated the new flagpole, & hoisted the Karnataka flag.

Shri. M. Munellappa, General Secretary, Karnataka Rajyotsava Samithi, welcomed the gathering, Honourable chief guests and speakers. The chief guests and renowned speakers who enlighten the stage were, Prof. B. P. Das, Prof. T. P. Prabhu, Dr. P. Kumaresan, Prof. K. N. Nagendra, Prof. R. Kariyappa, Prof. K. M. Hiremath,

The Office Bearers & EC members of Karnataka Rajyotsava Samithi, honoured Prof. G. C. Anupama for being elected as a Fellow of the National Academy of Sciences for the year 2012.

Shri. A. Narasimharaju, Shri. D. Lakshmaiah, Shri. Narasimhappa, Shri. V. Gopinath, & Shri. D. Prem Kumar.

Nada Geethe was sung by Ms Shweta B. Joshi & Group and Kannada patriotic songs were sung by members of Kendriya Sadan Kannada Sangha and followed by cultural programmes.

The Office Bearers & EC members of Karnataka Rajyotsava Samithi, honoured Prof. G. C. Anupama for being elected as a Fellow of the National Academy of Sciences for the year 2012. Later the samithi members gave their gratitude to Professor Bhanu Pratap Das and for all the Chief Guests.

The programme was anchored by Shri. B. S. Mohan and the vote of thanks was given by Shri. Yarappa, for one and all who made the programme a grand success.

- B. Mohan

Farewell

IIA wishes all the best to ...

... A. Selvaraj joined the services of IIA as Research Assistant on 23.12.1974 at Kodaikanal.He retired as Sr. Technical Officer at IIA, Bangalore on 31.07.2012 on attaining the age of superannuation.

... D . Dakshina Murthy joined the services of IIA as Typist on 18. 01.1982 at Bangalore. He retired as Sr. Office Superintendent at CREST Campus, Hosakote on 31.08.2012 on attaining the age of superannuation.

... K. Sutherson joined the services of IIA as Typist on 21.02.1974 at Kodaikanal. He retired voluntarily on 31.08.2012 as Sr. Section Officer Gr.-II.

... John Sunitha Nathan joined the services of IIA on 07.05.1984 as Sr. Technical Assistant (Documentation). He retired as Principal Scientific Officer on attaining theage of superannuation on 31.12.2012.

... M. P. Parthasarathy joined the services of IIA as Administrative Assistant on 18.04.1983 at Bangalore.He retired as Accounts Officer at IIA, Bangalore on 30.09.2012 on attaining the age of superannuation.

... Shri. K. Rangaswamy joined the services of IIA as Electrician on 24.04.1978. He retired as Sr.Technical Officer on attaining the age of superannuation on 31.12. 2012.

... L. Josephine joined the services of IIA as Junior Stenographer on 15.01.1979 at Bangalore. She retired as Sr. Section Officer at IIA, Bangalore on 30.09.2012 on attaining the age of superannuation.

... Mrs. P. Bama tendered her resignation from the position of Scientist-B w.e.f. 04.01.2013. She joined the services of IIA as Scientist-B at IAO, Hanle on 12.06.2003 and resigned from the position of Scientist-B at CREST Campus, Hoskote.

... A. Narasimharaju joined the services of IIA as Stenographer on 10.01.1980 at Bangalore. He retired as Personnel Officer at IIA, Bangalore on 31.10.2012 on attaining the age of superannuation.

... Shri. H. S. Subramanyam joined the services of IIA on 01.04.1985 as Chowkidar. Retired as Chowkidar-E at IIA, Gauribidanur on attaining the age of superannuation on 31.01.2013.

... M. Joseph Rosario joined the services of IIA as Jr Research Assistant on 27.08.1980. He has been elevated to various positions. Retired as Sr. Technical Officer at VBO, Kavalur on 31.10.2012 on attaining the age of superannuation.

New Appointments

M. Sampoorna joined the institute as Reader on October 10, 2012. She works on the theory of polarized light scattering and radiation transfer in solar and stellar atmospheres. Her thesis was on "Polarized line formation in turbulent and scattering media" under the JAAP program of Indian Institute of Science, Bangalore. Before taking up her new position at IIA, she was a post-doctoral fellow at Instituto de Astrofisica de Canarias, Tenerife, Spain, followed by Chandrasekhar post-doctoral fellow at IIA, Bangalore.

Shri. S.B. Ramesh has been appointed Accounts Officer at IIA, Bangalore on15.01.2013.

Shri. Anish Parwage joined as Engineer-C (Computer) w.e.f. 31.01.2013.

Preeti Kharb took up the position of a Reader at the Indian Institute of Astrophysics (IIA) on Dec 10, 2012. Prior to joining IIA, Dr. Kharb was a postdoctoral fellow in the Physics Department of the Rochester Institute of Technology (RIT), Rochester, NY (2009-2012). Before that, she held postdoc positions at Purdue University, Lafayette, IN (2007-2009), and the Center for Imaging Science at RIT (2005-2007). During the course of her research, Dr. Kharb followed a multi-wavelength observational approach to study active galactic nuclei (AGN), making use of both ground-based radio telescopes like the Very Large Array (VLA) and the Very Long Baseline Array (VLBA), and space-based telescopes like the Hubble Space Telescope and the Chandra X-ray Observatory. Apart from data, she brought in several NASA grants to her host institutions, through successful proposals. During the summer of 2012, she served as a member of the NASA Chandra proposal Peer Review Panel for Cycle 14. Dr. Kharb completed her Ph.D. thesis on "A Pc-scale Study of Radio-loud AGN : The Fanaroff-Riley Divide and Unification" at IIA in December 2004, under the supervision of Prof. Prajval Shastri. She has authored 40 refereed journal articles.

Chandrasekhar Post-Doctoral Fellowship

The Director, IIA invites applications from exceptionally bright candidates with outstanding academic credentials for the award of 'Chandrasekhar Post-Doctoral Fellowships' in all areas of astrophysics. Applications are accepted at any time of the year. The fellowship is for an initial period of two years, extendable to three, with a monthly stipend of Rs.50,000/- to Rs. 55,000/- for candidates with up to 2 years post-doctoral experience and Rs 55,000/- to 60, 000/- for those with more than two years experience. An annual contingency grant of Rs.2,00,000/-, housing and medical benefits, and support for travel to Bangalore. More details are at http://www.iiap.res.in/postdoc.htm.

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