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In this issue...

Founder's Day Celebrations

Professor Govindarajan Padmanaban accompanied by Professor Siraj Hasan,director of IIA garlanding the statue of Vainu Bappu on August 10, 2010 on the occasion of Founder's Day.

IIA celebrated Founder's Day on the 10th of August, 2010, the 83rd birth anniversary of Vainu Bappu. For IIA, Founder's Day is an occasion to come together and reflect on progress made towards its long-term vision, the foundations for which were laid by its founder. This year the Founder's Day events included a gathering of all IIA members in the Library, where a picture of Vainu Bappu was garlanded by the director followed by release of a flyer that collects together, from the IIA archives maintained by the library, the historic events that characterised the life of Vainu Bappu and his leadership at IIA.

A public lecture in the evening is a customary event on the Founder's day. This year the lecture was by the renowned biochemist and a pioneer in Indian biotechnology Govindarajan Padmanaban. Currently, he holds the NASI-Platinum Jubilee Chair/Honorary Professor at the Indian Institute of Science, Bengaluru. Professor Padmanaban spoke on *Growth of Biotechnology in India*. He described the key initiatives of the Indian government in the early phase of the development of biotechnology in the early eighties, which led to the formation of the Department of Biotechnology (DBT) in 1986. He then spoke at length on the various initiatives and establishments that DBT supported through new institutions, support for research, creation of infrastructure, generation of human resources, formulation of regulatory regimes and linkage with industries. With brief descriptions of his own research in the areas of recombinant DNA technology,

Pictures of a section of the audience (left), and Professor Padmanaban speaking on the Growth of Biotechnology in India on the occasion of Founder's day.

its applications, malarial parasite biology, identifying drug targets and development of vaccines for hepatitis B. He gave an account of the growth of modern life sciences research in India. He then spoke on the new directions involving stem cell research and applications in the areas of Health and Agriculture and how India can contribute significantly. While acknowledging issues in venture capital for new start-ups, he however saw optimism in the Indian government's support mechanisms through Technology Development Board (TDB) initiative.His closing part of the lecture focussed on the potential of India to reach global leadership in the areas of vaccines, biogenerics, traditional medicine (if properly validated and standardized) and service sector, including contract projects.

Professor Padmanaban completed his M.Sc from Indian Agricultural Research Institute (IARI) New Delhi in1960 and Ph.D from IISc in 1966. He worked as Assistant Professor (1969-75), Associate Professor (1975- 80) and as Professor (1980 onwards) at IISc, Bengaluru. He was Director of IISc during 1994-98. He also guided 45 Ph.D s and has published over 140 papers. He has mentored a large number of young scientists and entrepreneurs in the country. As Director, IISc, he promoted interaction with industry and started innovative programmes to attract students to research. He is personally involved in helping and motivating entrepreneurs to set up biotech industries, especially in modern vaccine manufacture. He is also is keenly interested in Indian philosophy and carnatic music.

Founder's day at VBO, Kavalur

Vainu Bappu Observatory, Kavalur also celebrated the Founder's Day. D. C.V.Mallik from IIA, Bangalore presided over as the chief guest and garlanded Professor Bappu's photo. On this occasion, a special public outreach programme was organized for college students. Welcome address was given by C. Muthumariappan the Scientist-in-charge at VBO, Kavalur. A total of 72 students from six colleges (10 physics students and 2 lecturers from each college) participated. D.C.V. Mallik delivered a lecture on "The World Beyond Ours" to the audience. This was followed by inter-collegeate quiz competition on Physics and Astronomy conducted by C. Muthumariappan. Saradha College for Women, Salem, won the first prize and Govt College for Men, Thiruvannamalai won the second prize of the quiz competition, and prizes were distributied to them by D.C.V. Mallik.

Following the programme, a visit to the Observatory

D.C.V Mallik is presenting a momento to the winner of the Science and Astronomy Quiz, from the Saradha College for Women, Salem.

was organized and the facilities were introduced to the students.The programme generated a great deal of interest in Astronomy among the students in Astronomy and led to discussion on various topics in Astronomy. The concluding remarks and vote of thanks were given by C. Muthumariappan.

- C. Muthumariappan

Observer Status for India in the Thirty Meter Telescope Project

The astronomy community in the country continued their efforts of joining one of the three proposed international mega optical and infrared ground-based facilities (GSMTs): the 42-m European Extremely Large Telescope (EELT), the Thirty Meter Telescope (TMT) and the 25-m Giant Magellan Telescope(GMT). A full report on the requirement of such an international collaboration, best option for India's participation among the three projects, and strategy on the human resources growth to meet the challenges was prepared and submitted to the Department of Science and Technology (DST) in early 2010. This was followed by a meeting in New Delhi in April 2010 that was attended by members from the planning commission, DST, GSMT- India national advisory group, directors of ARIES, IIA, IUCAA, RRI and coordinators of the GSMT-India project. The recommendation of the report that was discussed in detail was that the Thirty Meter Telescope (TMT) project consortium led by Caltech, Univ. of California and ACURA (Canada) is best suited to fulfill the aspirations of the Indian astronomy community. It is also well disposed to meet our science goals and development of indigenous technologies to set up medium-size telescopes in the country. After a high level meeting of the TMT board members and the DST at the TMT headquarters in Pasadena, a formal announcement to join the TMT project as an observer was made on 24 June 2010 at the Indo-US science and technology forum by Shri Prithviraj Chavan, Minister of Science and Technology.

At present the TMT project is a six member international consortium.Other members are China and Japan. The construction work is expected to begin in the middle of 2012 in Mauna Kea, Hawaii on a summit known as 13N at altitude of 4050m. Mauna Kea is one of the top few astronomical sites with median seeing of 0.75 arcsec and 76% of clear nights. During theobserver status it is envisaged that the Indian astronomical community would work closely with the TMT project and its other partners to identify niche areas where India could contribute to the development of the project in return for the observing time on the TMT. A few key areas of interest which have been identitfied are: primary mirror segments, mirror actuators, segment edge sensors, segment support system, observatory control software, hosting TMT science center and participating in the instrument building. TMT project management too has shown a keen interest in delegating some of these systems to India as part of India's in-kind contribution. The group is working towards formalizing the process of developing some of the work packages mentioned above.

- B. E. Reddy

Total Solar Eclipse of July 11, 2010 from Easter Island, Chile

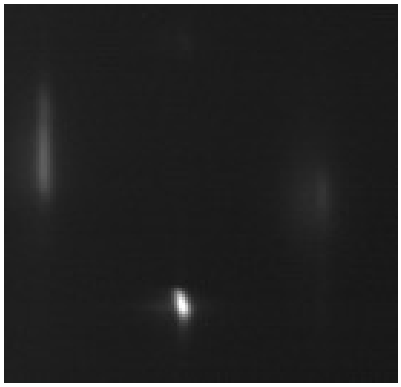
A team of scientists from the Indian Institute of Astrophysics, Bangalore set up camp at Easter Island, a triangle of volcanic rock islands in the south Pacific - best known for the giant stone monoliths called *Moai*, that dot the coastline. Easter Island is over 3,700 km from the nearest population center, (Tahiti and Chile), making it one of the most isolated places on Earth. The site was carefully selected to achieve the best observations in order to have a long duration of totality (4 min 40 sec). The path of the Moon's umbral shadow crossed the south Pacific ocean where it encountered a no-land mass except for Mangaia (Cook Islands), Easter Island (Isla de Pascua) and several isolated atolls. The path of totality ended just after reaching southern Chile and Argentina. The Moon's penumbral shadow produced a partial eclipse visible from a much larger region covering the South Pacific and southern South America. The team consisted of S. S. Hasan (Director), Jagdev Singh, Dipankar Banerjee, K. Ravi and F. Gabriel.

Indian eclipse team (from left to right) : J. Singh, K. Ravi, D. Banerjee, P. K. Kapoor (Indian ambassador to Chile) S.S. Hasan and K. Gabriel

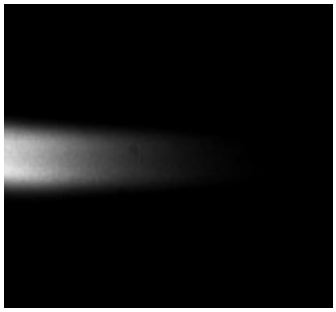
Astronomers from the Indian Institute of Astrophysics have conducted several experiments during total solar eclipses over the past three decades as listed in the table. This year, the IIA team successfully carried out the planned experiments in good sky conditions. The major challenge to study the line widths with chromospheric spectral lines is that the chromospheric spectra obtained on the disc has the inherent problem of integration of the signal along the line-of-sight. On the other hand, spectra obtained at the limb has scattered light component and makes it impossible to study the variation in line profiles as function of height and thus

Eclipse experiments performed over the years.

1980	Image Intensifier	Red line	Multislit spectroscopy	Spatial
1983	Image Intensifier	Red line	Multislit spectroscopy	Spatial
1994	Image Intensifier	Red & Green line	Multislit spectroscopy	Spatial
1995	PMT	Continuum	1 location	10 Hz
1998	PMT	Continuum	4 locations	50 Hz
2006	CCD	Green & Red	Imaging	
	Only one limb			
2009	CCD	Green & Red	Imaging	1.1.Hz
	All around the sun up to 1.5 solar radii			
2009	CCD	Green & Red	Spectroscopy	0.2 Hz
2010	CCD	Green & Red	Spectrocopy	0.23 & 0.9 Hz
2010	CCD	Spectroscopy in H-alpha line as function of height (New Experiment)		~7 Hz



A representative multi-slit spectra around green emission line with 3 s exposure. The central bright region may correspond to a jet- like structure at the solar limb.



A representative H-alpha image: A slit width of 300 microns at the East limb of the sun was used with an exposure time of 126 ms at 7.1 Hz.

study the chromospheric heating. Thus total solar eclipses provide the best opportunity to get the uncorrupted chromospheric spectra as a function of height. During the first few seconds of the second contact when the chromosphere is visible one needs to get the spectra at high frequency of about 10 Hz which was not possible earlier. It has now, become possible to get such data with the availability of high speed CCD cameras with high photometric accuracy during the eclipses.

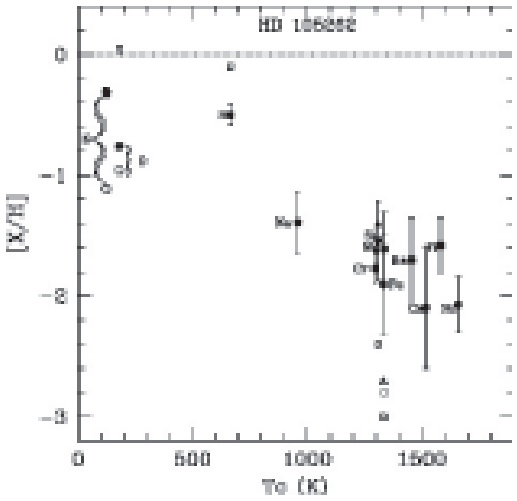
Keeping these constraints in mind two experiments were performed. 1) Emission line Spectroscopy: A two mirror coelostat with 10 cm, f/10 objective, collimator & camera lens with 14 cm aperture of 140 cm focal length resulted an image size of about 9.1 mm, 210 arcsec/ mm with dispersion : 2.095 A / mm. CCD cameras with 1K x 1K format (EM CCD), Pixel size : 13.5 x 13.5 microns, Read out : 14-bit at 10 MHz were used. Images were obtained at a frequency of about 1 Hz. The objective of the other experiment was to take Chromospheric spectra in the hydrogen-alpha line as a function of height at a high frequency of about 7 Hz. For this a two mirror coelostat system with 14 cm objective of 12m focal length yielded an image size of about – 35 cm with dispersion : 1.06 A / mm.

The accompanying image of the corona was taken with a SLR camera just to provide the context. The Sun is now going through a minimum phase of activity, so that the corona is more diffused and less structured.

A combination of imaging and spectroscopy can reveal a wealth of new information about the solar corona such as the presence of waves, that could be important for heating it to two million degrees. With this ground-based experiment from the Easter Island, the team has also performed simultaneous observations from space using the Japanees satellite called Hinode. For further details visit www.iiap.res.in

- Eclipse Team

Chemical Composition of A--F Type Post-AGB Candidates



Abundance [X/H] versus condensation temperature for H D 105262 (filled circles). The authors have included the abundance of the hot post-AGB stars H D 137569 (open squares) (Giridhar & Arellano Ferro 2005) and R OA 5701 (empty triangles) (Moehler et al. 1998). Open circles indicate the N and O values after the correction for N LTE.

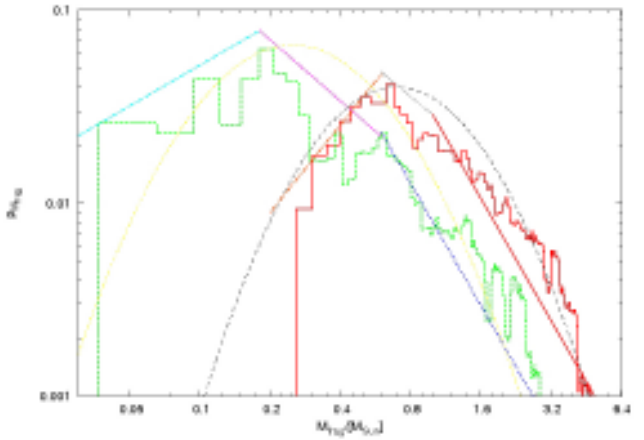
An abundance analysis has been conducted for a sample of nine post-AGB candidate stars; eight of them have not been explored before. The authors find four very promising objects like HD 105262, HD 53300 and CpD -62°5428 among them. Strong evidence of dust-gas separation through selective depletion of refractive elements in HD 105262 is also found. The same effect is also observed in HD 53300, CpD -62°5428 and HD114855 although abundance peculiarities are relatively smaller for the last two stars.

The authors also find strong enrichment of nitrogen for HD 725, HD 842, HD1457, HD 9233 and HD 61227 but no further evidence to support their post-AGB nature. The observed [N/C] ratios of these stars with the predictions of evolutionary models which include the rotation induced mixing are also compared. A weak correlation between [N/C] and [Na/Fe] for these N enriched stars is also found. It indicates a possible correlation of N enrichment with mass of the progenitor since [Na/Fe] is known to be correlated with the progenitor mass. *These results were published in MNRAS, 2010, 406, 290.*

Giridhar,S. Arellano Ferro, A., 2005, A&A, 443, 297
Moehler, S., Hber, U., Lemke, M., Napiwotzki, R. 1998, A&A, 339, 537

- S. Giridhar, R. Molina, A. Arellano Ferro & G. Selvakumar

The CMF as Provenance of the Stellar IMF



The histograms plotted here show the derived stellar IMFs for the five choices of core temperatures. The green, and red histograms are respectively, for non-turbulent, and turbulent prestellar cores.The canonical IMF, plotted with a different colour for each of the 3 mass ranges, and the log-normal IMF have also been shown for comparison purposes.

Stars usually form in clusters and the distribution of their masses is defined by the so called initial mass function (IMF). Classical Jeans theory suggests that the number of stars that a prestellar core could possibly form is approximately equal to the number of (thermal) Jeans mass that it has. This essentially means, the efficiency of the gas to star conversion, and therefore the IMF, depends critically on the prevalent physical conditions within the natal cores. Interestingly, masses of prestellar core themselves appear to be distributed according to the so called core mass function (CMF) that bears a close resemblance with the IMF. This apparent similarity between the two distributions has prompted people to suggest that the CMF could possibly be the progenitor of the stellar IMF. This is a problem fundamental in nature, for it seeks to encompass the entire star-formation episode, beginning formation of the prestellar core.

The problem spans a large parameter space that entails non-linear effects owing to thermal and kinematic details, rendering it non-trivial, though magnetic field has been excised for the time-being. Our present work tackles this problem through a marriage between a Monte-Carlo treatment of the problem, and a semi-analytic deduction by summoning essential physical details. Thus, commencing with a randomly picked sample of 14,000 prestellar cores with masses varying between 0.5 M_Sun and 10 M_Sun, distributed according to a typical power-law CMF, the authors generated a sample of ~100,000 protostellar fragments. The authors report that while

cores more massive than a Solar mass conveniently produce multiple fragments, smaller cores of sub-Solar masses, preferably produce a protostellar object with a circumstellar disk. The attendant disk could fragment to produce brown-dwarfs with a mass of ~0.03 M_Sun. Calculations of BD masses are corrected by accounting for protostellar heating of the disk which tends to suppress disk fragmentation in its inner regions.

The stellar IMF generated for this sample of protostars is shown by a red histogram in the Figure, which is in good agreement with the canonical power-law IMF plotted using tri-coloured segments; also plotted is a log normal approximation to the power-law IMF. According to the x^2 -goodness of fit test, the IMF derived here is within 10% of the canonical IMF. The author's work lends support to the hypothesis that the stellar IMF could trace its origin back to the CMF. *To appear in Astronomy and Astrophysics.*

- S. Anathpindika

Local Helioseismic Detection of Acoustic Sources Beneath a Sunspot

Inhibition of overturning convective motions by a strong magnetic field of a sunspot constitutes a basic magnetohydrodynamic (MHD) effect and was central to early theoretical ideas on explaining the thermal (darkness) and mechanical structure of a sunspot. How deep below the photosphere such an inhibiting action of the magnetic field persists or how coherent is the subsurface magnetic field, however, remains a matter of uncertainty for lack of a deductive magnetohydrodynamic model. Local helioseismology provides the only observational way of solving the problem, but currently faces inadequacies on several fronts, the major one being our inability to correctly account for the strong near-surface and directly observable changes that the acoustic waves impinging on the sunspot suffer.

Recent advances in instrumental capabilities, especially those that combine imaging and spectropolarimetry with high spatial and spectral resolutions, allow spatio-temporal correlation studies typical of modern local helioseismic analyses as well as probing wave processes as a function of observation height. In a work published recently in the Astrophysical Journal Letters, the authors (Rajaguru et al.) have just done the above using the Interferometric BI-dimensional Spectrometer (IBIS) installed at the Dunn Solar Telescope of the National Solar Observatory, Sac Peak, New Mexico, USA. IBIS has spectral and spatial resolutions of 25 m A and 0.165", respectively, and has a 80" diameter (60 Mm) circular field of view (FOV). They observed a medium sized sunspot (NOAA AR10960, diameter ~18 Mm) located close to disk center (S07W17) on June 8, 2007. The observations involved scanning and imaging in all the Stokes profiles (I,Q,U,V) of magnetic Fe I 6173.34 A and in Stokes I of non-magnetic Fe I 7090.4 A, with a cadence of 47.5 sec. Choosing the longest uninterrupted observation lasting about 7 hrs, the authors derive line-of-sight (LOS) velocity information over a range of heights within the formation region of the above lines using the Doppler shifts of line bisectors.Using 10 bisector levels with equal spacing in line intensity, ordered from the line core (level 0) to the wings (level 9), 10 velocity data cubes, $v_i(x,y,t)$ (i = 0,...,9), are derived for each line. Average of bisector velocities from the left (I+V) and right (I-V) circular polarization profiles were used for the magnetic line and those from the I profile for the non-magnetic line.

Imaging at each wavelength position allows a spatial map of wave phases while the fine spectral resolution allows following the waves over the height range of formation of the observed lines. The velocity data cubes v derived as above contain both the above crucial information on waves. The former spatial maps of waves are used in a conventional time-distance helioseimic analysis involving p modes and travel times are measured for surface travel distances Δ= 6.2, 8.7, 11.6, 16.95, and 24 Mm. Results for Δ =16.95 Mm are analysed in detail because, given the sizes of observed region (radius ~ 29 Mm) and the spot (radius ~ 9 Mm), this is the optimum Δ that facilitates distinguishing clearly the in- and out-going waves in the sense of their interactions with the spot. Height dependent contributions to out- and in-going phase travel times τ^+ and τ^- from within the line forming layers are determined using $\delta\tau^{\pm}_{i,0} = \tau^{\pm}_{0} - \tau^{\pm}_{i}$ (i=1,...,9).To determine the height evolution of waves at each location, instantaneous wave phases in the form of phase shifts, $\delta\phi_{i,0}$, due to wave progression between two heights corresponding to any one of bisector levels i=1,2,...,9 and level 0 (the top most layer) are also calculated. Signals over space are studied using LOS inclination γ or magnetic field B_{LOS}. Interested readers are referred to the published paper (ApJL 2010, 721, L86) for a complete analysis of $\delta\tau^{\pm}$ and $\delta\phi$.

Out-going waves at a given measurement location, in general, would consist of those locally generated and those generated elsewhere undergoing reflection at the photosphere directly below it. The latter component due to wave reflection would be seen in neither $\delta\phi_{i,0}$ nor $\delta\tau^{\pm}_{i,0}$, as they are evanescent at the observing height. For locally generated waves, circular wavefronts from a

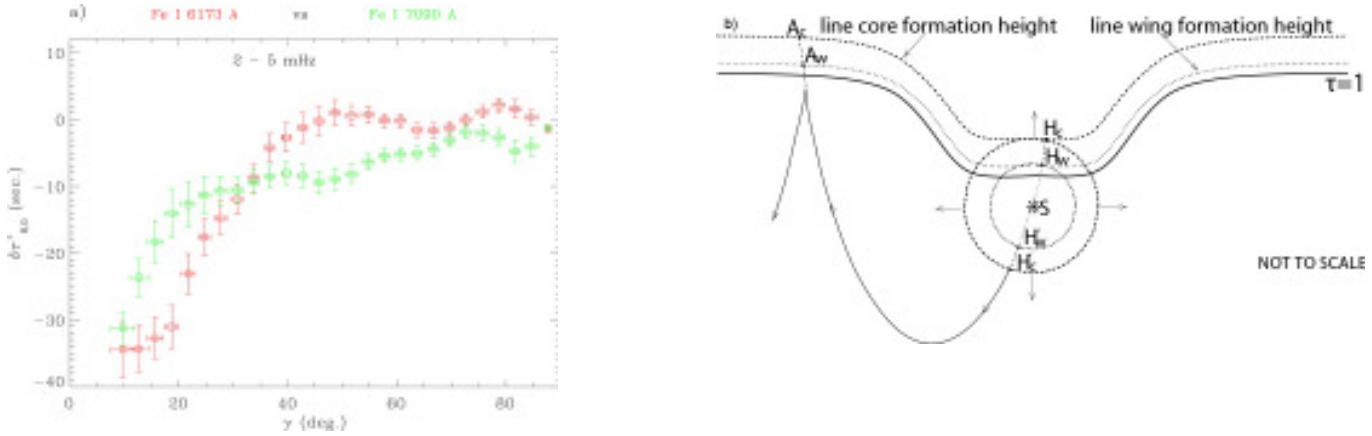


Figure 1. (Panel a) Changes in outgoing wave travel times, $\delta\tau^{+}_{8,0}$ due to wave propagation between the formation heights of the wings (20 km) and the core (270 km) of Fe I 6173 A (in red) and 7090 A (in green) lines as a function of γ of B. (Panel b), a cartoon depicting wavefronts from acoustic sources beneath the umbra, wave paths and line formation heights (see text for details).

source, while their upward propagating parts see themeselves up through the magnetic field, would cause out-going wave correlations yielding distinct signatures in $\delta\tau^{+}_{i,0}$ (see Figure 1b). Results in Figure 1a, for $\delta\tau^{+}_{8,0}$ from both the magnetic and non-magnetic lines, do indeed provide such a diagnostic: outgoing waves starting at higher height (H_c in Figure 1b) within the sunspot atmosphere and reaching the quiet-Sun at the chosen Δ(A_c in Figure 1b) have shorter travel times than those starting at a lower height (H_w) and reaching the quiet-Sun location (A_w) at the same Δ; since this is simply not possible, the only explanation for this observation is the one contained in our previous sentence and illustrated in Figure 1b, viz. outgoing wave time-distance correlations are predominantly due to waves directly from sources (marked S in the figure) just beneath the sunspot photosphere when oscillations observed within it are used. The main reason for this effect in $\delta\tau^{+}_{8,0}$ to be dominant over the sunspot region is the channeling or conduit provided by the sunspot magnetic field for waves to directly arrive at the observation location from possible sources beneath the surface. The magnetic fields achieve this by reducing the acoustic cut-off frequency (that depends on the inclination of the magnetic field), as documented widely in the literature.

The wider implications of the above finding of possible wave sources, which in the quiet-Sun are typically due to fast motions associated with overturning convection, beneath the dark umbral photosphere are yet to be assessed in detail. It should perhaps be pointed out here that the authors have not estimated how frequent and energetic are wave sources and resulting wave amplitudes, but as is well known, sunspots do indeed suppress convective motions and thus reduce the wave excitation when compared to the quiet Sun. But, what the authors have shown here are the large contributions from waves generated by such sources, however small in strength they are, to local helioseismic measurements of travel times or wave phases, which have so far been overlooked as that due to subsurface changes of sound speed and flows.

This work has been published in ApJ Letters 2010, 721, L86.

- S. P. Rajaguru

The Third IIA-Penn State Astrostatistics School

IIA and the Center for Astrostatistics, Penn State University, USA, came together for the third time, to organise the IIA-Penn State Astrostatistics school on the campus of the Vainu Bappu Observatory, Kavalur during 19-27 th July, 2010. A total of 29 astrophysicists participated, from both within the country and abroad.

The IIA-Penn State schools are a response to the current twin challenges that face empirical astrophysicists, viz., the need for rigour in the application of statistical methods to data analysis, and the need to invoke a diverse set of statistical techniques for the complex, automated analytical processes that are routinely required in data mining of large multi-wavelength data sets.

The schools provide a strong conceptual foundation in modern statistics as well as a repertoire of state-of-the-art statistical tools applicable to astrophysical problems. The schools are distinctive in being an inter-disciplinary collaboration between IIA, Center for Astrostatistics of Pennsylvania State University, USA, and the Indian

Anbazhagan Poobalan, VBO, welcoming the astrostatistics school participants at the inauguration of the school by Siraj Hasan, Director, IIA. Jogesh Babu from Penn State University looks on.

The participants engaged in an astrostatistics tutorial.

statistical community. For the last six years, the Center for Astrostatistics has run a very successful annual summer school on Astrostatistics in Penn State. The IIA-PennState schools were modelled on the PennState schools, and the two series of schools have begun to synergetically build on each other in their content and faculty. The school was aimed at astrophysics practitioners at all levels Ph.D. upwards.

Like the first two schools, the 3rd IIA-Penn State school was heavily oversubscribed, and had participants from a diverse set of backgrounds. The 29 participants included four from IIA, six from the Indian university sector (two faculty and four Ph.D. students), besides faculty, post-docs and students from other astrophysics research institutes of the country, viz., IISc, ISAC, PRL and TIFR. As Siraj Hasan, IIA Director, said while inaugurating the school, the school was kept international in its reach in keeping with the spirit of all of IIA's acitivities, and there were three PhD students from Spain, one from Germany, and a post-doctoral scientist from South Africa.

In addition to Jogesh Babu of the Centre for Astrostatistics, Penn State University,USA, the faculty of the school were Bhamidi V. Rao and Rajeeva Karandikar from the Chennai Mathematical Institute, Sushama Bendre from North-Eastern Hill University, Shillong, Mohan Delampady from Indian Statistical Institute, Bangalore,Thriyambakam Krishnan from Strand Life Sciences, Bangalore, Arnab Chakraborty from St. Xavier's College, Kolkata, and Deepayan Sarkar from Indian Statistical Institute, Delhi.

A notable feature in the course content was that prior knowledge of statistics was not a pre-requisite. However, since valid and rigorous application of statistical tools require a conceptual understanding of the methodology, the content of these schools are designed to be a mix of of prescriptive methods and their theoretical foundation. Apart from lectures on modern statistical concepts, a heavy emphasis was placed on lab sessions that demonstrated the use of statistical tools appropriate to astrophysical problems. Astrophysical data sets for the tutorials were compiled mainly by Eric Feigelson from the Center for Astrostatistics, Penn State. The tutorials were primarily designed by Arnab Chakraborty in the R software environment. This is the current standard in research-level statistical computation and is also open-source and multi-platform. For the purposes of the lab sessions, Anbazhagan Poobalan and his computer management team at the Vainu Bappu Observatory set up individual dual-platform laptops for the participants in the lecture hall with the R software installed, and networked them to a local data-server. The tutorial sessions were conducted by Arnab Chakraborty and Deepayan Sarkar. The statistics lectures and tutorials were brought out in the form of lecture notes,hard copies of which were made available to the participants at the start of the school. The website of the school has all the lecture notes as well as the tutorials and data sets(www.iiap.res.in/astrostat).

Several of the participants were given a slot upon request, to discuss their on-going individual research problems with the statisticians. Those participants that made use of this feature, then presented a summary of their problems and the inputs from the statisticians, to the whole school.

Apart from the pedagogical activity, the coming together of astrophysicists and statisticians reinforced once more the very real need for further collaborations between the two communities. The tranquil venue of the Vainu Bappu Observatory greatly facilitated the intense engagement that was demanded of the school. Although the dates of the school were selected to coincide with the lull-period in observing activity, on occasion

when the clouds parted, the participants and statisticians did have an opportunity to do sky-watching during the post-dinner hours.

The school came together because of the diligent efforts of an intensely committed organsing crew that had Ravinder Banyal, Varsha Chitnis, C. Muthumariappan, Anbazhagan Poobalan, Shalima Puthiyaveettil, and Sivarani Thirupathi, with the administrative support of Dr. P. Kumaresan, S. Rajendran, S. B. Ramesh, M.P. Parthasarathy, A. Narasimharaju, and K. Lakshmaiah, and most critical of all, the zealous efforts by the entire VBO team that has been a feature of every school. Prajval Shastri and Sabyasachi Chatterjee from IIA andJogesh Babu of Penn State were the co-ordinators.

- Prajval Shastri

Visiting Students from the USA

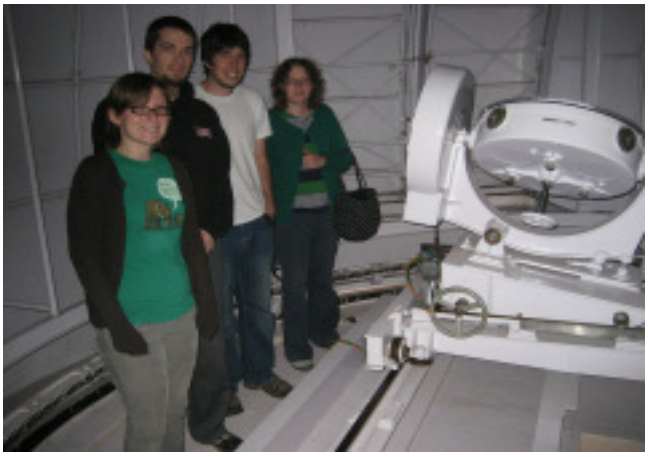
The visiting IRES students with the director, S. S. Hasan, the chairman of BGS and the dean (A) H. C. Bhat.

Under the International Research Experience for US Graduate Students (IRES) programme, sponsored by the National Science Foundation of USA, IIA hosted the following students during the summer (June - August) of 2010: Megan Force from the University of Vermont, VT, Christene Lynch from theUniversity of Iowa, IA, Gordon Macdonald from California StateUniversity, Northridge, CA, and Christopher Vorren from the University of North Corolina, NC.

The IRES programme, 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 programme 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 programme received a positive review and continued funding from the NSF and 2010 is the fourth year of the programme 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. Cultural and social events are interleaved too. The programme covers the students travel and stay and allows them to extend their return date in order to be a tourist in India at the end of theresearch period.

Megan Force worked with G.Pandey and C. Muthumariappan on '*Spectroscopic study of Betacephei star HR 4853*', Christene Lynch worked with G.C. Anupama on '*Photometric and spectroscopic evolution of Supernovae',* Gordon MacDonald worked with S.P. Rajaguru and S.S. Hasan on '*Studies of waves in sunspots using spectropolarimetric and imaging observations'* and Christopher Vorren worked with K.M. Hiremath on '*Theoretical probing of the solar core rotation*'.

Towards the end of their programme, Megan,Christene, Gordon and Christopher spoke to Rajaguru, Sivarani (Editors of IIA Newsletter) and R. Banyal about their experiences, both scientific and cultural. All of them



IRES students visiting the Kodaikanal Solar Observatory, Kodaikanal, from the left, Christene, Gordon, Christopfer and Megan

said that they had a very useful and thoroughly enjoyable stay in India, that their research work at IIA was very beneficial in terms of their learning something new that complemented what they were already exposed to in the USA, and that they intended to continue pursuing research in astronomy and astrophysics.

Some excerpts from the Interview:

Editors: What was the prime motivation of applying to the IRES programme ?

Megan: Always wanted to experience India -- its very different traditions and large population attracted me.

Christene: Wanted to engage myself in a research project while experiencing non-westernized and very different cultural and academic atmosphere of India.

Gordon: A variety of reasons from both academic and cultural angles; the area of my interest, solar physics, has a true international character and my prior learning in this field has a good overlap with what is done here at IIA.

Christopher: Wanted to experience the very different non-westernized settings of India.

Editors: What was the most striking or unique experience scientifically ?

Christene: A thorough understanding of the working of the instruments used in the astronomical observations is something that I found very useful and interesting, and I appreciated the importance of it through my mentor and other researchers whom I interacted with.

Megan: A very useful programme, and my experience at the Kavalur Observatory was unique.

Gordon: My interactions with the mentor was scientifically satisfying.

Editors: What was the best and worst aspects of your visit and stay in India?

All Students: The field trips to Kavalur and Kodaikanal were the best, and we enjoyed all aspects of them, including the train journey, local hikes around the Kavalur observatory and Kodaikanal. Getting sick was the worst aspect.

Editors: Did you travel around as tourists? Where did you visit and what were your experiences?

All Students: Yes, we had weekend road trips to Mysore and nearby places. They were fantastic.The people we met all along were very cheerful and friendly.

Christene: The temple visits in Mysore were extraordinary: we had a very enthusiastic tour guide who took all efforts to teach us the history and culture behind everything that we saw; his sincerity and enthusiasm were something that I have never experienced anywhere else as tourist.

Editors: How were your accomodation, food and other daily routines?

All Students: Our stay was very comfortable and IIA guest house accomodation was excellent. We read all newspapers, watched Indian TV Channels. Movies and music videos in India are very interesting, especially the music videos. The food was very enjoyable at IIA. We also explored local restaurants, and found them very good.

Gordon: The Indian sweets and, especially, the ice creams are so good.

Editors: Do you have any feedback on the IRES programme coordination at IIA?

All Students: We liked the overall coordination, travel and other arrangements. Timely communication from the organisers at IIA of various schedules of events (like the scientific presentations) and trips was lacking -- often we had to do things at very short notice.

The details of the IRES programme are available at http://eo.nso.edu/ires/

- S. P. Rajaguru & T. Sivarani

IIA Research Publications

†June - August 2010

(1) Sivaraman, K. R., *Sivaraman, H., Gupta, S.S., *Howard, R. F., 2010, SoPh 266, 247, *Return meridional flow in the convection zone from latitudinal motions of umbrae of sunspot groups*

(2) *Puthiyaveettil, S., Murthy, J., *Fix, J. D., 2010, MNRAS, 408, 53, *Modelling the diffuse ultraviolet radiation observed by dynamics Explorer 1*

(3) *Thomas, R. M. C., *Gupta, Y., Gangadhara, R. T., 2010, MNRAS, 406, 1029, *Understanding the effects of geometry androtation on pulsar intensity profiles*

(4) Ramesh, R., Kathiravan, C., *Barve, I.V., *Beeharry, G. K., *Rajasekara, G. N., 2010, ApJL 719, L41, *Radio observations of weak energy releases in the solar corona*

(5) Pradhan, A. C., Pathak, A., Murthy, J., 2010, ApJL, 718, L141, *Far-ultraviolet diffuse emission from the LargeMagellanic Cloud*

(6) *Fleming, S. W., *Ge, J., *Mahadevan, S., *Lee, B.,*Eastman, J. D.,*Siverd, R. J., *Gaudi, B. S., *Niedzielski, A., Sivarani , T.,and 28 coauthors, 2010, ApJ, 718, 1186, *Discovery of a low-mass companion to a metal-rich F star with the MARVELS pilot project*

(7) Anusha, L. S., Nagendra, K. N., *Stenflo, J.O., *Bianda, M., Sampoorna, M., *Frisch, H., *Holzreuter, R., *Ramelli, R., 2010, ApJ ,718, 988, *Generalization of the last scattering approximation for the second solar spectrum modeling: The Ca I 4227 Å line as a case study*

(8) Karthikeyan, B., *Rajamanickam, N., Bagare, S. P., 2010, SoPh, 264, 279 ,*On the rotational temperature of AlH in sunspots*

(9) Safonova, M., Stalin, C. S., 2010, New Astronomy, 15, 450, *Detection of IMBHs from microlensing in globular clusters*

(10) Anathpindika, S. V., 2010, MNRAS, 405, 1431, *Collision between dissimilar clouds: stability of the bow-shock, and the formation of pre-stellar cores*

(11) *Gupta, G. R., Banerjee, D., *Teriaca, L., *Imada, S., *Solanki, S., 2010, ApJ, 718, 11, *Accelerating waves in polar coronal holes as seen by EIS and SUMER*

(12) Choudhury, R., *Mookerjea, B., Bhatt, H.C., 2010, ApJ, 717, 1067,*Triggered star formation and young stellar population in bright-rimmed cloud SFO 38*

(13) Srinivasa Rao, M., 2010, Serb. Astr.J., 180, 11, *Study of Compton broadening due to electron-photon scattering*

(14) *Aghaee, A., *Petitjean, P., *Srianand, R., Stalin, C. S., *Guimaraes, R., 2010, JA&A, 31, 59, *Determination of the mean HI absorption of the intergalactic medium*

(15) *Bond, N. A., *Zcaron, I., *Sesar, B., *Juric, M., *Munn, J. A., *Kowalski, A., *Loebman, S., *Rovskar, R., *Beers, T. C., *Dalcanton, J., *Rockosi, C., *Yanny, B., *Newberg, H. J., *Prieto,, A. C.,*Wilhelm, R., *Lee, Y. S., Sivarani, T., and 40 coauthors, 2010, ApJ, 716, 1, *The Milky way tomography with SDSS. III. Stellar kinematics*

(16) *Deheuvels, S., *Bruntt, H., *Michel, E., *Barban, C., *Verner, G., *Regulo, C., *Mosser, B., Mathur, S., and 11 coauthors, 2010, 515, A 87,*Seismic and spectroscopic characterization of the solar-like pulsating CoRoT target HD 49385*

(17) *Thomas, R. M. C., Gangadhara, R. T., 2010, A&A, 515, A86, *Absolute emission altitude of pulsars: PSRs B1839+09, B1916+14, and B2111+46*

(18) Vyas, A., Roopashree, M. B., Prasad, B. R., 2010, SPIE 7739, *Dither-based sensor for improved consistency of adaptive optics system*

(19) Vyas, A., Roopashree, M. B., Prasad, B. R., 2010, SPIE 7736, *Noise reduction in the centroiding of laser guide star spot pattern using thresholded Zernike reconstructor*

(20) Vyas, A., Roopashree, M. B., Prasad, B. R., 2010, SPIE 7736, *Optimizing the modal index of Zernike polynomials for regulated phase screen simulation*

(21) Roopashree, M. B., Vyas, A., Prasad, B. R., 2010, SPIE 7736, *Multilayered temporally evolving phase screens based on statistical interpolation*

(22) Hasan, S. S., *Soltau, D., *Kärcher, H., *Süss, M., *Berkefeld, T., 2010, SPIE 7733, *NLST: the Indian National Large Solar Telescope*

(23) *Panda, P. K, Das, B. P, 2010, IJP, 84, 817, *Nuclear structure effects in parity non-conservation in heavy ions*

(24) Banyal, R. K, Prasad, B. R., 2010, Pramana, 74, 961,*Nonlinear response studies and corrections for a liquid crystal spatial light modulator*

(25) Kapoor, R.C.,2010, Ind.J.Trad.Knowledge,Vol.9,562,*Some observations on the metal-based preparations in Indian systems of medicine*

(26)Subarmanian, S., Subramaniam, A., 2010, A&A , in press,*An estimate of the structural parameters of the Large Magellanic Cloud using red clump stars*

(27) *Saha, A., *Olszewski, E.W., *Brondel, B., *Olsen, K., *Knezek, P., *Harris, J., *Smith, C., Subramaniam, A., *Claver, J., *Rest, A., *Seitzer, P., *Cook, K. H. *Minniti, D., *Suntzeff, N. B., AJ, in press, *First Results from the NOAO Survey of the Outer Limits of the Magellanic Clouds*

† *From IIA Repository*

* *Collaborators from other institutions*

Visiting Professor

Professor Armando Arellano Ferro, Institute of Astronomy, UNAM, is spending part of his sabbatical leave visiting IIA during July 8, 2010 to January 7, 2010. The visit to IIA is organized under the approved DST/ CONACyT project titled *Variability in the atmospheres of the sun and stars* which supports his visit for a month. He would be working at IIA as Visiting Professor for the remaining five months. During his stay he would work on the collaborative project on variable stars in Globular clusters with Sunetra Giridhar. He would also be giving a lecture course comprising of eight lectures and hands-on tutorial on *Photometry of stars*.

New Book on Aperture Synthesis

A book entitled, ***Aperture Synthesis: Methods and Applications to Optical Astronomy-*** Swapan K Saha, 2010, Springer, NY will be in the market soon.This book, a sequel of the author's earlier book entitled,`Diffraction-limited Imaging with Large and Moderate Telescope'- Swapan K Saha, 2007, World-Scientific, deals with the fundamentals of stellar interferometry with emphasis on aperture synthesis using sparse array oftelescopes particularly at optical/ IR wavelengths, the origin, properties,and optical effects of turbulence in the Earth's atmosphere, techniques developed to overcome image degradation. There is a chapter dedicated toradio and intensity interferometry corroborating with basic mathematical steps. Assisted by illustrations andfootnotes, the book examines the basic tricks of trade, current trend, motivation, methods, and path to future promise of true interferometry both from the ground and space. Also discussed are the technical challenge involved, such as beam transportation and recombination, detecting fringes using modern sensors, and image synthesis. Astronomical science that benefits from aperture synthesis imaging are highlighted as well. For more details you may look at http://springer.com/978-1-4419-5709-2

Congratulations

Mr. Avijeet Prasad, 2nd year M.Sc student in the first batch of the IIA-IGNOU Integrated M.Sc-Ph.D Programme has obtained third rank in the national level CSIR-NET exam held during June 2010. The Board of Graduate Studies (BGS) congratulates him for this achievement.

Farewell

IIA wishes all the best to...

... Dr Chirajib Konar, a post-doctoral fellow at IIA, left on 28 June 2010 to take up a new post doctoral position at Academia Sinica Institute of Astronomy and Astrophysics (ASIAA) Taipei, Taiwan.

... Mr. R.M. Paulraj joined IIA, Bangalore on 27 April 1983 and retired voluntarily from service as Section Officer at IIA, Bangalore on the forenoon of 1 July 2010.

... Mr. M. Kannan joined VBO, Kavalur on 16 October 1986 and retired as Chowkidar E on attaining the age of superannuation on 31 July 2010.

... Mr. V. Ponnurangam joined IIA, Kodaikanal on 20 August1975 and retired as Sr.Technical Assistant B on 31st August, 2010.

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 year. The fellowship is for an initial period of two years, extendable to three, with a minimum monthly stipend of Rs.25,000/-, an annual contingency grant of Rs.1,00,000/-, 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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