

SITARE Workshop Nepal

Southampton -IUCAA Training for Astronomical Research and Education

13-15 June, 2018

Central Department of Physics, Tribhuvan University, Kathmandu, Nepal

Program

Day (June, 2018)	10:00- 11:00	11:00- 11:30	11:30- 12:30	12:30- 14:00	14:00- 15:00	15:30- 16:00	16:00- 17:00
13	BA	T	KS	LUNCH	SM	T	IJ
14	BA	E	KS	LUNCH	SR	E	IJ
15	SM	A	KS	LUNCH	SR	A	IJ

Speakers

BA: **Binil Aryal**, Tribhuvan University : *Galaxy Evolution*

IJ: **Ian Jones**, Univ. of Southampton : *Gravitational Wave Astronomy*

SM: **Sanjit Mitra**, IUCAA : *Cosmic Microwave Background*

SR: **Somak Raychaudhury**, IUCAA : *Observational Cosmology*

KS: **Kanak Saha**, IUCAA : *Dynamics and Structure of galaxies*

Participants

SN	Name	Affiliation	Study/Teaching
1	Ajay Gopali	CDP, TU, Kirtipur	M.Sc. Student
2	Ajay Kumar Jha	CDP, TU, Kirtipur	Faculty (Astro)
3	Amrit Khadka	CDP, TU, Kirtipur	M.Sc. Student
4	Amrit Sedain	CDP, TU, Kirtipur	M.Sc. Student
5	Arjun Kumar Gautam (LOC)	CDP, TU, Kirtipur	Ph.D. Student
6	Aswin Thapa	CDP, TU, Kirtipur	M.Sc. Thesis Student
7	Barun DC	CDP, TU, Kirtipur	M.Sc. Student
8	Bhanu Prasad Sapkota (LOC)	CDP, TU, Kirtipur	Ph.D. Student
9	Bijaya Kharel	CDP, TU, Kirtipur	M.Sc. Student
10	Bijaya Sharma	CDP, TU, Kirtipur	M.Sc. Student
11	Bimal Bhandari	PMC, Lalitpur	M.Sc. Student
12	Binod Bhandari	CDP, TU, Kirtipur	M.Sc. Student
13	Daya Nidhi Chattkuli	CDP, TU, Kirtipur	Ph.D. Student
14	Debit Subedi	CDP, TU, Kirtipur	M.Sc. Student
15	Devendra Upadhaya	Amrit College	Faculty (Astro)
16	Devi Sapkota	CDP, TU, Kirtipur	M.Sc. Student
17	Dipendra Ojha	CDP, TU, Kirtipur	M.Sc. Student
18	Dr. Shiv Narayan Yadav (LOC)	PMC, Lalitpur	Faculty (Astro)
19	Gaurab Rijal	CDP, TU, Kirtipur	M.Sc. Student
20	Iswar Nath Joshi	CDP, TU, Kirtipur	M.Sc. Student

21	Janak Ratna Malla (LOC)	CDP, TU, Kirtipur	Ph.D. Student
22	Jayaraj Bhatta	Amrit College	M.Sc. Student
23	Jhimi Lama	PMC, Lalitpur	M.Sc. Student
24	Kabita Bista	CDP, TU, Kirtipur	M.Sc. Student
25	Khagendra Katuwal	CDP, TU, Kirtipur	M.Sc. Thesis Student
26	Krishna Baral	CDP, TU, Kirtipur	M.Sc. Student
27	Krishna Kumar Bhandari	CDP, TU, Kirtipur	M.Sc. Student
28	Meghraj Timilsina	CDP, TU, Kirtipur	M.Sc. Student
29	Namuna Adhikari	CDP, TU, Kirtipur	M.Sc. Student
30	Narendra Khadka	Amrit College	M.Sc. Student
31	Netra Bahadur Thapa	CDP, TU, Kirtipur	M.Sc. Student
32	Paramananda Bhandari	GGIC, Kathmandu	M.Sc. Student
33	Pawan Giri	CDP, TU, Kirtipur	M.Sc. Thesis Student
34	Prakash Basyal	CDP, TU, Kirtipur	M.Sc. Student
35	Prakash Chalise	CDP, TU, Kirtipur	M.Sc. Thesis Student
36	Puskar Acharya	GGIC, Kathmandu	M.Sc. Student
37	Rabina Khadka	PMC, Lalitpur	M.Sc. Student
38	Rabindra Aryal	CDP, TU, Kirtipur	M.Sc. Student
39	Raj Kumar Pradhan	CDP, TU, Kirtipur	M.Sc. Thesis Student
40	Rajesh Kumar Bachchan	CDP, TU, Kirtipur	Ph.D. Student
41	Raju Khasu	CDP, TU, Kirtipur	M.Sc. Student
42	Rashmi Parajuli	St Xaviers' College	M.Sc. Student
43	Sagar Adhikari	CDP, TU, Kirtipur	M.Sc. Student
44	Sagar Thapa	CDP, TU, Kirtipur	M.Sc. Student
45	Santosh Adhikari	CDP, TU, Kirtipur	M.Sc. Student
46	Sarashawati Dhital	CDP, TU, Kirtipur	M.Sc. Student
47	Saroj Dahal	CDP, TU, Kirtipur	M.Sc. Student
48	Shyam Pd Kuikel	CDP, TU, Kirtipur	M.Sc. Student
49	Shyam S K Duwedi	CDP, TU, Kirtipur	M.Sc. Student
50	Srijana Neupane	St Xaviers' College	M.Sc. Student
51	Sudip Paudel	CDP, TU, Kirtipur	M.Sc. Student
52	Surendra Singh	PMC, Lalitpur	M.Sc. Student
53	Yadav Paudel	PMC, Lalitpur	M.Sc. Student
54	Prof. Ian Jones	Univ. of Southampton	Expert
55	Prof. Somak Raychaudhury	IUCAA	Expert
56	Prof. Binil Aryal	Tribhuvan University	Expert
57	Associate Prof. Sanjit Mitra	IUCAA	Expert
58	Asst. Prof. Kanak Saha	IUCAA	Expert

Range/contributions

Total	Female Participants	Ph.D. (Astro) students	Astro Faculty	Other colleges
53	7	5	3	15

Brief Introduction of the Expert

Professor David Ian Jones

Professor of Mathematical Physics

Director of Service Teaching

Professor David Ian Jones is Professor of Mathematical Physics within Mathematical Sciences at the University of Southampton.



Education

- ❖ MA Physics and Theoretical Physics, University of Cambridge
- ❖ Certificate for Advanced Study in Mathematics, University of Cambridge
- ❖ PhD, Department of Physics and Astronomy, University of Cardiff
- ❖ Post-doctoral researcher, Mathematics, University of Southampton
- ❖ Post-doctoral researcher, Center for Gravitational Wave Physics, Pennsylvania State University
- ❖ Reader, Mathematics, University of Southampton
- ❖ Professor of Mathematical Physics, University of Southampton

Research interests

Research interest of Prof. Jones is focused on the astrophysics of compact objects, specifically neutron stars. These are ultra-dense stars, with a mass exceeding that of the Sun squeezed into a sphere of radius of about the size of a city. They have densities in excess of an atomic nucleus, they can rotate hundreds of times a second, have fantastically strong magnetic fields, and probably contains superfluid and superconducting components. In short, they provide ready-made laboratories for probing all sorts of extreme physics inaccessible to terrestrial experimenters.

His research lies in figuring out how measurements of these objects made by astronomers can be used to shed light on all these exotic pieces of physics. He is interested in observations from the radio, optical, X-ray and gamma ray bands, but am currently most excited about the prospect of detecting neutron stars using gravitational waves. Prof. Jones is a member of the world-wide gravitational wave detection effort that analyses data from the LIGO, VIRGO and GEO600 gravitational wave detectors, with the first ever detection of a gravitational wave hopefully coming soon.

In addition, He collaborates with theorists both here in Southampton and overseas, and am the UK representative on the Steering Committee of CompStar, a body funded by the European-Science Foundation to encourage collaboration between particles physicists, astronomers and the gravitational wave community.

Confirmation of the existence of gravitational waves was first announced in February 2016, following the detection of two colliding black holes in 2015. Professor Ian Jones, a mathematician at the University of Southampton, has spent 14 years working on the international gravitational wave detection project, providing colleagues with models for what the gravitational wave signals from neutron stars might look like and advising how best to search for these signals amongst other 'noisy' data. Professor Jones comments: *"For thousands of years we have used light to study the heavens. In 2015 we learnt how to use gravity itself to do astronomy, when the LIGO detectors picked up a signal from two colliding black holes. Now, for the first time, we have used both gravity and light together, to see two neutron stars, each with a mass greater than the Sun, crashing into one another at a tremendous speed"*.

He added *"The ripples in gravity we detected, along with the electromagnetic observations made by our colleagues of the accompanying explosion and glowing fireball, show that the era of multi-messenger astronomy has truly arrived."*

Prof. Somak Raychaudhury

Director of the Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India

Prof. Somak Raychaudhury is an Indian astrophysicist. He is on leave from Presidency University, Kolkata, India, where he is a Professor of Physics, and is also affiliated to the University of Birmingham, United Kingdom. He is known for his work on stellar mass black holes and supermassive black holes. His significant contributions include those in the fields of gravitational lensing, galaxy dynamics and large-scale motions in the Universe, including the Great Attractor.

Education

Somak Raychaudhury was born in Kolkata (then Calcutta), India. He attended Presidency College, Calcutta, where he completed his BSc degree in Physics in 1983. He then went to complete a BA degree in Physics at Trinity College, Oxford, University of Oxford, supported by an *Inlaks* Scholarship from the *Inlaks Shivdasani Foundation*, where he won a Douglas Sladen Essay prize. He then proceeded to obtain a PhD in Astrophysics from the University of Cambridge, United Kingdom, as a member of Churchill College, Cambridge, in 1990, supported by an Isaac Newton Studentship. Here, he was a recipient of a Smith's Prize (J.T. Knight Prize) in 1988. The subject of his doctoral thesis, supervised by Donald Lynden-Bell, FRS, was "Gravity, Galaxies and the 'Great Attractor' Survey"



Research Interests

Somak Raychaudhury became the fourth Director of the Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India, in September 2015. He was Professor and Head of Physics at Presidency University, Kolkata, where he was also the Dean of the Faculty of Natural and Mathematical Sciences till August 2015. He remains affiliated to the Astrophysics and Space Research group, School of Physics and Astronomy, University of Birmingham, where he used to be the director of the West Hills Observatory for the period 2003–2012. Prior to this, he was a member of the faculty at the Inter-University Centre for Astronomy and Astrophysics, Pune, India. He was a staff member at the Harvard–Smithsonian Center for Astrophysics, in Cambridge, Massachusetts, working for the Chandra X-ray Observatory. Before this, He was a Smithsonian postdoctoral fellow at the Harvard–Smithsonian Center for Astrophysics, and a tutor at Lowell House, Harvard University. Following his PhD, he was a SERC Research Fellow at the Institute of Astronomy, at the University of Cambridge, Cambridge, and a resident Junior Research fellow at St. Edmund's College, University of Cambridge. Raychaudhury's research interests lie in the study of the evolution of galaxies in groups and clusters, and on the supercluster filaments of the cosmic web. He has used optical, X-ray, radio, infrared and ultraviolet observations to understand how the transformations of galaxies are related to their local and global environment. He is involved in developing machine learning algorithms for Astronomical data mining. He has published over 80 research papers in peer-reviewed scientific journals on these themes. In addition, he leads a substantial outreach programme involving school students, teachers and the general public. He was one of the key people to start the Indian Astronomy Olympiad, and selected and coached the Indian Olympiad team to top results at the International Astronomy Olympiad in 1999[19] and 2000. His outreach activities include numerous programmes on radio, television and collaboration with performing artists.

Others

He is a member of the International Astronomical Union, a Fellow of the Royal Astronomical Society, and a Fellow of the European Astronomical Society. He is a Life Member of the Astronomical Society of India, and was an elected member of its Executive Council during 1998–2000.

Prof. Binil Aryal

Head, Central Department of Physics, Tribhuvan University, Kirtipur

Dr. Binil Aryal is the Professor and newly appointed Head of the Department at Central Department of Physics, Tribhuvan University, Kathmandu, Nepal. At present he is a senator of Tribhuvan University (TU) assembly, member of Academic Council of TU and standing committee member of the Faculty Board, IoST, TU. Dr Aryal served as the chairperson of a working committee which drafted the '*structure of B.Sc. four year system*' in Nepal. In this system, single major with computational and interdisciplinary courses have been introduced. He was actively involved in the process of implementation of semester system at the masters' level in science, at the central campus, Kirtipur. He has been teaching quantum mechanics, nuclear & particle physics and astrophysics to the M.Sc.(Physics) students.



Education

- ❖ M.Sc. (Physics): Central Department of Physics, Tribhuvan University (1997)
- ❖ Ph.D. (Astrophysics): Institute of Astro-particle Physics, Innsbruck University, Austria (2002)
- ❖ Post Doctorate: University of Washington, Seattle (2005)

Dr. Aryal returned back to Nepal in the year 2006 and introduced 'Astrophysics' course at the graduate level. He is the first astrophysicists of Nepal.

Research Interests

He is one of the actively working astrophysicists of Nepal. He has been working in the field of Galaxy orientation and Evolution. His research interest includes the origin of angular momentum of galaxies in the large scale structure and the structure shaping mechanism in the interstellar medium. He has supervised 7 Ph.D. projects and more than 154 M.Sc. (Physics) students for their dissertation. He has published more than forty papers in the international peer reviewed Journals.

Others

He was awarded by '*Mahendra Bidhya Bhushan ka*' by the late king Birendra Shah for securing highest score in the M.Sc. Examination. He received '*Third World Academy Award (TWAS)*' for his Ph.D. work. Dr. Aryal visited various Universities of USA, UK, Japan, Germany, Switzerland, Australia, Spain, Belgium, France, the Netherland, Denmark, Sweden, Italy, China, Vietnam and South Korea. He has served as a judge of International Astronomy Olympiad. He is the country representative of BCVSPIN school.

Assoc. Prof. Sanjit Mitra

Associate Professor (Scientist F) at the Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India

Education

- ❖ Ph.D. (Physics) IUCAA, degree awarded by University of Pune 2007
- ❖ M.Sc. (Physics) University of Calcutta, Kolkata Jul 2001
- ❖ B.Sc. (Physics) University of Calcutta, Kolkata Jul 1999

Career

- ❖ Associate Professor (Scientist F) IUCAA, Pune, India Jul 2015 - to date
- ❖ Assistant Professor (Scientist E) IUCAA, Pune, India Oct 2011 - Jul 2015
- ❖ Planck Project Specialist University of California Santa Barbara, US Apr 2011 -



Sep 2011

- ❖ Post-doctoral fellow Jet Propulsion Laboratory, Caltech, US Feb 2008 - Jan 2011
- ❖ Post-doctoral fellow Observatoire de la Côte d'Azur, France Jan 2007 - Oct 2007

Research Interest

Dr. Mitra's research interest includes Gravitational Waves (GW) and Cosmic Microwave Background (CMB). GW are ripples in space-time that carry information about massive and/or violent astronomical events inaccessible to electro-magnetic astronomy. Detection of GW, 100 years after their prediction, was not only an important test of Einstein's General Relativity theory, but it opened a new window of astronomy. The LIGO-India detector will immensely help the international community in this effort and provide a great platform for a multi-disciplinary collaborative mega-science project involving cutting-edge technology. The universe had a hot and highly isotropic past. It expanded and cooled, and those relic photons are coming to us from every direction, creating a cosmic microwave background at $\sim 2.7\text{K}$. Tiny fluctuations of the CMB temperature and polarization embed the history of the early universe, which were measured by the Planck mission to put precise constraints on the cosmological models and parameters. He has published more than 120 papers in the peer reviewed Journals. He has been teaching M.Sc. course on General Relativity and graduate school Mathematical Methods in Pune University, since last 6 years.

Others

- ❖ Project Coordinator, Teaching Learning Centre (TLC) for higher education in Astronomy funded by the MHRD under the PMMMNMTT scheme [March 2018 - present]
- ❖ Chair, Interim sub-committee for LIGO-India EPO activities [September 2017 - present]
- ❖ In-charge Gravitational Wave Data Centre at IUCAA [August 2016 - present]
- ❖ Chair, IUCAA SciPOP Committee [November 2014 - present]
- ❖ Chair, IUCAA Press Committee [November 2014 - December 2015]
- ❖ Chair, IUCAA Standing Local Organising Committee [October 2012 - December, 2015]
- ❖ Chaired several administrative and purchase committees at IUCAA
- ❖ Organized several introductory and advanced workshops on GW, including GPPAW-2013

Asst Prof. Kanak Saha

Assistant Professor

Office - 124, Inter-University Centre for Astronomy and Astrophysics

Education

- ❖ Ph.D. (Astrophysics) 2008, Indian Institute of Science, Bangalore, India
- ❖ M.Sc.(Physics) 2001, Banaras Hindu University, Varanasi, India
- ❖ B.Sc. (Physics) 1998, Scottish Church College, University of Calcutta, Kolkata, India

Research

Dr. Saha works primarily in the area of galaxies, their structure, formation and evolution. For more details on my research activities at IUCAA, please browse through the navigation bar. Prior to joining IUCAA, he spent my time at different institutes and in reverse chronological order, they are Geneva Observatory ; MPE ; ASIAA , TIARA ; RRI ; STScI and IISc . He has published more than 22 papers in the international peer review Journals. He has been involved in the ASTROSAT.

