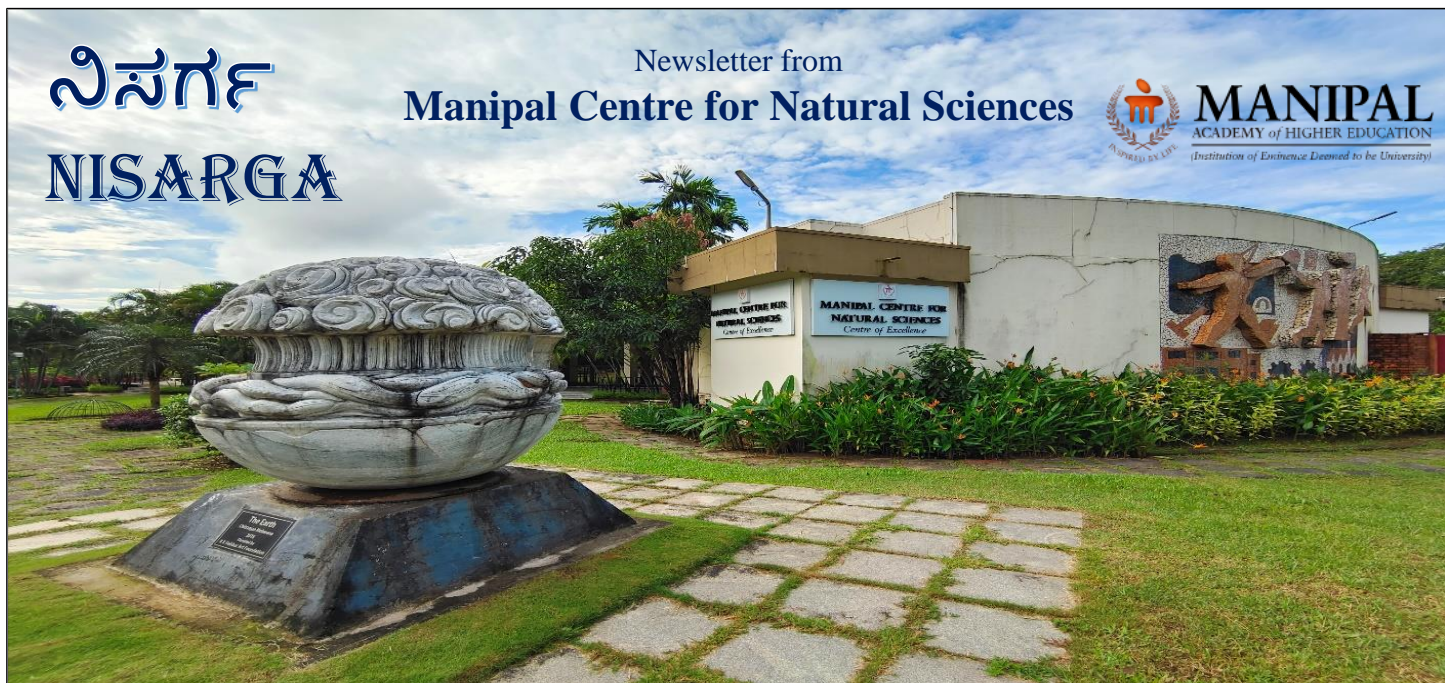


ನಿಸರ್ಗ
NISARGA

Newsletter from
Manipal Centre for Natural Sciences



MANIPAL
ACADEMY of HIGHER EDUCATION
(Institution of Excellence Deemed to be University)



Vol - 2

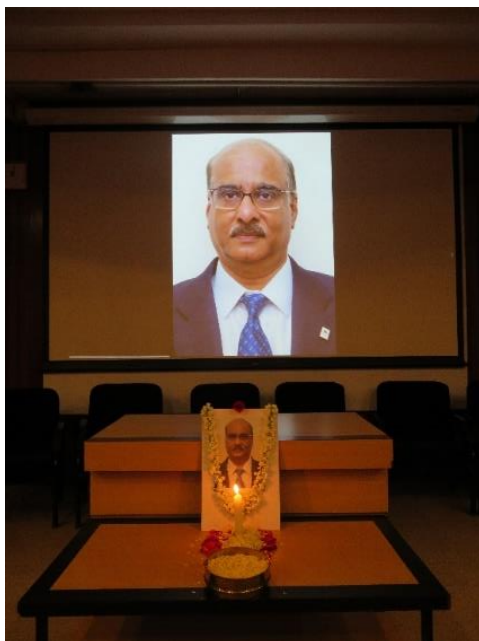
January 2023

Issue - 1

This issue is dedicated to the fond memory of

Dr. M. Prithviraj,

Former Dean & In-charge Director, MCNS.



He passed away on 16th November 2022, at 11.11 pm.

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EDITOR'S VOICE

In this column in the last issue, the concluding line said, “Let us meet again with greetings for the New Year in 2023!”. Of course, the world celebrated the new year with the usual cheers. But MCNS was still not out of the shock created by the demise of our In-charge Director, Dr. M Prithviraj, on 16th November 2022. He was ill and on personal leave from as early as June 1, but was constantly driving the Centre, from wherever he was, until his last breath. The major paths he laid out after he took over in April 2021, continue to guide the Centre. The Centre is indebted to him!

While awaiting a new Director, MAHE entrusted the responsibilities of MCNS to the care of Dr. Debbijoy Bhattacharya, Associate Professor, MCNS.

This issue of Nisarga, though it has the usual item captions, showcases certain unique achievements or milestones seen. Expansion of MCNS Academic programs to open up new Ph.D. domains, viz. (1) Biological Science, and (2) Chemistry, to the existing Physics domain, is an important milestone crossed in the last six months. Another significant event in the Centre was the three-day workshop on Solar Flare Studies using Aditya-L1. Prestigious honours received by Dr. Sreejith and Dr. Chandrachur from the Inter-University Centre for Astronomy and Astrophysics (IUCAA), India, make us proud. Dr. Suranjan achieved a research grant from the Science and Engineering Research Board (SERB), and Dr. Krishna Mohana, achieved his PhD degree. The other important programs include our outreach activities and the Summer Research Internship (SRI) program. Please look inside for nutshell details on these and more.



The art of bending, budging, and leaning to an erect and powerful master, slowly occupying his kingdom seems true in the plants' world too! This is evident from the scientific article by Dr. Vivek Pandi, in this issue, of Climbing plants.

The item "Director Speaks", a space wherein Dr. Prithviraj used to put in his own views on the progress made and to be made in the Centre, is purposely left unfilled in this issue, as a mark of respect to him.

Dr. V. Gopalakrishnan, Editor, Nisarga

DIRECTOR SPEAKS



HOMAGE TO Dr. PRITHVIRAJ

Dr. M. Prithviraj, Dean Research & In charge Director, MCNS, MAHE, passed away on Wednesday, the 16th of November 2022, at 11.11 pm, due to prolonged illness, in his Bengaluru residence. A condolence meeting was held at 10:30 am on 17th November 2022, in the Dr T.M.A Pai Auditorium, Planetarium Building, MCNS, Manipal, to pay homage. Faculty members, researchers, students, and other staff joined the meeting. A one-minute of silence was observed. Dr. Prithviraj, took over the responsibilities of the Director of the Centre, from April 1, 2021,

when the Centre's progress was below par, consequent to the pandemic and reduction in the faculty/student strength. Soon, he constituted a panel of advisors of international repute, for Physical and Earth sciences, and quickly did what was necessary to increase the faculty strength. He got the approval awaited then, for the Integrated PhD program in physics, and commenced it right earnest in the same year. He brought the entire MCNS team working from



split venues to a single venue in the Planetarium building, and achieved greater interactions within each discipline and also across disciplines. His directives brought the Centre to a place of pride as assessed by the National Assessment and Accreditation Council (NAAC) of India. He had many more plans on the chart to lift the Centre to newer heights; but unfortunately, passed away, just in his early sixties. It is a loss to the Centre. However, some of the paths he has already laid will continue to strengthen the Centre to reach the goals he desired. MCNS will remember, Dr. Prithviraj, for his commitment and dedication to make the Centre nationally and internationally prominent.

SCIENTIFIC ARTICLE

TAXONOMIC ESTIMATES OF CLIMBING PLANTS IN INDIA: HOW MANY SPECIES ARE OUT THERE?

We have always been amazed by the variety of plant growth forms. Whether they are canopy trees, intermediate shrubs, or ground-dwelling herbs, each has evolved a distinct structural and functional strategy to ensure their fitness and survival. Climbers, the plants with extraordinarily long and thin stems that cling to tall trees, binding the canopy together and bearing dense foliage, are common sights in tropical forests worldwide. If you have ever wondered why and how plants climb? Why can't climbers grow erect just like other plants? Such questions have also long piqued the interest of many biologists, including Charles Darwin, who discussed the structure and behavior of climbing plants in his classic study, *on the movements and habits of climbing plants* (1875).

This article reads the general characteristics of climbers and summarizes the recently published research article in *Ecoscience* (Taylor & Francis Group), titled *Taxonomic estimates of climbing plants in India: how many species are there?* by Dr. Pandi and his collaborators.

General features of climbers

Climbers are vascular plants that cannot grow vertically for any appreciable height on their own but have evolved various methods for reaching tree tops. Climbers can be non-woody (vines) or woody (lianas), and they can attach or ascend the host trees using any of the following climbing techniques: twining (coiling around the host), scrambling, producing tendrils, adhesive roots, or hooks to hold the support. The evolution of these climbing techniques is regarded as one of the most significant innovations in plants' evolution history.

Climbers are frequently mistaken for parasites, which derive their nutrients from the host. However, climbers germinate and root in the soil independently, but lack the mechanical strength required for autonomous vertical growth. Therefore, in order to climb to the forest canopy and be exposed to the environment with plenty of light, they must rely on other types of external support, primarily trees. The term "*structural parasites*" thus frequently appears in the literature. In fact, it can be challenging to differentiate between tree and climber seedlings during the juvenile stage because many climbers begin their life as self-supporting plants. However, subsequently, climbers do engage in a rhythmic motion in a circular pattern known as *circumnutation*, to locate a suitable host.

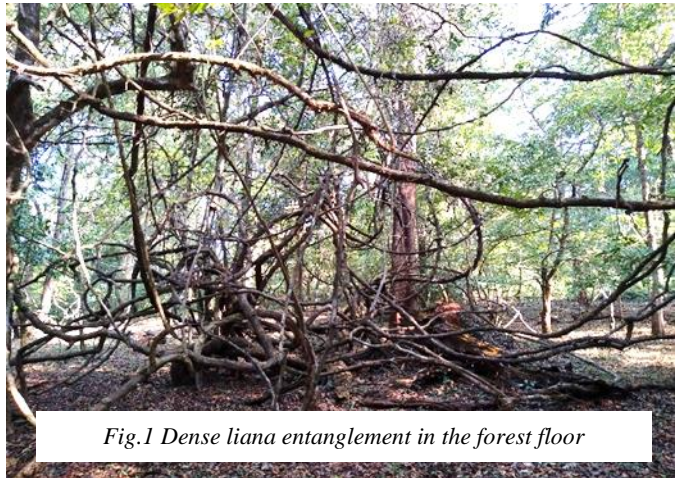


Fig.1 Dense liana entanglement in the forest floor

Climbers are so diverse that one-third of all globally known plant families contain at least one climber species. Some pantropical plant families, such as Convolvulaceae, Cucurbitaceae, and Menispermaceae, are exclusively climbers. Climbers are one of the key features that distinguish tropical forests from temperate ecosystems. In the tropics, they are notorious for their clumped distribution, which forms a dense entanglement that is often difficult to penetrate (Fig.1). Furthermore, they aggressively compete with trees for above-ground and below-ground resources, resulting in reduced tree growth and function. In many cases, liana colonization causes host tree mortality to increase (Fig. 2). It's no surprise that they're regarded as a nuisance in many forest management practices aimed at timber extraction. Climbers' presence can also be beneficial because it connects the forest canopy, creating a pathway for arboreal animals. They also provide a valuable food source for a diverse range of faunal assemblages. Climbers have traditionally been used by local communities as a food source, medicine, and source of income. Millions of people worldwide rely on agro-horticultural vine crops and forest vines for food. Grapes (*Vitis* spp.), sweet potatoes (*Ipomoea batatas*), yams (*Dioscorea* spp.), black pepper (*Piper nigrum*), vanilla (*Vanilla planifolia*), melons, squash, and cucumbers are all derived from climbers. Passion fruit (*Passiflora edulis*) and chayote (*Sechium edule*) are commercially valuable foods in tropical countries.

Taxonomic estimates of climbing plants in India

Understanding precise diversity is one of the most important prerequisites for ecology and evolutionary studies. Unfortunately, climbers have historically been overlooked in forest inventories due to a lack of standard methodologies and difficulties in taxonomic assertion, and field collection. This created a significant impediment to understanding the ecology and evolution of these fascinating life forms. The absence of a climber diversity database is a truly global issue. However, considering the limitations in resources and lack of transparency in data sharing, we attempted to estimate the taxonomic diversity of climbing plants in India for the first time (Pandi et al. 2022; Pandi and Babu 2022; Pandi, 2023).

Based on a thorough literature review of more than 100 research materials (Florals, research articles, reviews, monographs, and technical reports) spanning more than 120 years, our study presented a most comprehensive list of climber species in India for the first time, integrating ecological and taxonomic records. Our results revealed that 2624 climber species are found in India under 104 seed-plant families, accounting for nearly 12% of all recorded plant species in India and ~25% of all globally known spermatophyte plant families. The research also uncovered the complexities involved in assigning appropriate climbing mechanisms to climber species.

Further, 20% of the climber species reported in the study are endemic to India. The Western Ghats and the Eastern Himalayas are home to the majority of the endemic climbers, highlighting their ecological importance. Each species' IUCN (International Union for Conservation of Nature) conservation status was examined, and those with immediate conservation needs are highlighted in the manuscript. This study also reported an updated list of global climber plant families, which significantly increased the magnitude of the existing global dataset. We recommended that similar studies be conducted in order to achieve the goal of creating a global climbing plant database. To our knowledge, this is one of the very few attempts globally to estimate climber diversity within a well-defined geographical extent. This pioneering effort from India will find future applications in climber taxonomy, ecology, and evolutionary biology.

Dr. Vivek Pandi, Assistant Professor at Manipal Centre for Natural Sciences, MAHE, has been researching climbers for over a decade. Dr. Pandi is currently trying to explain the evolution of climbing behavior in plants. vivek.pandi@manipal.edu



Fig. 2 A host tree colonized by multiple lianas

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Pandi, V., Naveen Babu, K., Anbarashan, M., Sudhakar Reddy, C., Borgohain, J., Shynyan, K., ... & Parthasarathy, N. (2022). Taxonomic estimates of climbing plants in India: how many species are out there? *Écoscience*, 29(4), 325-343.

Pandi, V., & Babu, K. N. (2022). The climbing flora of India: A comprehensive checklist. *F1000Research*, 11(980), 980.

Pandi, V. (2023). *Taxonomy and Ecology of Climbers: Climbing Plants of India*. Singapore: Springer Nature Singapore. Pp (923).

ACADEMIC PROGRAMS

New Ph.D. Domains added at MCNS (in addition to the existing Ph.D. in Physics)

1. Ph.D. in Biological Science
 2. Ph.D. in Chemistry
-

SUMMER RESEARCH INTERNSHIP (SRI)

Summer Research Internship (SRI) program - 2022 has received an overwhelming number of applications from across India. The 15 most qualified candidates were chosen to work on the MCNS' diverse research portfolio. Dr. Vasudha Devi, Deputy Director, Centre for Doctoral Studies, presided over the event's official inauguration, and Dr. Mohammed Zuber, Assistant Director, Innovation Centre, presided over the valedictory event. This six-week tailor-made program provided the candidates with much-needed exposure to the excellence of research in fundamental Sciences, as well as a platform for them to interact with some of the world's most renowned scientists from India and around the world. At the end of the program, the participants presented their research findings on the chosen topic and discussed their significance, to the delight of the audience and the panel of judges. The top three posters were awarded certificates during the valedictory session.



SCIENCE OUTREACH ACTIVITIES

MCNS engages in outreach activities and a brief account of the programmes are given below:

1. Dr. T.M.A. Pai Planetarium: MCNS is in charge of this planetarium, which helps taking science to general public and more specifically to school students. There are regular shows in English and Kannada.

2. Public Talks: IUCAA, MCNS organized following talks for the public:

- **Prof. Durgesh Tripathi**, Inter-University Centre for Astronomy & Astrophysics (IUCAA), Pune, “The Fiery Star that gives us Life”, 28 Nov 2022.
- **Prof. Dipankar Banerjee**, Director, ARIES, Nainital & President, Astronomical Society of India (ASI) & **Dr. Sankarasubramanian K**, Head, Space Astronomy Group (SAG), ISRO Principal Scientist, ADITYA - L1, an interactive talk on “India’s first Space Solar Observatory: Aditya-L1”, 28 Nov 2022.
- The “**Ask Astronomers**”, an interactive program was organized for students on 29 Nov 2022. The program, aimed at school children, focused on sensitizing participants to the various aspects of Astronomy & Astrophysics through interaction and presentation of simple applications in the field, awakening their interests.
- **Dr. Mohammed Hasan**, Science Program Office, ISRO HQ, Bangalore, an interactive talk on “Indian Space Science Program”, 30 Nov 2022.

3. Special Lecture Series:

MCNS organized ‘Introductory Lecture Series’ on Earth and Planetary Science between 25 Nov and 16 Dec 2022. The main aim of the series is to introduce Earth and Planetary Science subject areas to young students and create awareness about the field and make them fascinated by the world we live in.



Talks by invited experts on the eve:

Name	Title of the talk	Date
Dr. Koji Wada , Principal Staff Scientist Planetary Exploration and Research Centre Chiba Institute of Technology Chiba, Japan	A Space Impact Experiment in Hayabusa 2	25 Nov 2022
Dr. T. R. Premathilake , Senior Lecturer, Postgraduate Institute of Archaeology University of Kelaniya, Sri Lanka	Understanding past and present tropical vegetation dynamics using the palynological and phytolith approaches: an introductory discourse	02 Dec 2022
Prof. R. Shankar , Marine Geology, Mangalore University, Mangalagangothri, Karnataka, India	How is Earth Science Important in Our Daily Lives?	09 Dec 2022
Prof. G. V. R. Prasad , Department of Geology, Centre for Advanced Studies, University of Delhi, Delhi, India	Dinosaur Fossil Heritage of India	09 Dec 2022
Dr. Vandana Prasad , Birbal Sahni Institute of Palaeosciences, Lucknow, Uttar Pradesh, India	Evolutionary history of tropical angiosperms based on Indian pollen fossil records	16 Dec 2022

4. Students' Clubs Activities:

MCNS Students' Clubs, managed by the research students of MCNS, with guidance from faculty, organized the following activities:

Reading Club: Ideas presented in the following documents, given in advance for reading, formed the theme for the discussion in the Reading club meetings:

- "First Sagittarius A* Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way". Published in The Astrophysical Journal Letters, 930: L12 May 2022. (02-07-2022).
- "Al Cluster Superatoms as Halogens in Polyhalides and as Alkaline Earths in Iodide Salts". Published in Science, Vol. 307 Jan 2005. (03-09-2022).
- "Functional susceptibility of tropical forests to climate change". Published in Nature Ecology & Evolution, Vol. 6 Jul 2022. (05-11-2022).

Nature Club: - The following are the recent nature club activities:

- “The Bizarre World of Groundwater and Subterranean Fishes of Southern India”. Talk given by Dr. Rajeev Raghavan, Assistant Professor, Kerala University of Fisheries and Ocean Studies (KUFOS), and currently the South Asia Chair of the IUCN's Freshwater Fish Specialist Group. (09-07-2022).
- “Introduction to Snakes of Peninsular India”. Talk given by Mr. Hanuman Tulsidas Gawas. (14-09-2022).
- A Field visit to Manipal End Point to explore ‘the wild plants of Manipal’. (08-10-2022).
- “Awareness Discussion on Plastic Usage”. (12-11-2022).

Movie Club: - The following are the movies recently screened:

- Life that glows (27 Jul 2022).
- American Genius: Oppenheimer vs. Heisenberg [Episode 7] (24 Sep 2022).
- American Genius: Edison vs. Tesla [Episode 1] (22 Oct 2022).
- Super Telescope: Mission to The Edge of the Universe (24 Dec 2022)

EXPERT TALKS

A. Talks at MCNS by invited experts

- **Prof. Marek Jamrozy**, Astronomical Observatory of the Jagiellonian University Cracow, Poland, “Extragalactic radio astronomy - the golden age of dynamic development and great discoveries”, 6 July 2022.
- **Prof. Douglas J Klein**, FSCI - Texas A& M University at Galveston, Texas, USA, “Conjugated-Carbon Nano-Structures: Defects, Decorations, Functionalizations”, 3 Aug 2022.
- **Prof. M.L. Khan**, Dept. Botany, Dr. Harisingh Gour Vishwavidyalaya Central University, Madhya Pradesh, “Rethinking to rebuilding- stepping towards environment, sustainability and ecosystem services”, 29 Sep 2022 (jointly organized by MCNS & MSLS, MAHE, Manipal).
- **Prof. M.K. Janarthanam**, Prof. Botany, Goa University, Goa, “Lateritic outcrops: are they barren or biodiversity rich”, 29 Sep 2022 (jointly organized by MCNS & MSLS, MAHE, Manipal).
- **Prof. P. Poulouse**, Department of Physics, IIT Guwahati, Assam, India, “Mysteries of the Cosmos: Story of Dark Matter”, 29 Sep 2022.
- **Dr. R. G. Pizzone**, INFN-LNS, Catania-95123, Italy, “Cosmic Challenges in Nuclear Astrophysics: The Indirect Approach”, 05 Dec 2022

B. Talks given at other institutions by MCNS experts on invitation

- **Dr. Sreejith Pandinhatteeri** was invited as a speaker for the ‘Aditya-L1 Science Support Cell Workshop’ and delivered a talk on “Science from Aditya L1: SUIT”, organised by ARIES Nainital and ISRO Bangalore, 5 July 2022.
- **Dr. Debbijoy Bhattacharya** delivered a talk on ‘Study of emission mechanism of blazers in AstroSat era’ at Seven years of AstroSat conference at ISRO HQ, Bangalore organized by Indian Space Research on 28 September 2022.
- **Dr. Rupak Roy** given an invited presentation on ‘Recent trends in SN research’ on the eve of 50 years of Golden Jubilee Celebration, ARIES, Manora Peak, Nainital on 19 October 2022.
- **Dr. Vivek Pandi** delivered a lecture on tropical ecosystems in the DIES ASIA Regional workshop (Training course of Management of Internationalization) 27 October 2022
- **Dr. Vivek Pandi** delivered a talk on the ecology of the Western Ghats at the Gandhian Centre for Philosophical Arts and Science, MAHE on 29 October 2022
- **Dr. Shalima P** delivered an online talk on ‘Our dusty view of the Universe’ at Dept. of Physics Tezpur University and ICARD on 17 November 2022.
- **Dr. Vivek Pandi** was invited as a resource person for the national workshop on vegetation analysis techniques organized by Stella Maris College (Autonomous) Chennai on 8 – 10 December 2022.

WORKSHOPS AND TRAINING

1. Solar Flare Studies using Aditya-L1 (28 – 30 November 2022)

Aditya -L1 is India’s first dedicated space mission to study the Sun. A National Workshop on “Solar Flare Studies using Aditya -L1” was organized by Manipal Centre for Natural Sciences (MCNS) from 28 -30 November 2022 at Manipal Academy of Higher Education (MAHE). MCNS is a partner institute developing Solar



Ultraviolet Imaging Telescope (SUIT) onboard Aditya-L1. The workshop objective was to discuss

the unsolved research problems in the field of solar flare studies and how Aditya-L1 can address some of those problems. In addition, this workshop also aimed at preparing the user community to do science with Aditya -L1 data after its commissioning. Forty-six participants from across the country participated in the workshop, along with fifteen resource persons. The resource persons included world-renowned scientists and faculties from different research centers. The prominent among them are Prof. Dipankar Banerjee, Director, Aryabhata Research Institute of Observational Sciences (ARIES), Nainital, Dr. Sankarasubramanian, Principal Scientist of Aditya-L1 and Group Head of Space Astronomy Group, ISRO, Bangalore, Prof. Durgesh Tripathi, Professor, Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune and principal investigator of SUIT onboard Aditya-L1, etc. In addition to the three-day workshop programs, the eminent scientists delivered three evening public talks. Also, they participated in different public programs in the nearby colleges in Udupi and Mangalore.

NEW JOINEES

- Mr. Ravindra Acharya, Senior Executive – Administration & Operations
Joined the centre in September 2022.
 - Ms. Tania Sarkar, Project Associate, joined the Centre in November 2022.
Her area of research is in Computational chemistry.
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AWARDS AND RECOGNITIONS

MCNS congratulates the following for their accomplishments:



Dr. Chandrachur Chakraborty, Assistant Professor, MCNS is honoured with ‘Visiting Associateship’ at Inter-University Centre for Astronomy and Astrophysics, India, for three years from August 2022. He is also an Editorial Board member of Cosmology and Associate Guest Editor in Astronomy and Space Sciences published by Frontiers Media S.A., Switzerland.



Dr. Sreejith Padinhatteeri, Assistant Professor, MCNS is honoured with ‘IUCAA Associateship’ at Inter-University Centre for Astronomy and Astrophysics, India from 1 Aug 2022 to 31 July 2025.

ACHIEVEMENTS

A. Faculty of MCNS



Dr. Suranjan Shil, Assistant Professor, received a research grant from Science and Engineering Research Board (SERB), Govt. of India for his project entitled "Spin dynamics of magnetic molecules".

B. Students of MCNS



Mr. Krishna Mohana A, Ph.D. scholar of MCNS was awarded doctoral degree for his thesis titled "Understanding Blazar Emission Processes Using Multiwavelength Spectral and Timing Studies". The research work was carried out under the guidance of **Dr. Debbijoy Bhattacharya**, Associate Professor, Manipal Centre for Natural Sciences, MAHE, Manipal.

OBSERVANCE OF COMMEMORATIVE / IMPORTANT DAYS

MCNS Celebrated '**Bharatiya Bhasha Utsav**' as a part of Azadi ka Amrit Mahotsav, the 75th year of our Independence on 11 December 2022, inviting all the MCNS staff and their family members. The "language harmony" event consisted of an introductory address, talks about origin of different languages, cultural program, My language My signature campaign and group photographs.



PUBLICATIONS

1. **Suvedha Suresh Naik**, **Kazuyuki Furuuchi** and Pravabati Chingangbamb. (2022). Particle production during inflation: a Bayesian analysis with CMB data from Planck 2018. *Journal of Cosmology and Astroparticle Physics (JCAP)*, 07 (2022) 016.
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3. **P. M. Prajapati**, R G Pizzone, Akash Hingu, S Mukherjee and **S. V. Suryanarayana**. (2022). Production and characterisation of 20, 22 Ne targets. *Pramana – J. Phys.* (2022) 96: 167.
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 5. **Krishna Mohana A.**, **Debbijoy Bhattacharya**, Subir Bhattacharyya, Nilay Bhatt and Chelliah Subramonian Stalin. (2022). Long-Term Monitoring of Blazar PKS 0208-512: A Change of g-Ray Baseline Activity from EGRET to Fermi Era. *Universe* 2022, 8, 534.
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 8. **P. M. Prajapati** et al., (2022) A New Reaction Rate of the 27Al(p/α) 24Mg Reaction Based on Indirect Measurements at Astrophysical Energies and Implications for 27Al Yields of Intermediate-mass Stars. *The Astrophysical Journal*, 941:96.
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