

# Proceedings of the 1<sup>st</sup> BINA workshop: Instrumentation and Science with the 3.6-m DOT and 4-m ILMT telescopes

Peter De Cat<sup>1\*</sup>, Jean Surdej<sup>2†</sup>, Amitesh Omar<sup>3‡</sup>, Michaël De Becker<sup>2§</sup>, Santosh Joshi<sup>3¶</sup>

<sup>1</sup> Royal Observatory of Belgium (ROB), Ringlaan 3, 1180 Brussels, Belgium

<sup>2</sup> Space sciences, Technologies and Astrophysics Research (STAR) Institute, Université de Liège,  
Allée du 6 Août 19c, 4000 Liège, Belgium

<sup>3</sup> Aryabhata Research Institute of Observational Sciences (ARIES), Manora peak,  
Nainital 263002, India

## 1 Devasthal Observatory

The Devasthal observatory is a new astronomical site in India, located at a high altitude of 2450 meters in the Kumaun region of Himalayas in the district Nainital in the state Uttarakhand (Fig. 1, top). It is operated by the Aryabhata Research Institute of Observational Sciences (ARIES; Nainital, India) and currently hosts three telescopes: a 1.3-m optical telescope and two so-called Indo-Belgian telescopes. The 3.6-m Devasthal Optical Telescope (DOT; Fig. 1, bottom left and middle) has received this status because it has been constructed by AMOS (Advanced Mechanical and Optical Systems; Liège, Belgium) with financial support of €2 000 000 from the Belgian Federal Science Policy Office (BELSPO; Govt. of Belgium). In return for the financial aid, 7% of the telescope time with the DOT is reserved for projects lead by Belgian astronomers. The 4-m International Liquid Mirror Telescope (ILMT; Fig. 1, bottom right) is a Belgian initiative lead by members of the University of Liège in collaboration with institutes in India (ARIES; Nainital) and Canada (Québec, Montréal, Toronto, Vancouver, and Victoria).

## 2 BINA

The “Belgo-Indian Network for Astronomy and Astrophysics” (BINA) was created to increase the interaction between Indian and Belgian astronomers and to stimulate the common use of the Indo-

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\*Guest-editor section “Galactic astronomy”; Belgian PI of BINA; e-mail: Peter.DeCat@oma.be

†Guest-editor section “Extragalactic astronomy”

‡Guest-editor section “Instrumentation”

§Editor

¶Indian PI of BINA



Figure 1: Top: An aerial view of the Devasthal observatory that hosts the Indo-Belgian telescopes. Bottom: The building of the 4-m ILMT (left) and the dome (middle) of the 3.6-m DOT (right).

Belgian telescopes and other telescopes of interest (Table 1) to maximize their scientific output for solar system, galactic and extragalactic celestial objects. The proposal for this bilateral project was submitted in 2014 by Dr. Peter De Cat (Belgian PI; Royal Observatory of Belgium, Brussels, Belgium) and Dr. Santosh Joshi (Indian PI; Aryabhata Research Institute of Observational Sciences, Nainital, India). It has been approved in 2016 by the International Division, Department of Science and Technology (DST, Govt. of India; DST/INT/Belg/P-02) and BELSPO (BL/11/IN07). The network that emerged from this collaboration is still expanding and currently involves colleagues from six Belgian and twelve Indian institutes (Table 2).

BINA provides funding both to organize workshops in India or Belgium and to enable work visits of typically two weeks of Indian scientists/technicians to Belgian partner institutes and vice versa. These workshops are ideal to present scientific results of Indo-Belgian projects and to allow face-to-face discussions to strengthen on-going collaborations and/or to initiate new ones. The work visits can be used to discuss scientific and instrumentation projects for the new observing facilities at Devasthal observatory.



Figure 2: Group picture of the participants to the 1<sup>st</sup> BINA workshop.

### 3 1<sup>st</sup> BINA workshop

The first official BINA activity was the 1<sup>st</sup> BINA workshop (<https://aries.res.in/~bina/>). It was held from 15-18 November 2016 at the Uttarakhand Academy of Administration (UAoA, ATI; <http://uaoa.gov.in/>) in Mallital Nainital (India). The organization was lead by Santosh Joshi (ARIES, India) who received financial support of DST (Govt. of India), BELSPO (Govt. of Belgium) and ARIES (host institute).

About 150 people from India, Belgium and other countries expressed their interest for this workshop. However, due to financial limitations, only 107 astronomers could participate. They originated from 8 different countries (#88 from India, #10 from Belgium, #3 from Thailand, #2 from Japan, #1 from China, #1 from Russia, #1 from South Africa, and #1 from Taiwan), making it a true international workshop. Fig. 2 gives a group picture of the participants.

The focus of this workshop was on the “Instrumentation and Science with the 3.6-m DOT and 4-m ILMT telescopes”. Given that this was the first event where all the Indian and Belgian partners could meet in person, the aim was to give an overview of the current and future possibilities to base scientific projects on data obtained with the Indo-Belgian telescopes and/or other astronomical facilities in India. Furthermore, members of each partner institute have been given the opportunity to highlight their main scientific topics to stimulate collaborations with each other and international collaborators. The program of this 4-day meeting consisted of three types of activities.

#### 3.1 Inauguration

The 1<sup>st</sup> BINA workshop started with an inauguration ceremony for the Indo-Belgian telescopes (15 November 2016, 9:30 – 15 November 2016, 10:30). After the lightning of the Diya (Fig. 3) and some welcome words by Dr. Wahab Uddin (director of ARIES; ARIES, Nainital, India), Dr. Peter De Cat (Belgian PI of BINA; ROB, Brussels, Belgium) and Dr. Anil Kumar Pandey (chairman of the SOC; ARIES, Nainital, India) gave a short introduction of the BINA network and of the scientific program of the workshop, respectively. Prof. Swarna Kanti Ghosh (director of NCRA-TIFR; Mumbai, India) has put BINA into a bigger perspective by giving a brief description of the various on-going astronomical projects in the context of the Indian observing facilities. He summarized the importance of BINA



Figure 3: Lightning of the Diya by Dr. Santosh Joshi (top left), Dr. Peter De Cat (top right), Prof. Swarna Kanti Ghosh (bottom left), and Dr. Wahab Uddin (bottom right).



Figure 4: Views on the public during the inauguration ceremony.



Figure 5: The 1<sup>st</sup> BINA workshop received a lot of attention in the Indian media (e.g. <https://www.youtube.com/watch?v=wd3LV2YLiQ0&feature=youtu.be>).

in the light of both the ground-based Indian telescopes (at Devasthal and other Indian astronomical sites) and the first Indian multi-wavelength astronomical space mission (ASTROSAT). Dr. Santosh Joshi (Indian PI of BINA and main organizer of this workshop; ARIES, Nainital, India) ended the inauguration ceremony with a few words of thanks. Some pictures of the audience during this event are given in Fig. 4. The 1<sup>st</sup> BINA workshop received a lot of attention in the Indian media as well as abroad (Fig. 5).

### 3.2 Presentations

During the scientific part of the 1<sup>st</sup> BINA workshop (15 November 2016, 11:30 – 17 November 2016, 15:30), the participants could enjoy 36 talks (Fig. 6) and 42 posters covering a large variety of topics, with tea and lunch breaks in between the blocks with oral presentations. The tea breaks were combined with poster viewing sessions (Fig. 7). Everybody was invited to publish their results. It resulted in 59 proceeding papers. They are subdivided into three main sections.

#### Instrumentation (guest-editor: Amitesh Omar)

- Back-end instruments of the 3.6-m DOT (#3: Basant Ballabh Sanwal et al.; Brijesh Kumar et al.; Shashi Bhushan Pandey et al.),
- Second-generation instruments of the 3.6-m DOT (#1: Devendra Ojha et al.),
- The ILMT and multiwavelength astronomy (#3: Jean Surdej et al.; Brajesh Kumar et al.; Bikram Pradhan et al.), and
- Instrumentation for ongoing and future scientific activities (#6: Peter De Cat et al.; Ram Kesh Yadav et al.; Drisya Karinkuzhi et al.; Bhuwan Chandra Bhatt; Umesh Chandra Joshi et al.; Kaushal Sharma et al.).

#### Galactic Astronomy (guest-editor: Peter De Cat)

- Solar System (#1: Shashikiran Ganesh et al.),
- Exo-planets (#1: Parijat Thakur et al.),
- Variable Stars (#6: Patricia Lampens et al.; Po-Chieh Huang et al.; Nand Kumar Chakradhari & Santosh Joshi; Chris Engelbrecht; Mrinal Kanti Das et al.; Subhajeet Karmakar & Jeewan Chandra Pandey),



Figure 6: Some of the speakers at work during their oral presentation: Prof. Jean Surdej (top left), Dr. Shashanka Gurumath (top right), Dr. Drisya Karinkuzhi (middle left), Dr. Priya Hasan (middle right), Prof. Ram Sagar (bottom left), and Dr. Sanjeev K. Varshney (bottom right).



Figure 7: Some representative pictures of a tea break in between the sessions with scientific talks. The tea breaks were combined with poster viewing sessions.

- Stars in Multiple systems (#6: Sachindra Naik; Arti Joshi & Jeewan Chandra Pandey; Michaël De Becker; Bharti Arora & Jeewan Chandra Pandey; Jagirdar Rukmini & Devarapalli Shanti Priya; Devarapalli Shanti Priya & Jagirdar Rukmini),
- Stars in Open Clusters (#6: Priya Hasan; Nareemas Chehlaeh et al.; Sneha Lata; Devendra Bisht et al.; Alok Durgapal et al.; Gaurav Singh & Ramakant Singh Yadav), and
- Star Formation Regions (#7: Soumen Mondal et al.; Saurabh Sharma et al.; Piyali Saha et al.; Tirthendu Sinha et al.; Ekta Sharma et al.; Neelam Panwar; Satoshi Hamano et al.).

### **Extragalactic Astronomy (guest-editor: Jean Surdej)**

- Active Galactic Nuclei (#8: Gopal-Krishna & Paul Joseph Wiita; Hum Chand et al.; Mousumi Das et al.; Arun Mangalam et al.; Parveen Kumar et al.; Aditi Agarwal et al.; Sapna Mishra et al.; Priyanka Jalan et al.)
- Supernovae, Transients and Gravitational Lensing (#6: Delampady Narasimha et al.; Mridweeka Singh et al.; Kuntal Misra et al.; Anjasha Gangopadhyay et al.; Raya Dastidar et al.; Margarita Safonova et al.)
- Galaxies (#4: Alka Mishra et al.; Marjorie Declair et al.; Suvendu Rakshit et al.; Vineet Ojha et al.)

The best poster presentations were selected by a small committee of experts. Bikram Pradhan (STAR Institute, Université de Liège, Liège, Belgium), Dr. Kuntal Misra (ARIES, Nainital, India), and Po-Chieh Huang (Institute of Astronomy, National Central University, Taoyuan City, Taiwan) were the chosen ones to receive a prize for their contribution in the area of instrumentation, galactic astronomy and extragalactic astronomy, respectively (Fig. 8).

The scientific part of the 1<sup>st</sup> BINA workshop ended with a summary that was presented by Prof. Ram Sagar (IIA, Bangalore, India; Fig. 6, bottom left), who has been the main driving force behind



Figure 8: Bikram Pradhan (left), Po-Chieh Huang (middle), Dr. Kuntal Misra (right) receiving their prize for the best poster in the area of instrumentation, galactic astronomy and extragalactic astronomy, respectively.

the foundations of the Devasthal Observatory for many years. He basically opened the door for BINA. Afterwards, some concluding remarks were given by Dr. Sanjeev K. Varshney (Adviser, International Bilateral Cooperation; Fig. 6, bottom right) who summarized the on-going Indian bilateral projects supported by DST with Belgium and other countries. It highlights the importance and the potential of India as a growing astronomical country.

### 3.3 Social events

On the evening of Wednesday 16 November 2016, the workshop dinner was held at the Manu Maharani Hotel Nainital. It ended with a spontaneous dancing party with mainly Indian music.

On the evening of Thursday 17 November 2016, Prof. Chris Engelbrecht (University of Johannesburg, Johannesburg, South Africa) gave a public lecture about the “Music of the Stars” (Fig. 9). This outreach event was organized especially for school children. About 150 students from various schools attended.

On the last day of the workshop (Friday 18 November 2016), a trip to the Devasthal Observatory was organised. After a welcome drink at the guesthouse of the observatory, the participants could enjoy a guided tour of the telescopes of this new observatory, with a spectacular view on the Himalayas in the background (Fig. 10).

## 4 2<sup>nd</sup> BINA workshop

The 2<sup>nd</sup> BINA workshop will take place in Brussels (Belgium) from 9 to 12 October 2018 with the aim to promote “BINA as an expanding international collaboration”. It will give the opportunity for the participants to review the progress of the network in terms of scientific output and development of new instruments. This workshop will be hosted by the Royal Observatory of Belgium (ROB; Brussels, Belgium).

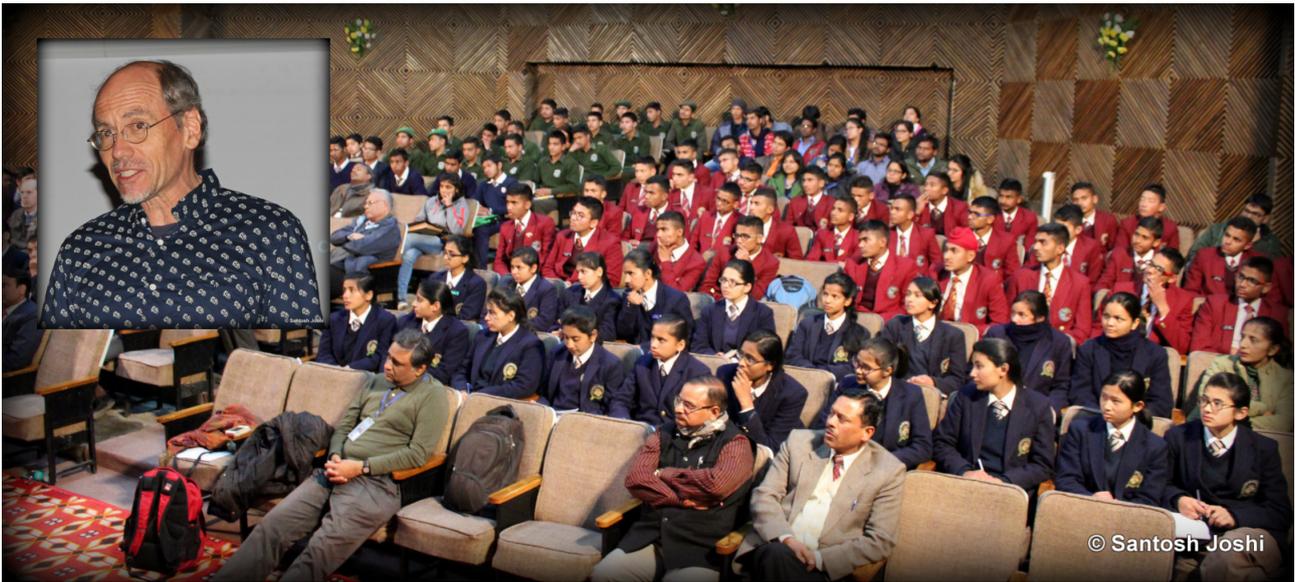


Figure 9: The public lecture “Music of the Stars”, given by Prof. Chris Engelbrecht (inset), was attended by about 150 students from various schools.



Figure 10: The building of the ILMT with the Himalayas in the background.

Table 1: Overview of the Indo-Belgian telescopes (top) and other telescopes of interest (bottom) within BINA.

INDO-BELGIAN TELESCOPES	
DOT@ARIES	= 3.6-m Devasthal Optical Telescope
- location:	Devasthal observatory (Devasthal, India)
- operated by:	Aryabhata Research Institute of Observational Sciences (Nainital, India)
- instruments:	optical and near-infrared imaging, narrowband and broadband photometry, low-resolution spectroscopy
ILMT@ARIES	= 4-m International Liquid Mirror Telescope
- location:	Devasthal observatory (Devasthal, India)
- operated by:	Aryabhata Research Institute of Observational Sciences (Nainital, India)
- instruments:	CCD direct imaging
OTHER TELESCOPES OF INTEREST	
1.04-m@ARIES	= 1.04-m ARIES telescope
- location:	ARIES observatory (Nainital, India)
- operated by:	Aryabhata Research Institute of Observational Sciences (Nainital, India)
- instruments:	CCD, three-channel fast photometer & polarimeter
1.3-m@ARIES	= 1.3-m Robotic Telescope (Devasthal, India)
- location:	Devasthal observatory (Devasthal, India)
- operated by:	Aryabhata Research Institute of Observational Sciences (Nainital, India)
- instruments:	AIMPOL (ARIES Imaging Polarimeter) & CCDs
2.01-m@HCT	= 2.01-m Himalayan Chandra Telescope
- location:	Indian Astronomical Observatory (Leh, Ladakh, India)
- operated by:	Indian Institute of Astrophysics (Bangalore, India)
- instruments:	HFOSC (Himalaya Faint Object Spectrograph), near-IR imager, HESP (Hanle Echelle Spectrograph) & optical CCD imager
1.2-m@PRL	= 1.2-m Infrared Telescope
- location:	Mount Abu Observatory (Rajasthan, India)
- operated by:	Physical Research Laboratory (Ahmedabad, India)
- instruments:	NICMOS infrared camera and spectrograph, imaging Fabry-Perot spectrometer, high time resolution infrared photometer, optical polarimeter, fibre-linked grating spectrograph & high resolution optical spectrometer
GMRT@NCRA-TIFR	= Giant Metrewave Radio Telescope
- location:	GMRT Observatory (Khodad, India)
- operated by:	National Center for Radio Astrophysics (Pune, India) Tata Institute of Fundamental Research (Mumbai, India)
- instruments:	30 parabolic 45-m dishes spread over up to 25 km for radio interferometry
1.2-m@RMO	= 1.2-m Mercator telescope
- location:	Roque de los Muchachos Observatory (La Palma, Canary Islands, Spain)
- operated by:	Katholieke Universiteit Leuven (Louvain, Belgium)
- instruments:	HERMES (high-resolution spectroscopy) & MAIA (3-channel fast photometer)
all@ESO	= all telescopes of the European Southern Observatory
- location:	La Silla Observatory (Chile) Paranal Observatory (Chile) Llano de Chajnantor Observatory (Chile)
- operated by:	European Southern Observatory (Garching, Germany)

Table 2: Overview of the Belgian (top) and Indian (bottom) partner institutes of BINA (with the names and e-mail address of the contact person(s) between brackets). They are listed in alphabetical order.

BELGIAN PARTNER INSTITUTES	
ROB	Royal Observatory of Belgium, Brussels, Belgium (P. De Cat < <i>Peter.DeCat@oma.be</i> >)
UAntwerpen/ KU Leuven	Universiteit Antwerpen, Antwerp, Belgium/ Katholieke Universiteit Leuven, Louvain, Belgium (K. Kolenberg < <i>katrien.kolenberg@kuleuven.be</i> >)
UGent	Universiteit Gent, Ghent, Belgium (M. Baes < <i>maarten.baes@ugent.be</i> >)
ULB	Université Libre de Bruxelles, Brussels, Belgium (A. Jorissen < <i>Alain.Jorissen@ulb.ac.be</i> >)
ULiège	Université de Liège, Liège, Belgium (J. Surdej < <i>jsurdej@ulg.ac.be</i> >)
INDIAN PARTNER INSTITUTES	
ARIES	Aryabhata Research Institute of Observational Sciences, Nainital, India (S. Joshi < <i>santosh@aries.res.in</i> >)
BOSE	S.N. Bose Institute, Kolkata, India (S. Mondal < <i>soumen.mondal@bose.res.in</i> >)
DU	Delhi University, North Campus Delhi, India (H.P. Singh < <i>hpsingh@physics.du.ac.in</i> >)
IIA	Indian Institute of Astrophysics, Bangalore, India (A. Goswami < <i>aruna@iiap.res.in</i> >; G. Pandey < <i>pandey@iiap.res.in</i> >)
IIST	Indian Institute of Space Science & Technology, Thiruvananthapuram, India (R. Lekshmi < <i>l.resmi@gmail.com</i> >)
ISAC	ISRO Satellite Centre (ISAC), Bangalore, India (V. Girish < <i>giri@isac.gov.in</i> >)
IUCAA	Inter-University Centre for Astronomy and Astrophysics, Pune, India (A.N. Ramaprakash < <i>anr@iucaa.in</i> >; R. Gupta < <i>rag@iucaa.in</i> >)
KU	Kumaun University, Nainital, India (A.K. Durgapal < <i>alokdurgapal@gmail.com</i> >)
NCRA-TIFR	National Center for Radio Astrophysics - Tata Institute of Fundamental Research, Pune, India (I. Chandra < <i>ishwar@ncra.tifr.res.in</i> >)
PRL	Astronomy & Astrophysics Division, Physical Research Laboratory, Ahmedabad, India (S. Ganesh < <i>shashi@prl.res.in</i> >; S. Naik < <i>snaik@prl.res.in</i> >)
RSU	Pt. Ravi Shankar University, Raipur, India (N.K. Chakradhari < <i>nkchakradhari@gmail.com</i> >)
TIFR	Tata Institute of Fundamental Research, Mumbai, India (D.K. Ojha < <i>ojha@tifr.res.in</i> >; A. Mazumdar < <i>anwesh@tifr.res.in</i> >)

Table 3: Overview of the participants to the 1<sup>st</sup> BINA workshop (15-18 November 2016, Nainital, India).

Name	First Name(s)	Affiliation
Absil	Olivier	STAR Institute, Université de Liège, Liège, Belgium
Agarwal	Aditi	Aryabhata Research Institute of Observational Sciences, Nainital, India
Agrawal	Vishi	Aryabhata Research Institute of Observational Sciences, Nainital, India
Anand	Rahul	Gorakhpur University, Gorakhpur, India
Arora	Bharti	Aryabhata Research Institute of Observational Sciences, Nainital, India
Bangia	Tarun	Aryabhata Research Institute of Observational Sciences, Nainital, India
Bharti	Yugam	Aryabhata Research Institute of Observational Sciences, Nainital, India
Bhatraju	Naveen Kumar	CSIR-Institute of Genomics and Integrative Biology, Delhi, India
Bhatt	Bhuwan Chandra	Indian Institute of Astrophysics, Bangaluru, India
Bisht	Devendra	Physical Research Laboratory, Ahmedabad, India
Chand	Hum	Aryabhata Research Institute of Observational Sciences, Nainital, India
Chand	Krishna	Aryabhata Research Institute of Observational Sciences, Nainital, India
Chandra	Ishwara	NCRA, Tata Institute of Fundamental Research, Pune, India
Chattopadhyay	Indranil	Aryabhata Research Institute of Observational Sciences, Nainital, India
Chelaeh	Nareemas	National Astronomical Research Institute of Thailand, Chiangmai, Thailand
Das	Mousumi	Indian Institute of Astrophysics, Bangaluru, India
Das	Mrinal Kanti	University of Delhi South Campus, Delhi, India
Dastidar	Raya	Aryabhata Research Institute of Observational Sciences, Nainital, India
De Becker	Michaël	STAR Institute, Université de Liège, Liège, Belgium
De Cat	Peter	Royal Observatory of Belgium, Brussels, Belgium
Decler	Marjorie	Universiteit Gent, Gent, Belgium
Devulapalli Venkata	Phani Kumar	Aryabhata Research Institute of Observational Sciences, Nainital, India
Dumka	Umesh Chandra	Aryabhata Research Institute of Observational Sciences, Nainital, India
Durgapal	Alok	Kumaun University, Nainital, India
Engelbrecht	Chris	University of Johannesburg, Johannesburg, South Africa
Ganesh	Shashikiran	Physical Research Laboratory, Ahmedabad, India
Gangopadhyay	Anjasha	Aryabhata Research Institute of Observational Sciences, Nainital, India
Gaur	Haritma	Shanghai Astronomical Observatory, Shanghai, China
Ghosh	Swarna Kanti	NCRA, Tata Institute of Fundamental Research, Pune, India
Gopal-Krishna		CBS, University of Mumbai, Mumbai, India
Gopinathan	Maheswar	Aryabhata Research Institute of Observational Sciences, Nainital, India
Gurumath	Shashanka	VIT University, Vellore, India
Hamano	Satoshi	Kyoto Sangyo University, Kyoto, Japan
Hasan	Priya	Maulana Azad National Urdu University, Hyderabad, India
Huang	Po-Chieh	Institute of Astronomy, National Central University, Taoyuan City, Taiwan
Jalan	Priyanka	Aryabhata Research Institute of Observational Sciences, Nainital, India
Jangid	Purushottam	Aryabhata Research Institute of Observational Sciences, Nainital, India
Joshi	Arti	Aryabhata Research Institute of Observational Sciences, Nainital, India
Joshi	Mohit Kumar	Aryabhata Research Institute of Observational Sciences, Nainital, India
Joshi	Santosh	Aryabhata Research Institute of Observational Sciences, Nainital, India
Joshi	Umesh Chandra	Physical Research Laboratory, Ahmedabad, India
Joshi	Yogesh C.	Aryabhata Research Institute of Observational Sciences, Nainital, India
Karinkuzhi	Drisyaa	Universite libre de Bruxelles, Brussels, Belgium
Karmakar	Subhajeet	Aryabhata Research Institute of Observational Sciences, Nainital, India
Kashyap	Adarsh	Delhi University, Delhi, India
Kaur	Harmeen	Kumaun University, Nainital, India

Table 3: Continued.

Name	First Name(s)	Affiliation
Kobayashi	Naoto	Kiso Observatory, Institute of Astronomy, University of Tokyo, Japan
Kolenberg	Katrien	University of Antwerp, Antwerp, Belgium & KU Leuven, Leuven, Belgium
Krishna Reddy	Bheemireddy	Aryabhata Research Institute of Observational Sciences, Nainital, India
Kumar	Brajesh	Indian Institute of Astrophysics, Bangaluru, India
Kumar	Brijesh	Aryabhata Research Institute of Observational Sciences, Nainital, India
Kumar	Parveen	Aryabhata Research Institute of Observational Sciences, Nainital, India
Kumar	T.S.	Aryabhata Research Institute of Observational Sciences, Nainital, India
Lampens	Patricia	Royal Observatory of Belgium, Brussels, Belgium
Lata	Sneh	Aryabhata Research Institute of Observational Sciences, Nainital, India
Mangalam	Arun	Indian Institute of Astrophysics, Bangaluru, India
Mathpal	Mahesh C.	Kumaun University, Nainital, India
Medhi	Biman Jyoti	Aryabhata Research Institute of Observational Sciences, Nainital, India
Mishra	Alka	Aryabhata Research Institute of Observational Sciences, Nainital, India
Mishra	Sapna	Aryabhata Research Institute of Observational Sciences, Nainital, India
Misra	Kuntal	Aryabhata Research Institute of Observational Sciences, Nainital, India
Mitra	Arabinda	Department of Science & Technology, Delhi, India
Mktrchian	David	National Astronomical Research Institute of Thailand, Chiangmai, Thailand
Mondal	Soumen	SNBNC for Basic Sciences, Kolkata, India
Naik	Sachindra	Physical Research Laboratory, Ahmedabad, India
Narasimha	Delampady	Tata Institute of Fundamental Research, Mumbai, India
Ojha	Devendra Kumar	Tata Institute of Fundamental Research, Mumbai, India
Ojha	Vineet	Aryabhata Research Institute of Observational Sciences, Nainital, India
Omar	Amitesh	Aryabhata Research Institute of Observational Sciences, Nainital, India
Panchal	Alaxender	Aryabhata Research Institute of Observational Sciences, Nainital, India
Pande	Bimal	Kumaun University, Nainital, India
Pande	Seema	Kumaun University, Nainital, India
Pandey	Anil Kumar	Aryabhata Research Institute of Observational Sciences, Nainital, India
Pandey	Jeewan Chandra	Aryabhata Research Institute of Observational Sciences, Nainital, India
Pandey	Shashi Bhushan	Aryabhata Research Institute of Observational Sciences, Nainital, India
Pant	Jaysreekar	Aryabhata Research Institute of Observational Sciences, Nainital, India
Panwar	Neelam	Delhi University, Delhi, India
Paswan	Abhishek	Aryabhata Research Institute of Observational Sciences, Nainital, India
Pospieszalska	Anna	STAR Institute, Université de Liège, Liège, Belgium
Pradhan	Bikram	STAR Institute, Université de Liège, Liège, Belgium
Rakshit	Suwendu	Indian Institute of Astrophysics, Bangaluru, India
Ramaprakash	Anamparambu	Inter-University Centre for Astronomy and Astrophysics, Pune, India
Rangwal	Geeta	Kumaun University, Nainital, India
Rukmini	Jagirdar	Department of Astronomy, Osmania University, Hyderabad, India
Safonova	Margarita	Indian Institute of Astrophysics, Bangaluru, India
Sagar	Ram	Indian Institute of Astrophysics, Bangaluru, India
Saha	Piyali	Aryabhata Research Institute of Observational Sciences, Nainital, India
Sanwal	Basant Ballabh	Aryabhata Research Institute of Observational Sciences, Nainital, India
Semenko	Eugene	Special Astrophysical Observatory, Nizhny Arkhyz, Russia

Table 3: Continued.

Name	First Name(s)	Affiliation
Shanti Priya Sharma	Devarapalli Ekta	Department of Astronomy, Osmania University, Hyderabad, India
Sharma	Kaushal	Aryabhata Research Institute of Observational Sciences, Nainital, India
Sharma	Saurabh	Delhi University, Delhi, India
Singh	Arpan	Aryabhata Research Institute of Observational Sciences, Nainital, India
Singh	Mahendra	Aryabhata Research Institute of Observational Sciences, Nainital, India
Singh	Mridweeka	Aryabhata Research Institute of Observational Sciences, Nainital, India
Singh	Sadhana	Aryabhata Research Institute of Observational Sciences, Nainital, India
Sinha	Tirthendu	Aryabhata Research Institute of Observational Sciences, Nainital, India
Srivastava	Priyanka	Aryabhata Research Institute of Observational Sciences, Nainital, India
Surdej	Jean	STAR Institute, Université de Liège, Liège, Belgium
Thakur	Parijat	Guru Ghasidas Central University, Bilaspur, Chhatisghadh, India
Uddin	Wahab	Aryabhata Research Institute of Observational Sciences, Nainital, India
Varshney	Sanjeev K.	Department of Science & Technology, Delhi, India
Verma	L.P.	M. B. College Haldwani, Nainital, India
Yadav	Shobhit	Aryabhata Research Institute of Observational Sciences, Nainital, India
Yadav	Ramakant Singh	Aryabhata Research Institute of Observational Sciences, Nainital, India
Yadav	Ramkesh	National Astronomical Research Institute of Thailand, Chiangmai, Thailand

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