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Proceedings of the 2nd BINA workshop: BINA as an expanding international collaboration

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Abstract: The Belgo-Indian Network for Astronomy & astrophysics (BINA) was initiated in 2014 to stimulate Belgian and Indian astronomers to collaborate on projects that are based on observations with the Indo-Belgian telescopes and other telescopes of interest. After the successful event of the 1st BINA workshop that took place in Nainital (India) in November 2016, the 2nd BINA workshop was held in Brussels (Belgium) in October 2018 to promote this network as an expanding international collaboration. In this paper, a detailed overview of this event is presented as an introduction to the proceedings containing 39 additional papers corresponding to presentations that were given at the 2nd BINA workshop.

1 Introduction

The Belgo-Indian Network for Astronomy & astrophysics (BINA) is a network fostering collaboration between Belgian and Indian institutes to stimulate research on the Solar System, galactic and extragalactic celestial objects based on observations with the Indo-Belgian telescopes, i.e. the 3.6-m Devasthal Optical Telescope (DOT) and the 4.0-m International Liquid Mirror Telescope (ILMT), and other telescopes of interest. More information about these telescopes is given in Tables 1 and 2, respectively. The network currently includes 6 Belgian and 13 Indian partner institutes. They are listed in Table 3 where the names of the contact persons for each of these institutes can be found. Joshi & De Cat (2019) give an overview of all the activities that were organised during the first phase of the BINA project.

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Figure 1: Poster (left) and group picture (right) of the 2nd BINA workshop (Credits: P. Van Cauteren).

The 1st BINA workshop was held in Nainital (India) on 15-18/11/2016 with the aim to establish close interactions between Indian and Belgian astrophysicists and to discuss about the first- and second-generation instruments for these new Indo-Belgian telescopes. It was successfully hosted by the Aryabhatta Research Institute of Observational Sciences (ARIES). The proceedings of this workshop containing 59 papers were published in the Bulletin de la Société Royale des Sciences de Liège (De Cat et al. 2018).

This paper gives a detailed description of the 2nd BINA workshop that was hosted by the Royal Observatory of Belgium (ROB) in Brussels on 09-12/10/2018 (Fig. 1). The Local Organizing Committee (LOC) was chaired by P. De Cat who could rely on the help of 6 colleagues of the ROB (in alphabetical order: M. Bruyninckx, P. Lampens, H. Langenaken, P. Van Cauteren, J. Vandekerckhove & L. Vermeylen). This workshop was organized one year after the start of science observations with the 3.6-m DOT to promote BINA as an expanding international collaboration. This goal was met as almost half of the 48 participants on site were foreigners, including 18 colleagues from India. Most Indian participants received financial help from the BINA project to be able to attend this event. A few talks were presented via Skype by Indian BINA members that were not able to come to Brussels. The Scientific Organizing Committee (SOC) consisted of 4 scientists from India (in alphabetical order: A. Goswami, S. Joshi, D. K. Ojha & H. P. Singh) and 5 scientists from Belgium (in alphabetical order: M. De Becker, P. De Cat, A. Jorissen, P. Lampens & K. Kolenberg). This committee, including 3 women, was chaired by P. Lampens. In Section 2, the detailed outline of the scientific programme and a short overview of the scientific content are given while the social events are described in Section 3. We end with some future propects for the second phase of the BINA project in Section 4.

2 Scientific programme

The focus of this meeting relied on three themes, reflected in three sessions:

(S1) *Instrumentation of the Indo-Belgian telescopes*: What could be the role of these 4-m class telescopes on the international astronomical scene once they are equipped with well-chosen instruments? Which instruments are presently operational and how well are they performing? Which instruments are currently being developed? Special attention was given to the status of the high-resolution spectrograph (HRS) that will be offered as a second-generation instrument on the 3.6-m DOT.

Figure 3: Pictures of an oral presentation by P. Lampens (left) and a discussion between P. Lampens & Y. C. Joshi about a poster presentation (right) during the 2nd BINA workshop (Credits: P. Van Cauteren).

(S2) *Data & science with the Indo-Belgian telescopes*: Which projects have started to make use of the 3.6-m DOT? What is the quality of the data? What first scientific results have been obtained? Which other projects with the Indo-Belgian telescopes are planned in the near future?

(S3) *Data & science with other telescopes of interest*: By joining forces, Belgian and Indian astronomers can get access to more telescopes of interest. Which science involving Belgian and Indian partners is based on data from these telescopes?

The main goal of this workshop was to provide answers to these questions based on input from the participants. Therefore, scientists working in all astrophysical areas were kindly invited to attend this event. There were 69 registered participants (Table 4). The detailed outline of the scientific programme, as given in Fig. 2, was based on the submitted abstracts. During the 3.5-day meeting, there were 44 very interesting oral presentations, 8 poster presentations, 1 round-table discussion, and a summary talk (Fig. 3). All the talks were streamed and recorded via Webex (with the help of L. Vermeylen). These recordings, as well as the PDF files of the corresponding presentations, were published on a dedicated website in the case we received the permission of the lead author to do so (`http://aa.oma.be/18bina`). Both the oral and poster presentations were highly relevant to the chosen themes, and of high quality.

During the workshop, it has become evident that an Indo-Belgian collaboration provides access to a large arsenal of telescopes and instruments (to both sides), opening the door to many scientific fields and new possibilities. Various invited reviews highlighted the connection between efficient instrumentation and quality of the scientific output, whether the instruments are equipping larger telescopes (e.g. of 4-m class and larger; see talks presented by I. Ribas, A. Pasquali, A. Ramaprakash, J. C.Pandey, and M. Baes) or smaller ones (e.g. talks by H. Van Winckel and E. Jehin).

2.1 Opening ceremony

The opening ceremony was started by R. Van der Linden, the director of the host institute located in the south of Brussels (capital of Belgium and Europe). He addressed some words of welcome to the participants and expressed his gratitude to see many Indian colleagues amongst them. He was followed by S. Joshi, the Indian PI of BINA, who gave a brief introduction of BINA, including a summary of the ongoing scientific activities (Joshi & De Cat 2019). M. Freire from the Belgian Federal Science Policy Office (BELSPO) explained the importance of sponsoring networking projects like BINA for the strengthening of science and technology in the federal scientific institutes in Belgium

Figure 4: Some pictures taken during coffee/tea breaks illustrating the friendly atmosphere and personal contacts between the participants of the 2nd BINA workshop. Appearing on the pictures from left to right: D. Mkrtichian & P. Lampens (top left), A. Goswami & M. De Becker (top right), G. Krishna & A. Mazumdar (bottom left), and M. Baes & M. Groenewegen (bottom right) (Credits: P. Van Cauteren).

and their partner institutes. The presentation by X. Verians from Advanced Mechanical and Optical Systems (AMOS; Liège) was a nice example of expertise in high-technological instrumentation for astronomical research within Belgium, including the 3.6-m DOT and the 4-m ILMT.

2.2 Intrumentation session

In the instrumentation session (S1), the currently available and offered instruments at Indian and Belgian telescopes, as well as the recent improvements, future developments, and potential upgrades (adaptive optics) were presented against the background of very relevant actual scientific questions. The large multi-wavelength coverage of various instruments, both on the ground and in space, was highlighted in many scientific talks in the following sessions (S2 & S3). It is clear that several highly performant instruments are/will be available to the astronomical communities in the (near) future. During the round-table discussion, both Indian and Belgian participants confirmed their wish to provide the 3.6-m DOT with an efficient high-resolution spectrograph. They are willing to pursue this goal together, even if it is clear that large efforts will still be necessary to achieve it.

2.3 Data & science sessions

The data & science sessions (S2 & S3) covered a large diversity of topics ranging from the Solar System (comets, asteroids & NEA's, space debris) via exo-planets (exo-planetary science) to galactic

Figure 5: Pictures taken during the tour of Royal Observatory of Belgium where the 45-cm historical refractor is shown to participants of the 2nd BINA workshop. Appearing on the picture from left to right: M. Decleir, E. Semenko, D. Mkrtichian, R. K. Dubey, A. Goswami & P. Lampens (Credits: P. Van Cauteren).

and extra-galactic astronomy. Such a diversity of topics is unusual in most scientific conferences, where the focus generally lies on a specific domain in astronomy.

Concerning studies of small bodies of/in the Solar System, a variety of observational techniques were discussed. The need for both extended observations (when the objects are distant and fainter) and high-resolution spectroscopy (for chemical characterization) was highlighted. In stellar physics, the need for (spectroscopic) follow-up of space missions, for chemical tagging (detailed abundance analyses), the influence of binary star evolution and of massive stars, early stellar formation, stellar associations (clusters), stellar rotation (young clusters), as well as (various types of) stellar populations and pulsations were topics of discussion and high interest. The talks about galaxies, their stellar and dust content, their evolution (galactic archaeology), their environments and interactions were both stimulating and inquisitive. In the extra-galactic domain, the results of (multi-wavelength) studies of exotic objects such as AGN's and blazars, radio galaxies, the search for (strong) gravitational lensing were also nicely presented and summarized.

2.4 Closing ceremony

The final impressions, kindly provided by Ph. Prugniel (Observatoire de Lyon, France) as an external reviewer, confirmed that this workshop has been a success, and should not be the last of its kind. Notwithstanding the broad range of topics (this summary is not all-inclusive), the interest of all the participants for the different science cases was genuine. This was possible thanks to a friendly atmosphere and personal contacts, and the goal of developing scientific collaboration in which the whole workshop was embedded. This is illustrated in Fig. 4.

3 Social events

On Thursday 11 October 2018, three social events were organised.

1. *Tour of Brussels*: From 14:30 until 18:00, a guided bus tour was organised to discover all aspects of Brussels: the diversity of the city, the extremes and the contradictions, the problems and the challenges, and dynamics of Brussels. This tour showed the splendor of the Cinquantenaire, the

green areas of the Brussels parks, the office developments in the Leopold district and the North Quarter, the urban dynamics around the canal zone and the popular districts like Matongé or Saint-Josse. It also included a walk in the area of the Grand Place and a coffee/tea break.

2. *Tour of Royal Observatory of Belgium*: From 18:15 to 19:15, there was a guided tour of the Royal Observatory of Belgium, lead by H. Langenaken. This tour included the Meridian room and its museum, the heliometer of Jean-Charles Houzeau de Lehaie, and visits to the domes of the 45-cm (Fig. 5) and the 1.2-m Ukkel Schmidt telescope.
3. *Workshop dinner*: In the evening, starting at 19:30, the participants of the workshop could enjoy the workshop dinner at the restaurant Relais St. Job (1 Place de Saint Job, 1180 Uccle). It included an appetizer and a three-course menu.

The social events were included in the registration and nearly all participants attended all of them.

4 Future prospects

The first phase of BINA has shown to be a success. The network provided financial support for the organisation of two international workshops (one in India and one in Belgium) and several work visits in both directions. These personal contacts between Indian and Belgian scientists have led both to the strengthening and/or the start of collaborations in different fields of astronomical research and to the joint development of a high-resolution spectrograph for the 3.6-m DOT. The nearby future of BINA is guaranteed as both the International Division, Department of Science and Technology (DST, Govt. of India) and the Belgian Federal Science Policy Office (BELSPO, Govt. of Belgium) agreed to fund the project for another three years. This will allow to fund ten work visits of typically two weeks each (five in each direction) as well as the organisation of the 3rd BINA workshop. This workshop is planned to take place in India after the Monsoon of 2020, with the aim to discuss the impact of the Indo-Belgian telescopes and the role of the Devasthal observatory in the astronomical community worldwide.

Acknowledgements

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References

De Cat P., Surdej J., Omar A., De Becker M., Joshi S., 2018, BSRSL, 87, 1
Joshi S., De Cat P. 2019, BSRSL, 88, 19 (this volume)

2nd BINA WORKSHOP

"BINA as an expanding international collaboration"

SCIENTIFIC PROGRAMME

Venue: Meridian Room, Royal Observatory of Belgium, Brussels
Date: October 9-12, 2018
Email: 18bina@oma.be
Website: http://aa.oma.be/18bina

Rooms: All presentations and coffee/tea breaks take place in the Meridian Room of the Royal Observatory of Belgium. The lunch breaks are at the dining room of the Royal Meteorological Institute (same site).

Type of presentations:
IRNN = Invited Review (40 min, including 8 min of questions)
ITNN = Invited Talk (30 min, including 7 min of questions)
CTNN = Contributed Talk (20 min, including 5 min of questions)

WiFi access: (WPA-protocol needed)
Network: ROB-External
Password: ROB-Access!

TUESDAY 09/10/2018

08:30		**Start of day 1** (Meridian room opens)
09:00		Registration
09:45		Opening ceremony Dr. Ronald Van der Linden (director of Royal Observatory of Belgium) Dr. Santosh Joshi (Indian PI of BINA) Ms. Margarida Freire (BELSPO) Dr. Xavier Verians (AMOS)
SESSION 1:		**INSTRUMENTATION OF THE INDO-BELGIAN TELESCOPES** **(chair: Dr. Patricia Lampens)**
10:30	IR01	Astrophysics and exoplanets with a 4-m class telescope by Dr. Ignasi Ribas (Institute of Space Sciences & Institut d'Estudis Espacials de Catalunya, Spain)
11:10		**Coffee/Tea break**
11:40	IR02	The far-reaching impact of surveys carried out with 4m-class telescopes by Dr. Anna Pasquali (ARI, Heidelberg, Germany)
12:20	IR03	Performance of the instruments on 3.6-m Devasthal Optical Telescope by Dr. Amitesh Omar (ARIES, Nainital, India) *(skype presentation)*

Figure 2: Scientific programme of the 2nd BINA workshop, including oral presentations (Invited Reviews of 40 minutes, Invited Talks of 30 minutes, and Contributed Talks of 20 minutes) and poster presentations.

13:00		**Lunch break**
		(chair: Prof. Katrien Kolenberg)
14:30	IR04	Current & future science instruments for the 3.6-m Devasthal Optical Telescope by Prof. Anamparambu Ramaprakash (IUCAA, Pune, India)
15:10	IR05	10 years of HERMES at the 1.2-m Mercator telescope by Prof. Hans Van Winckel (KU Leuven, Leuven, Belgium)
15:50	CT01	Upgrading HERMES: an improved fiber link and a new wavelength calibrator by Dr. Gert Raskin (KU Leuven, Leuven, Belgium)
16:10		**Coffee/Tea break**
16:30	IR06	The High Resolution Spectrograph of the Aryabhatta Research Institute of Observational Sciences by Dr. Jeewan C. Pandey (ARIES, Nainital, India) *(skype presentation)*
17:10		Round table discussion
18:10		**End of day 1**
		WEDNESDAY 10/10/2018
09:00		**Start of day 2** (Meridian room opens)
		(chair: Dr. Michaël De Becker)
09:30	CT02	A sharp future for the 3.6-m Devasthal Optical Telescope? The power of adaptive optics for medium size telescopes by Dr. Gilles Orban de Xivry (STAR, ULiège, Belgium)
SESSION 2:		**DATA & SCIENCE WITH THE INDO-BELGIAN TELESCOPES**
Session 2.1:		**Solar system and exoplanet studies with the Indo-Belgian telescopes**
09:50	IR07	Solar system studies with the Indo-Belgian telescopes by Dr. Shashikiran Ganesh (PRL, Ahmadabad, India)
10:30	CT03	Size estimation of orbital debris using a zenith-pointing telescope by Mr. Bikram Pradhan (STAR, ULiège, Belgium)
Session 2.2:		**Galactic astronomy with the Indo-Belgian telescopes**
		(chair: Prof. Aruna Goswami)
10:50	IR08	Scientific potential of Indo-Belgian 3.6-m Devasthal Optical Telescope and 4-m International Liquid Mirror Telescope in the field of Galactic Astronomy by Prof. Ram Sagar (IIA, Bangalore, India)
11:30		**Coffee/Tea break**

Figure 2: Continued.

11:50	CT04	Optical characterization and radial velocity monitoring of exoplanet and eclipsing binary candidates by Dr. Yogesh Joshi (ARIES, Nainital, India)
12:10	CT05	Eclipse mapping of Algol-type systems with oscillating delta Scuti type components by Dr. Patricia Lampens (ROB, Brussels, Belgium)
12:30	CT06	Light curve parameters of Cepheid and RR Lyrae variables at multiple wavelengths: theory vs. observations by Prof. Harinder Singh (DU, Delhi, India)
12:50	CT07	Rotation rates of pre-main sequence stars by Dr. Soumen Mondal (SNBNCBS, Kolkata, India)
13:10		**Lunch break**
14:30	CT08	Instabilities and mass-loss in massive stars by Dr. Abhay Pratap Yadav (Government Model College Shahpura, Dindori, India) *(skype presentation)*
14:50	CT09	Accurate estimation of effective temperature and metallicity of asteroseismic targets with BINA telescopes by Prof. Anwesh Mazumdar (HBCSE-TIFR, Mumbai, India)
Session 2.3:		**Extragalactic astronomy with the Indo-Belgian telescopes**
		(chair: Prof. Maarten Baes)
15:10	IT01	The diversity of Active Galactic Nuclei variability: Some highlights and challenges by Prof. Gopal Krishna (ARIES, Nainital, India)
15:40	CT10	Complex X-ray/ultraviolet/optical variabilities of the Seyfert 1 galaxy NGC4593 by Dr. Sachindra Naik (PRL, Ahmadabad, India)
16:00	CT11	Multi-wavelength studies of Zwicky's Nonet by Mr. Biju Koonammakkil George (W.M.O Arts & Science College, Kalpetta, India) *(skype presentation)*
16:20		**Coffee/Tea break**
16:40	CT12	Multi-wavelength studies of giant radio galaxies by Mr. Pratik Dabhade (IUCAA, Pune, India) *(skype presentation)*
17:00	CT13	Strong lensing studies with the 3.6-m Devasthal Optical Telescope: opportunities and challenges by Dr. Dominique Sluse (STAR, ULiège, Belgium)
17:20	CT14	REMAP: REverberation Mapping of the Active galactic nuclei Program at the 2-m Himalayan Chandra Telescope by Mr. Amit Kumar Mandal (IIA + Christ University, Bangalore, India)
17:40	CT15	Observations of galaxy collisions and prediction of parameters of resulting galaxies by Mr. Rajesh Kumar Dubey (Institute of Advanced Physics, Yamuna Nagar, India)
18:00		**End of day 2**

Figure 2: Continued.

		THURSDAY 11/10/2018
09:00		**Start of day 3** (Meridian room opens)
SESSION 3:		**DATA & SCIENCE WITH OTHER TELESCOPES OF INTEREST**
Session 3.1:		**Solar system and exoplanet studies with other telescopes of interest**
		(chair: Dr. Michaël De Becker)
09:30	IR09	Study of small bodies of the Solar System with small and large telescopes by Dr. Emmanuel Jehin (STAR, ULiège, Belgium)
Session 3.2:		**Galactic astronomy with other telescopes of interest**
		(chair: Prof. Anamparambu Ramaprakash)
10:10	IR10	Galactic sources at low radio frequency by Prof. Ishwara Chandra Chenakkod (NCRA-TIFR, Pune, India) *(presented by Prof. Anandmayee Tej)*
10:50	CT16	Application of convolutional neural nets for stellar spectral analysis by Dr. Kaushal Sharma (IUCAA, Pune, India) *(skype presentation)*
11:10		**Coffee/Tea break**
11:30	CT17	Evolution of magnetic activities on active solar-type stars: starspot modulation, surface differential rotation, and flares by Dr. Subhajeet Karmakar (PRL, Ahmedabad, India) *(skype presentation)*
11:50	CT18	Three years of AstroSat: India's first mission dedicated to astronomy by Dr. Girish Veerappa (ISRO, Bangalore, India)
12:10	CT19	The ultraviolet imaging telescope on-board AstroSat: recent results by Dr. Chelliah Subramonian Stalin (IIA, Bangalore, India)
12:30	CT20	Spectroscopic view on the pulsating A-type stars HD 73045 and HD 118660 by Dr. Eugene Semenko (SAO, Nizhnii Arkhyz, Russia)
12:50		**Workshop picture**
13:10		**Lunch break**

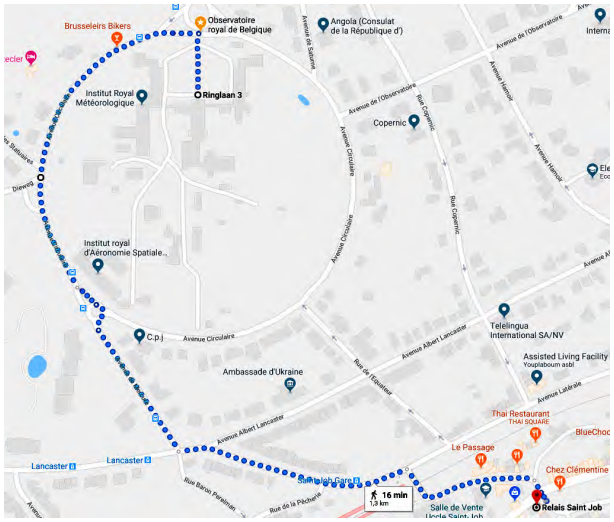
Figure 2: Continued.

SOCIAL EVENTS:

14:30 **Tour of Brussels**

18:15 **Tour of Royal Observatory of Belgium**

19:30 **Workshop dinner**
restaurant: Relais Saint Job
address: Place de Saint-Job 1, Uccle/Ukkel



22:30 **End of day 3**

FRIDAY 12/10/2018

09:00 **Start of day 4** (Meridian room opens)

(chair: Prof. Ram Sagar)

09:30 CT21 Stellar and galactic studies with the 2-m Himalayan Chandra Telescope
by Prof. Aruna Goswami (IIA, Bangalore, India)

09:50 CT22 Spectroscopic studies of carbon-enhanced metal-poor stars
by Ms. Meenakshi Purandardas (IIA, Bangalore, India)
(presented by Prof. Aruna Goswami)

10:10 CT23 Probing the Galactic s-process nucleosynthesis using metal-deficient Barium stars
by Ms. Shejeelammal Jameela (IIA, Bangalore, India)

10:30 CT24 Probing high-mass star-formation in the outflow source G12.42+0.50
by Prof. Anandmayee Tej (IIST, Thiruvananthapuram, India)

10:50 CT25 High-mass star formation toward the southern infrared bubble S10
by Mr. Swagat Ranjan Das (IIST, Thiruvananthapuram, India)
(presented by Prof. Anandmayee Tej)

11:10 **Coffee/Tea break**

Figure 2: Continued.

11:30	CT26	Optical and X-ray observations of three candidate polars: RX J0859.1+0537, RX J0749.1-0549, and RX J0649.8-0737 by Ms. Arti Joshi (ARIES, Nainital, India)
11:50	CT27	Ground-based photometric survey to search for the pulsational variability in Ap and Am Stars by Dr. Santosh Joshi (ARIES, Nainital, India)
12:10	CT28	The spectroscopic survey of southern oEA stars by Dr. David Mkrtichian (NARIT, Chiang Mai, Thailand)
12:30	CT29	Prospects for radio observations of Particle-Accelerating Colliding-Wind Binaries with the Giant Metrewave Radio Telescope by Dr. Michaël De Becker (STAR, ULiège, Belgium)
12:50	CT30	Understanding physical properties of M-dwarfs: near-infrared (HK band) spectroscopic studies by Mr. Dhrimadri Khata (SNBNCBS, Kolkata, India) *(presented by Dr. Soumen Mondal)*
13:10		**Lunch break**
Session 3.3:		**Extragalactic astronomy with other telescopes of interest** **(chair: Prof. Gopal Krishna)**
14:30	IR11	Multi-wavelength extragalactic astronomy by Prof. Maarten Baes (UGent, Ghent, Belgium)
15:10	CT31	DustKING - the story continues: dust attenuation in NGC628 by Ms. Marjorie Decleir (UGent, Ghent, Belgium)
15:30	CT32	Multi-wavelength variability and quasi-periodic oscillations in Blazars by Dr. Alok Chandra Gupta (ARIES, Nainital, India) *(skype presentation)*
15:50		**Coffee/Tea break**
SESSION 4:		**WORKSHOP SUMMARY & CLOSING CEREMONY** **(chair: Prof. Harinder Singh)**
16:10	IR12	Workshop summary with some thoughts on the future expectations by Prof. Philippe Prugniel (Observatoire de Lyon, Lyon, France)
16:50		Closing ceremony
17:00		**End of day 4**

Figure 2: Continued.

2nd BINA WORKSHOP

"BINA as an expanding international collaboration"

SCIENTIFIC PROGRAMME

POSTER PRESENTATIONS

P01 On the requirement for a high resolution spectrograph to investigate the multiplicity of massive stars with the 3.6-m Devasthal Optical Telescope
by Dr. Michaël De Becker (STAR, ULiège, Belgium)

P02 Characterization of pre-main sequence population in H II region Sh2-242
by Mr. Alik Panja (SNBNCBS, Kolkata, India)
(presented by Dr. Soumen Mondal)

P03 Spectral calibration of cool stars: a new medium-resolution HK-band HCT TIRSPEC spectral library
by Mr. Supriyo Ghosh (SNBNCBS, Kolkata, India)
(presented by Dr. Soumen Mondal)

P04 A search for fast photometric variability of very low mass stars in IC 348
by Mr. Samrat Ghosh (SNBNCBS, Kolkata, India)
(presented by Dr. Soumen Mondal)

P05 Photometric study of three W UMa type variable stars
by Mr. Alaxender Panchal (ARIES, Nainithal, India)
(presented by Dr. Yogesh Joshi)

P06 Linear polarization towards anti-galactic direction: a case of the open star cluster Alessi1
by Ms. Sadhana Singh (ARIES, Nainithal, India)
(presented by Ms. Arti Joshi)

P07 Polarization study of massive binaries with the 1.04-m ARIES telescope
by Ms. Arora Bharti (ARIES, Nainithal, India)
(presented by Ms. Arti Joshi)

P08 Photometric study of the open clusters NGC 381 and King 21
by Mr. Jayanand Maurya (ARIES, Nainithal, India)
(presented by Dr. Yogesh Joshi)

Figure 2: Continued.

Table 1: Overview of the Indo-Belgian telescopes within BINA.

INDO-BELGIAN TELESCOPES		
DOT@ARIES	=	3.6-m Devasthal Optical Telescope
- location:		Devasthal observatory (Devasthal, India)
- operated by:		Aryabhatta 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:		Aryabhatta Research Institute of Observational Sciences (Nainital, India)
- instruments:		CCD direct imaging

Table 2: Overview of other telescopes of interest within BINA.

OTHER TELESCOPES OF INTEREST		
2.34-m@VBO	=	2.34-m Vainu Bappu Telescope
- location:		Vainu Bappu Observatory (Kavalur, India)
- operated by:		Indian Institute of Astrophysics (Bangalore, India)
- instruments:		imaging camera, medium resolution spectropolarimeter, medium resolution optometrics research spectrograph & high-resolution échelle spectrograph
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 (Hanle Faint Object Spectrograph), near-IR imager, HESP (Hanle Échelle Spectrograph) & optical CCD imager
2.0-m@IUCAA	=	2.0-m telescope
- location:		Girawali Observatory (Junnar, India)
- operated by:		Inter-University Centre for Astronomy and Astrophysics (Pune, India)
- instruments:		IUCAA Faint Object Spectrograph and Camera (IFOSC) & Princeton Instruments CCD (PI-CCD)
1.3-m@ARIES	=	1.3-m Robotic Telescope (Devasthal, India)
- location:		Devasthal observatory (Devasthal, India)
- operated by:		Aryabhatta Research Institute of Observational Sciences (Nainital, India)
- instruments:		AIMPOL (ARIES Imaging Polarimeter) & CCDs
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

Table 2: Continued.

OTHER TELESCOPES OF INTEREST		
1.04-m@ARIES	=	1.04-m Sampurnanand telescope
- location:		ARIES observatory (Nainital, India)
- operated by:		Aryabhatta Research Institute of Observational Sciences (Nainital, India)
- instruments:		CCD, three-channel fast photometer & polarimeter
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
AstroSat	=	India's first dedicated multi-wavelength space observatory
- location:		650-km, near-equatorial orbit (space)
- operated by:		Indian Space Research Organization (ISRO) - Telemetry, Tracking and Command Network (ISTRAC; Bangalore, India)
- instruments:		Two 38-cm UltraViolet Imaging Telescopes (UVIT), Soft X-ray telescope (SXT), three co-aligned identical Large Area X-ray Proportional Counters (LAXPC), Cadmium Zinc Telluride Imager (CZTI), Scanning Sky Monitor (SSM) & Charged Particle Monitor (CPM)
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)
- access:		through Belgian collaborators from institutes in HERMES consortium (KU Leuven, ROB, ULB)
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)
- access:		through Belgium
6.0-m@SAO	=	6.0-m Large Altazimuth Telescope (BTA)
- location:		Special Astrophysical Observatory (Zelenchuksky District, Russia)
- instruments:		main stellar spectrograph, nasmyth échelle spectrometer, digital speckle interferometer, spectral camera with optical reducer for photometric and interferometric observations, multi-mode spectrograph & multicolor panoramic photometer-polarimeter)
- access:		through bilateral programme between India and Russia
all@SAAO	=	all telescopes of the South African Astronomical Observatory
- location:		South African Astronomical Observatory (Sutherland, South Africa)
- operated by:		South African Astronomical Observatory (Cape Town, South Africa)
- access:		through bilateral programme between India and South Africa

Table 3: Overview of the Belgian (top) and Indian (bottom) partner institutes of BINA (with the names and e-mail address of the current contact person(s) between brackets). The top institutes host the PI's of BINA. The other institutes are listed in alphabetical order.

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

Table 4: Overview of the participants to the 2nd BINA workshop (9-12 October 2018, Brussels, Belgium) in alphabetical order. The members of the Local and Scientific Organising Committee are indicated with 'LOC' and 'SOC', respectively. The participants that gave their presentation via Skype are indicated with 'skype'.

Name	First Name(s)	Affiliation
Baes	Maarten	Universiteit Gent, Gent, Belgium
Bharti	Arora	Aryabhatta Research Institute of Observational Sciences, Nainital, India (skype)
Bruynickx	Martine	Royal Observatory of Belgium, Brussels, Belgium (LOC)
Chelliah Subramonian	Stalin	Indian Institute of Astrophysics, Bangalore, India
Chenakkod	Ishwara-Chandra	National Center for Radio Astrophysics - Tata Institute of Fundamental Research, Pune, India (skype)
Dabhade	Pratik	Inter-University Centre for Astronomy and Astrophysics, Pune, India (skype)
Das	Swagat Ranjan	Indian Institute of Space Science and Technology, Thiruvananthapuram, India (skype)
De Becker	Michaël	STAR Institute, Université de Liège, Liège, Belgium (SOC)
De Cat	Peter	Royal Observatory of Belgium, Brussels, Belgium (LOC, SOC)
Decleir	Marjorie	Universiteit Gent, Gent, Belgium
Dubey	Rajesh Kumar	Institute of Advanced Physics, Yamuna Nagar, India
Freire	Margarida	Belgian Science Policy, Brussels, Belgium
Frémat	Yves	Royal Observatory of Belgium, Brussels, Belgium
Ganesh	Shashikiran	Physical Research Laboratory, Ahmedabad, India
Ghosh	Samrat	S. N. Bose National Centre for Basic Sciences, Kolkata, India (skype)
Ghosh	Supriyo	S. N. Bose National Centre for Basic Sciences, Kolkata, India (skype)
Goswami	Aruna	Indian Institute of Astrophysics, Bangalore, India (SOC)
Groenewegen	Martin	Royal Observatory of Belgium, Brussels, Belgium
Gupta	Alok Chandra	Aryabhatta Research Institute of Observational Sciences, Nainital, India (skype)
Jameela	Shejeelammal	Indian Institute of Astrophysics, Bangalore, India
Jehin	Emmanuel	STAR Institute, Université de Liège, Liège, Belgium
Jorissen	Alain	Université libre de Bruxelles, Brussels, Belgium (SOC)
Joshi	Arti	Aryabhatta Research Institute of Observational Sciences, Nainital, India
Joshi	Santosh	Aryabhatta Research Institute of Observational Sciences, Nainital, India (SOC)
Joshi	Yogesh Chandra	Aryabhatta Research Institute of Observational Sciences, Nainital, India
Karmakar	Subhajeet	Physical Research Laboratory, Ahmedabad, India (skype)
Khata	Dhrimadri	S. N. Bose National Centre for Basic Sciences, Kolkata, India (skype)
Kolenberg	Katrien	University of Antwerp, Antwerp, Belgium & KU Leuven, Leuven, Belgium (SOC)
Koonammakkil George	Biju	W.M.O Arts & Science College, Kalpetta, India (skype)
Krishna	Gopal	Aryabhatta Research Institute of Observational Sciences, Nainital, India
Lampens	Patricia	Royal Observatory of Belgium, Brussels, Belgium (LOC, SOC)
Langenaken	Hilde	Royal Observatory of Belgium, Brussels, Belgium (LOC)
Lobel	Alex	Royal Observatory of Belgium, Brussels, Belgium
Mandal	Amit Kumar	Indian Institute of Astrophysics, Bangalore, India & Christ University

Table 4: Continued.

Name	First Name(s)	Affiliation
Maurya	Jayanand	Aryabhatta Research Institute of Observational Sciences, Nainital, India (skype)
Mazumdar	Anwesh	Homi Bhabha Centre for Science Education - Tata Institute of Fundamental Research, Mumbai, India
Mktrchian	David	National Astronomical Research Institute of Thailand, Chiangmai, Thailand
Mondal	Soumen	S. N. Bose National Centre for Basic Sciences, Kolkata, India
Naik	Sachindra	Physical Research Laboratory, Ahmedabad, India
Omar	Amitesh	Aryabhatta Research Institute of Observational Sciences, Nainital, India (skype)
Orban de Xivry	Gilles	STAR Institute, Université de Liège, Liège, Belgium
Panchal	Alaxender	Aryabhatta Research Institute of Observational Sciences, Nainital, India (skype)
Pandey	Jeewan	Aryabhatta Research Institute of Observational Sciences, Nainital, India (skype)
Panja	Alik	S. N. Bose National Centre for Basic Sciences, Kolkata, India (skype)
Pasquali	Anna	Astronomisches Rechen-Institut, Heidelberg, Germany
Pradhan	Bikram	STAR Institute, Université de Liège, Liège, Belgium
Prugniel	Philippe	Observatoire de Lyon, Saint-Genis Laval, France
Purandardas	Meenakshi	Indian Institute of Astrophysics, Bangalore, India (skype)
Ramaprakash	Anamparambu	Inter-University Centre for Astronomy and Astrophysics, Pune, India
Raskin	Gert	KU Leuven, Leuven, Belgium
Ribas	Ignasi	Institute of Space Sciences & Institut d'Estudis Espacials de Catalunya, Bellaterra, Spain
Rogozin	Dmytro	KU Leuven, Leuven, Belgium
Sagar	Ram	Indian Institute of Astrophysics, Bangaluru, India
Semenko	Eugene	Special Astrophysical Observatory, Nizhny Arkhyz, Russia
Sharma	Kaushal	Inter-University Centre for Astronomy and Astrophysics, Pune, India (skype)
Singh	Harinder	Department of Physics & Astrophysics, University of Delhi, Delhi, India (SOC)
Singh	Sadhana	Aryabhatta Research Institute of Observational Sciences, Nainital, India (skype)
Sluse	Dominique	STAR Institute, Université de Liège, Liège, Belgium
Tej	Anandmayee	Indian Institute of Space Science and Technology, Thiruvananthapuram, India
Van Cauteren	Paul	Royal Observatory of Belgium, Brussels, Belgium (LOC)
Vandekerckhove	Joan	Royal Observatory of Belgium, Brussels, Belgium (LOC)
Van de Steene	Griet	Royal Observatory of Belgium, Brussels, Belgium
van Hoof	Peter	Royal Observatory of Belgium, Brussels, Belgium
Van Winckel	Hans	KU Leuven, Leuven, Belgium
Veerappa	Girish	Space Astronomy Group, U R Rao Satellite Centre, Bangalore, India
Verians	Xavier	Advanced Mechanical & Optical Systems, Angleur, Belgium
Vermeylen	Lore	Royal Observatory of Belgium, Brussels, Belgium (LOC)
Wiegert	Joachim	Royal Observatory of Belgium, Brussels, Belgium
Yadav	Abhay Pratap	Government Model College Shahpura, , India (skype)