



Brief history and public outreach activity database (2018-2023) of Gauhati University (GU) Observatory

Prepared by

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THE GAUHATI UNIVERSITY OBSERVATORY



The observatory with one of its domes opened. Image credit: Mr. Abhijit Talukdar and Mr. Debojit Paul, PhD students, Department of Physics, GU

About

GU Observatory is the first astronomical observatory in the North East. It is used for practice in observational astronomy in MSc Physics program and public outreach activities.

Operated by

Department of Physics, Gauhati University, an IUCAA Centre for Astronomy Research & Development (ICARD)

History

- Established : 1990
- Foundation supported by: Inter University Centre for Astronomy and Astrophysics (IUCAA), Pune and Astronomical Society of India.
- Founders: Dr. Hiralal Duorah (former professor of physics and former Vice Chancellor, GU (1996-2001)) and (Late) Dr. Kalpana Duorah.



Dr. Hiralal Duorah (left) and (Late) Dr. (Mrs.) Kalpana Duorah (right) – the founders of the observatory and the two internationally recognised astrophysicists.

- People in charge of the observatory:
 - (i) (Late) Dr. (Mrs.) Kalpana Duorah (1993-2005), Department of Physics, GU.
 - (ii) Dr. Madhurjya P Bora (2005 -2016), Professor, Department of Physics, GU.
 - (iii) Dr. Sanjeev Kalita (2016 till present time) (ICARD Coordinator and FRAS), Department of Physics, GU

Initial domes: Hemispherical dome.

Telescopes in foundational stage: 3 inch refractor, 6 inch reflector and 12 inch reflector.

Developments:

- Electrically powered sliding dome (2009) followed by installation of a 9 inch reflector and 16 inch reflector telescope,
- Installation of a 6 inch motorised refractor telescope (2017) through DST –FIST support and procuring a NexImage 5 MP Solar System Imager (2022) for imaging celestial objects.
- Major renovation of observatory floor and interior completed (January 2024) with financial support from the University.

Existing telescopes and devices:

- 6 inch refractor (FIST sponsored, C-SKY) (motorised and automated), 9 inch reflector (Celestron) (motorised and automated), 12 inch Meade reflector (manual mode) and 16 inch reflector (Meade) (motorised and automated).
- NexImage 5 MP Solar System Imager (Celestron), SBIG CCD.

Goal of the observatory

- (a) **To continue the study of astronomy and train the students in observational techniques.**
- (b) To hold regular public events for viewing interesting celestial objects and events and hence **to create and promote universe awareness** through various modes of presentations.
- (c) **To make interface with schools and colleges for developing astronomy education.**

Our team in action

- (a) Dr. Sanjeev Kalita (i/c, GU Observatory), an expert in theoretical astrophysics and cosmology (black holes and cosmic expansion), a science contributor from GU for the development of upcoming international Thirty Meter Telescope Observatory (Hawaii), a visiting associate of the Inter University Centre for Astronomy & Astrophysics (IUCAA), Pune, coordinator of the IUCAA Centre for Astronomy Research & Development (ICARD), Department of Physics, GU and a Fellow of the Royal Astronomical Society (FRAS).
- (b) Dr. Biman J Medhi, an expert in observational astronomy, star formation, comets and interstellar matter and galactic magnetic fields and polarisation, a visiting associate of Inter University Centre for Astronomy & Astrophysics (IUCAA), Pune and a former Scientist, ARIES, Nainital.
- (c) Current group of PhD students: Ms. Chayanika Rabha (cosmology), Mr. Samuzal Barua (active galaxies), Ms. Nirmali Das (formation of massive black holes in the early universe), Ms. Sushmita Deb (astrobiology, stars), Mr. Abhijit Talukdar (cosmology and gravitational physics), Mr. Debojit Paul (testing gravitational physics near compact objects and the Galactic Centre) and Mr. Samrat Biswas (stars and polarimetric studies).
- (d) Non-teaching staff members for technical works: Mr. Mahesh Rai, Mr. Dipak Rai and Mr. Shivnath Rai.

A glimpse of astronomy outreach activities of the observatory during 2018 – 2024

(Coordinated by Dr. Sanjeev Kalita, i/c GU Observatory during various celestial events)

- (a) People gathered at the observatory premise to observe the **total lunar eclipse on 31st January, 2018**. Parents, school children and students viewed the eclipse.



A child looking at the eclipse through telescope eyepiece



(One of the founders of the observatory, (Late) Dr. (Mrs.) Kalpana Duorah interacting with students)



(Around 200 people observed the eclipse)

(b) Solar eclipse viewing on 26th December, 2019:

Public visited the observatory to view partial solar eclipse of 26th December, 2019 projected on screen with a 6 inch refracting telescope.



People viewing the solar eclipse (top, left panel) which was projected (top, right panel). The Registrar, Gauhati University (4th from right in the front row, bottom panel) also visited and observed the eclipse.

(c) Reaching out to people during pandemic:

Great conjunction of Jupiter and Saturn occurred on 21st December 2020.

Nearly 100 people including students, children, parents, teachers and science enthusiasts gathered at the observatory campus to observe this event.



Organisers with the telescope



Viewers with the telescope



Jupiter with its 4 moons (bottom left of the left panel) and Saturn (on top right of the left panel, rings unresolved) captured through camera within the same field of view of the telescope. It is possible only when the conjunction occurs or when the angular separation between the planets is around 0.1 degree.

They appeared almost as “double planet” !

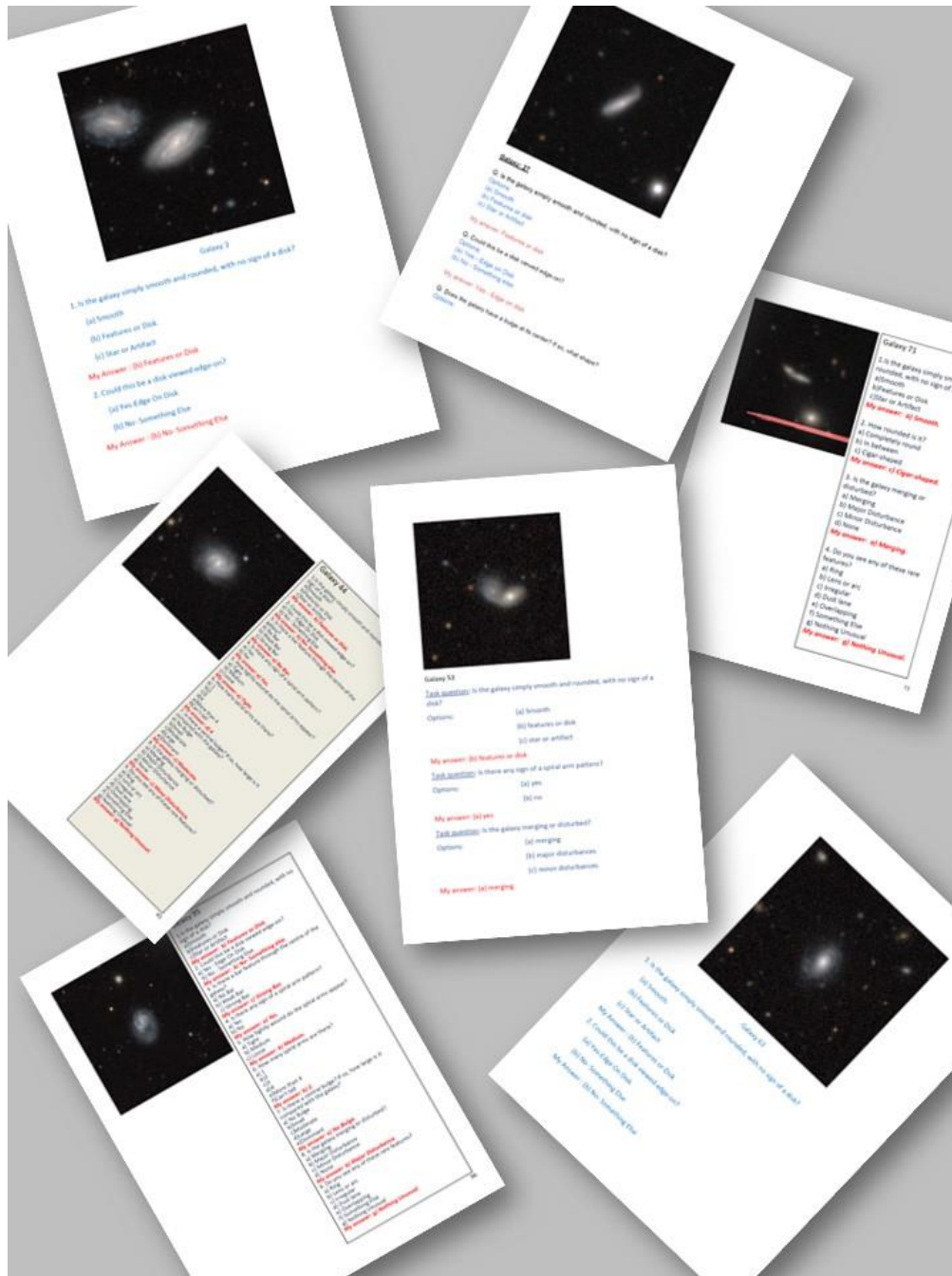
The Moon (right panel) was also captured during the event. The craters (visible in the image) attracted people.

(d) **An online citizen science program for college students and amateurs was organised during February 2022 for classifying 100 galaxies in the Zooniverse project. Three best classifications were awarded with prizes by the GUO group on 28th February, 2022.**

This is a new initiative of the observatory for promoting astronomy among masses through digital media and publicly available astronomy databases.



A group photograph of the citizen science program with the winners (front- 3rd, 4th and 5th position from the right).



Submitted documents on a few galaxies classified by the participants through Zooniverse portal.

(e) **A planet viewing program was organised at the observatory on 3rd November, 2022.** This was an observation and astronomy interaction program hosted for more than 20 students of department of physics, Pandu College, Guwahati. A 6 inch refracting and tracker telescope and a 5.5 inch Newtonian telescope were used for the observation of the planets and their moons. Research scholars of Astronomy & Astrophysics group presented scientific documents and visuals on the celestial objects.



Pandu college team interacting with research scholars (top panel) and a group photograph (bottom panel)

(f) A public event named as “*The Wanderers in the Gauhati University Sky*” was organized on 11th January, 2023 in order to view the three planets- Jupiter, Saturn and Mars. The target viewers were the University fraternity, children and local people. The team of astronomy and astrophysics research scholars projected the image of Jupiter by using a 5 MP color planetary imager and a projection facility.



Children observing through the eyepiece



Jupiter was projected through camera



Research scholars explaining the planets

(g) A planet and star viewing program was organised at the observatory on 16th February, 2023. This was an observation and astronomy interaction program hosted for 22 students of department of physics, Guwahati College, Guwahati. A 6 inch refracting and tracker telescope and the 12 inch Meade reflector telescope were used for the observation of Jupiter and its moons, Venus and two bright stars – Sirius and Betelgeuse. Research scholars of Astronomy & Astrophysics group presented scientific documents and visuals on the celestial objects.



Group photographs of the event near the observatory dome



Dr. Sanjeev Kalita illustrating the altazimuth coordinate system with 12 inch Meade reflector



Dr. Biman J Medhi illustrating the equatorial coordinate system with 6 inch refractor

(h) **A Citizen Science Hackathon was organised during July 2023.** The mission was to identify Milky Way type galaxies from the images released by space telescopes and to extract possible techno-signature of Extra-terrestrial Civilizations from a list of radio signals. Best performers were awarded prizes at the department premise.



The three winners (3rd, 4th and 5th from right) with the astronomy team (left panel) and the first prize winner holding the prize distributed by with Dr. Sanjeev Kalita (right panel)

Capturing the heavens

As routine practice, our PhD students in Astronomy & Astrophysics captured the images of the gas giants Jupiter and Saturn with the 5 MP Color Camera connected to the 6 inch telescope **on 1st November, 2023**. These images are used to by MSc students in their lab activity in observational astronomy such as measuring distance to the planets, their angular size, extent of Saturn's ring systems etc.



(Jupiter)



(Saturn with its ring)

Future aspiration

In order to sustain astronomy education and outreach we aspire for few more telescopes of larger optical size with recent technologies embedded. With large sized telescopes we gain resolution (clarity) and can view faint celestial objects which can be scientifically measured for science practice and then be brought to people at large for universe awareness.

We believe that with this the observatory will be able to improve science-society connection which is being pursued.
