

A REPORT ON

পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো...A Talk Series
(Theme 1: Astronomy and Astrophysics)
29 November, 2022 to 31 March, 2023



Organized by

Department of Physics, Kamrup College, Chamata
in collaboration with
Department of Physics, Dakshin Kamrup College, Mirza

Introduction:

পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো is an online talk series organised by Department of Physics, Kamrup College, Chamata in collaboration with Dakshin Kamrup College, Mirza, that brings researchers involved in cutting-edge research in Physical Sciences to the undergraduate and postgraduate students of colleges and universities in Assam. Speakers present their research, share their experiences in academia and guide the young audience members to exciting careers in science.

The talk series comprises of thematic talks, each theme consisting of six talks. The talks are uploaded to YouTube on the channel *পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো* (@pbituxitu). Certificates of attendance are disbursed at the end of a particular theme to the audience members.

Organising Team:

- 1) Himanshu Bora, Department of Physics, Kamrup College, Chamata
- 2) Dr. Nabendu Kumar Deb, Department of Physics, Kamrup College, Chamata
- 3) Dr. Pintu Barman, Department of Physics, Kamrup College, Chamata
- 4) Dr. Apurba Das, Department of Physics, Dakshin Kamrup College, Mirza

Website:

<http://www.ituxitu.in/>

Youtube Channel:

পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো (@pbituxitu)

<https://www.youtube.com/@pbituxitu/>

Theme 1: Astronomy and Astrophysics

There was a total of six talks on the theme of *Astronomy and Astrophysics*, the first talk being held on 29 November, 2023 and the sixth on 31 March, 2023. This report covers the details of the talks on this theme.

Coordinator
Internal Quality Assurance Cell
Kamrup College, Chamata

Principal
Kamrup College, Chamata
Principal
Kamrup College, Chamata

Talk 1

Talk Title:

Gravitational-wave Astronomy: Observations of Compact Binary Mergers

Speaker: Dr. Khun Sang Phukan

Designation and Affiliation:

Post-doctoral Fellow,
University of Birmingham, United Kingdom

Date: 29 November, 2022

Time: 3:00 pm IST

Platform: Google Meet

YouTube link: <https://youtu.be/5srPC3oT3Go>

Department of Physics,
Dakshin Kamrup College and Kamrup College
presents

পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো
... A Talk Series

Theme: Astronomy and Astrophysics
Talk 1: (online)

Gravitational-wave Astronomy:
Observations of Compact
Binary Mergers
by
Dr. Khun Sang Phukan
University of Birmingham, UK

Time: 3:00 p.m. IST
Tuesday, 29 November 2022
Meeting Link: will be provided after registration

Click <https://forms.gle/AoHtzMU6ZLkqT9APA>
Or scan QR code to register
Certificate will be provided to participants attending at least
three talks in the series
Contact: 99545 17951, 84866 09233

Convenors:
Dr. Apurba Das (DK College), Himanshu Bora (Kamrup College)
Co-convenors:
Dr. Bidyut K Das (DK College), Dr. Nabendu Deb & Dr. Pintu Barman (Kamrup College)

In the first talk of the series, Dr. Phukan talks about the recent happenings in the field of Gravitational Wave Astronomy and the exciting future prospects of this field.

Gravitational Waves: Signals we are looking for

Coalescing Binary Systems

- Black hole – black hole
- Black hole – neutron star
- Neutron star – neutron star
- White dwarf binaries (modeled waveform)

Transient/Burst Sources

- asymmetric core collapse supernovae
- cosmic strings (Unmodeled waveform)

Stochastic Background

- residue of the Big Bang
- incoherent sum of unresolved 'point' sources (stochastic, incoherent noise background)

Continuous Sources

- Spinning neutron stars (monotone waveform)

And possibly the unknown...

Dr. Khun Sang Phukan

The speaker covered the history of Gravitational Wave Astronomy as a distinct field of study in the Physics and Astronomy community, which also bagged the 2017 Nobel Prize in Physics. He discussed the efforts of the collaboration in achieving the first direct detection of black hole merger, as well as the future scientific plans of the collaboration. The talk was followed by an interaction session with the audience where the speaker offered valuable career related advice.

Talk 2

Talk Title:

Mysteries of the Universe: Observing a Black Hole

Speaker: Dr. Indu Kalpa Dihingia

Designation and Affiliation:

Post-doctoral Fellow,
Tsung-Dao Lee Institute,
Shanghai Jiao Tong University, China

Date: 4 January, 2023

Time: 3:30 pm IST

Platform: Microsoft Teams

YouTube link: https://youtu.be/NF_WHwNE-Zs

Department of Physics,
Dakshin Kamrup College and Kamrup College
presents

পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো
... A Talk Series

Theme: Astronomy and Astrophysics
Talk 2: (online)

**Mysteries of the Universe:
Observing a Black Hole**
by
Dr. Indu Kalpa Dihingia
Postdoctoral fellow at
Tsung-Dao Lee Institute -
Shanghai Jiao Tong University, China

Time: 3:30 p.m. IST
Tuesday, January 4, 2023
Meeting Link: will be provided after registration

Visit www.tlujtu.in or scan QR code to register
Certificate will be provided to participants attending at least
three talks in the series
Contact: 99545 17951, 84866 09233

Convenors:
Dr. Nabendu Deb & Dr. Pintu Barman (Kamrup College)

Co-convenors:
Dr. Apurba Das (DK College), Himanshu Bora (Garmur College)

In the second talk of the series, Dr. Dihingia talks about various aspects of black holes and trending research endeavors related to it.

Recent Observations (M87):

April 10, 2019 EHT collaboration March 24, 2021

Participants: JS (Apurba Sharma), FB (Fatima Begum), JS (Iyobhanta sharma), MR (Madhumita Roy), MR (MR. APURBA DAS), SK (Sikhamoni Kakati), LT (Ipponyon Thakura), AB (ANURU PICTI BO...), DR (Dr. Pradyot Raj...), AA (Abdul Aziz), ND (N. K. Das), +14

The speaker gave an outline of general relativity and briefly covered the theory of black holes. He then discussed the challenges of directly imaging a black hole and proceeded to discuss how the Event Horizon Telescope managed to produce the first direct image of a the supermassive blackhole at the centre of the M87 galaxy. The discussion session that followed the talk focused on the pathways that lead to Astronomy as a career and profession for aspiring students.

Talk 3

Talk Title:

What is in the Sky? Observing Stars, Galaxies and Exoplanets in the Era of Big Telescopes

Speaker: Debasish Hazarika

Designation and Affiliation:

Doctoral Researcher,
Institute of Astronomy and Planetary Sciences, University of Atacama, Copiapó, Chile

Date: 24 January, 2023

Time: 6:00 pm IST

Platform: Google Meet

YouTube link: https://youtu.be/oRs_mkWRkLo

Department of Physics,
Dakshin Karrup College and Karrup College
presents

পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো
... A Talk Series

Theme: Astronomy and Astrophysics
Talk 3: (online)

What is in the Sky?
Observing Stars, Galaxies and Exoplanets
in the Era of Big Telescopes
by
Debasish Hazarika
Doctoral Researcher at
Institute of Astronomy and Planetary
Sciences, University of Atacama,
Copiapó, Chile

Time: 6:00 p.m. IST
Tuesday, January 24, 2023
Meeting Link: will be provided after registration

Visit www.tuxitu.in or scan QR code to register
Certificate will be provided to participants attending at least
three talks in the series
Contact: 99545 17951, 84866 03233

Co-sponsors:
Dr. Apurba Das (DR College), Himanshu Bora (Karrup College)
Co-sponsors:
Dr. Nabendu Deb & Dr. Pintu Barman (Karrup College)

In the third talk of the series, Mr. Debasish Hazarika spoke about the exciting prospects of the ground-based and space-based big telescopes and presented a glimpse of the cutting-edge techniques used by observational astronomers to analyze the telescope data.

Exoplanet Detection

Transit Method
Planet can block a small fraction of observed light from its parent star as it passes in front of the host star.

- Most successful method in detecting maximum number of exoplanets so far (Deeg and Alonso, 2018)

Img Credit: <https://svs.gsfc.nasa.gov/>

Debasish Hazarika

The speaker presented a historical account of the development of Astronomy as a scientific field and discussed the sophistication it has reached in the present times. He discussed the details of a number of running and upcoming ground-based and space-based telescopes that are launched for observational astronomy in the optical and infrared domain. The discussion that followed the talk focused on applying for research positions both in India and abroad.

Talk 4

Talk Title:

The Radio Universe

Speaker: Dr. Barnali Das

Designation and Affiliation:

Post-doctoral Researcher,
University of Delaware, Newark, Delaware, USA

Date: 15 February, 2023

Time: 6:30 pm IST

Platform: Google Meet

YouTube link: <https://youtu.be/176aLzvJMcg>

The poster is for a talk titled "The Radio Universe" by Dr. Barnali Das. It is presented by the Department of Physics at Dakshin Kamrup College and Kamrup College. The talk is part of a series called "পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো ... A Talk Series". The theme is Astronomy and Astrophysics. The talk is online on Wednesday, February 15, 2023, at 6:30 p.m. IST. The meeting link will be provided after registration. A QR code is provided for registration. The contact information is 99545 17951, 84866 03233. The poster also lists the organizers: Dr. Apurba Das (DK College), Himanshu Bora (Kamrup College), and Dr. Nabendu Deb & Dr. Pintu Barman (Kamrup College).

Dr. Das talked presented an account of Radio Astronomy aimed at undergraduate students.

The slide is titled "How does the largest radio telescope compare with the optical telescopes?". It contains two bullet points: "The largest optical telescope has a mirror of diameter only ≈ 10 m." and "But even these huge radio telescopes fall behind the optical telescope in one very important aspect, which is resolution." Below the text are two images of galaxies. The left image is a low-resolution, pixelated view of a galaxy, while the right image is a high-resolution, detailed view of a galaxy. The credits are "Credits: NASA, ESA, CSA, and STScI". A small video window in the bottom right corner shows Dr. Barnali Das.

The speaker talked about the history of radio astronomy- how it was born, the unique challenges involved, and how those were overcome eventually to establish radio wavelengths as one of the most important probes of the universe. The speaker also discussed the key differences between optical and radio astronomy, both in terms of the techniques used, and the science that can be performed along with India's contribution to the field of radio astronomy. At the end, she talked about her research in Radio Astronomy and discussed various career pathways for students in radio astronomy.

Talk 5

Talk Title:

Gravitational Waves, Gamma-Ray Bursts, and more...

Speaker: Dr. Biswajit Banerjee

Designation and Affiliation:

Post-doctoral Researcher,
Gran Sasso Science Institute, L'Aquila, Italy

Date: 23 March, 2023

Time: 3:30 pm IST

Platform: Google Meet

YouTube link: <https://youtu.be/wubTld4fCIk>

Department of Physics,
Dakshin Kamrup College and Kamrup College
presents

পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো
... A Talk Series

Theme: Astronomy and Astrophysics
Talk 5: (online)
Gravitational Waves, Gamma-Ray Bursts, and more...
by
Dr. Biswajit Banerjee
Postdoctoral Researcher at
Gran Sasso Science Institute (GSSI)
L'Aquila, Italy

Time: 3:30 p.m. IST
Thursday, March 23, 2023
Meeting Link: will be provided after registration

Visit gssi.it or scan QR code to register
Certificate will be provided to participants attending at least
three talks in the series.
Contact: 99545 17951, 84866 09233

Convenors:
Dr. Pritu Barman & Dr. Nabendu Deb (Kamrup College)
Co-convenors:
Dr. Apurba Das (DK College), Himanshu Bora (Kamrup College)

Dr. Banerjee talked about the latest developments in Multi-messenger Astronomy, as well as the future prospects of this exciting field.

GRB 221009A the GRB of the century!

- highest fluence ever detected by Fermi/GBM
- high-energy counterpart starting after about 200 s from the Fermi/GBM trigger time
- LHAASO reported the detection of more than 5000 VHE photons (up to 18 TeV) within 2 ks from the trigger-time

Biswajit Banerjee

The speaker presented an account of multi-messenger astronomy- its present and future. He discussed how Gravitational Wave Astronomy, High-energy Astronomy, Optical/Infrared Astronomy and Radio Astronomy come together to uncover the greatest mysteries of the universe. At the end, he interacted with the audience and discussed the opportunities of scholarships and funded PhDs in India and Italy.

Talk 6

Talk Title:

An Overview of Radio Astronomy: brief history and its emerging future

Speaker: Dr. Wasim Raja

Designation and Affiliation:

Research Scientist,
CSIRO Space and Astronomy,
Marsfield, New South Wales, Australia

Date: 31 March, 2023

Time: 4:00 pm IST

Platform: Google Meet

YouTube link: <https://youtu.be/ThFm9J-RVRs>



Department of Physics,
Dakshin Kamrup College and Kamrup College
presents

পদার্থ বিজ্ঞানৰ ইটো-সিটো আৰু বহুতো
... A Talk Series

Theme: Astronomy and Astrophysics
Talk 6 (online)

An Overview of Radio Astronomy-
brief history and its
emerging future
by

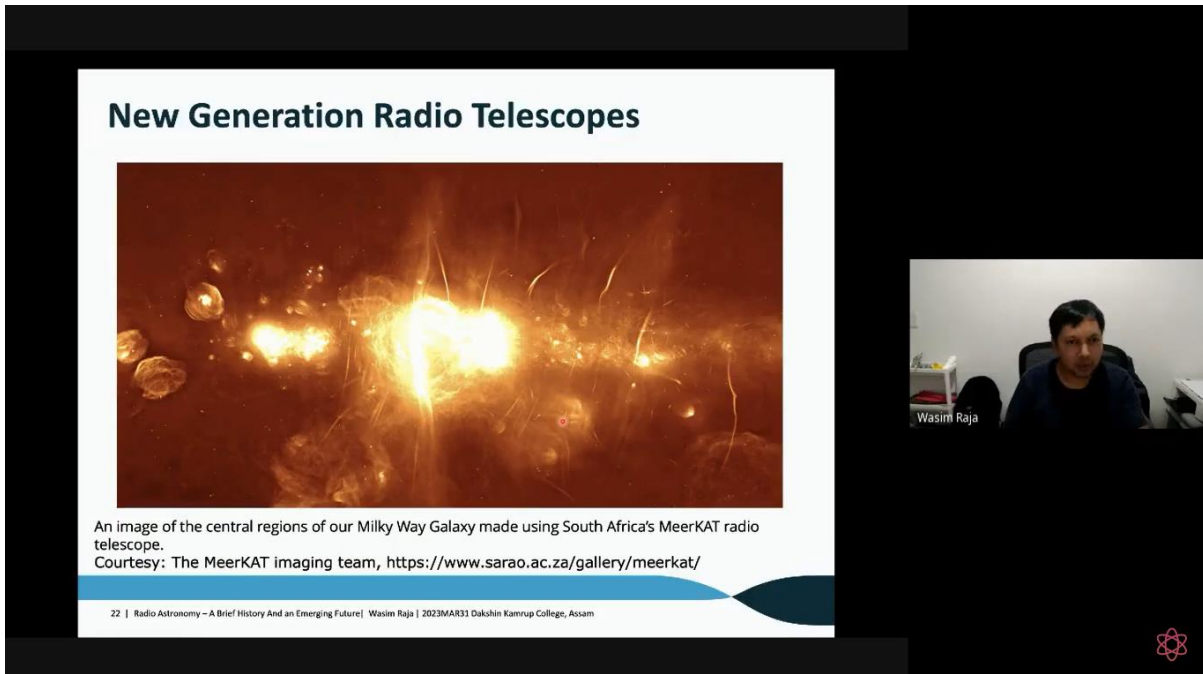
Dr. Wasim Raja
Research Scientist at
CSIRO Space and Astronomy
Marsfield, NSW, Australia

Time: 4:00 p.m. IST
Friday, March 31, 2023
Meeting Link: will be provided after registration

Visit www.tuxtu.in or scan QR code to register
Certificate will be provided to participants attending at least
three talks in the series
Contact: 99545 17951, 84866 09233

Convener:
Dr. Aparita Dita (DK College), Himantshu Bora (Kamrup College)
Co-conveners:
Dr. Pintu Barman & Dr. Nabendu Deb (Kamrup College)

In this talk, Dr. Wasim Raja talked about the history and development of radio astronomy as an exciting sub-field of Astronomy and presented an overview of the running big radio astronomy projects, as well as the upcoming ones.



New Generation Radio Telescopes

An image of the central regions of our Milky Way Galaxy made using South Africa's MeerKAT radio telescope.
Courtesy: The MeerKAT imaging team, <https://www.sarao.ac.za/gallery/meerkat/>

22 | Radio Astronomy - A Brief History And an Emerging Future | Wasim Raja | 2023MAR31 Dakshin Kamrup College, Assam

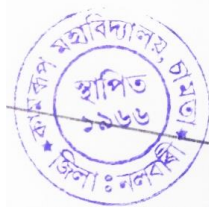
The speaker talked about the latest mega-scale projects in the field of Radio Astronomy after presenting a historical account of this field. He also touched upon the unique techniques used by radio astronomers and also discussed India's contribution and participation in this field. He also discussed his experience working in the largest science project till date i.e. the Square Kilometre Array project, and discussed various opportunities for students in this field.

Outcome of the Event:

E-certificates were distributed to the participating audience members at the end of the six lectures in the Astronomy and Astrophysics theme. There was positive feedback from the audience members who kept in touch with the speakers for science related queries and career advice. The talk series will continue with different themes in the future.



Coordinator
Internal Quality Assurance Cell
Kamrup College, Chamata



Principal
Kamrup College, Chamata.
Principal
Kamrup College, Chamata