

Overview of Horizon: The Physics and Astronomy club (Jan 19)

Where sky meets the eye

Club under Centre for Innovation

Indian Institute of Technology, Madras

Introduction

Astronomy club is the oldest club of IIT Madras. It was started in the early years of the institute out of a common interest in the campus community. In 2008, Centre For Innovation (CFI) was founded with the help from alumni funding. CFI is a student run innovation lab with international impact hosting over 14 clubs and competition teams. Astronomy club joined CFI at its inception. In 2016 the astronomy club was merged with the physics club, which was then under incubation and it was renamed as Horizon: the Physics and Astronomy club.

The club's structure comprises of a faculty advisor, two heads, strategists, coordinators, project members and volunteers.

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Vision

To increase awareness and interest about astronomy in the campus and local community.
To promote and support undergraduate research in the fields of astronomy and physics.



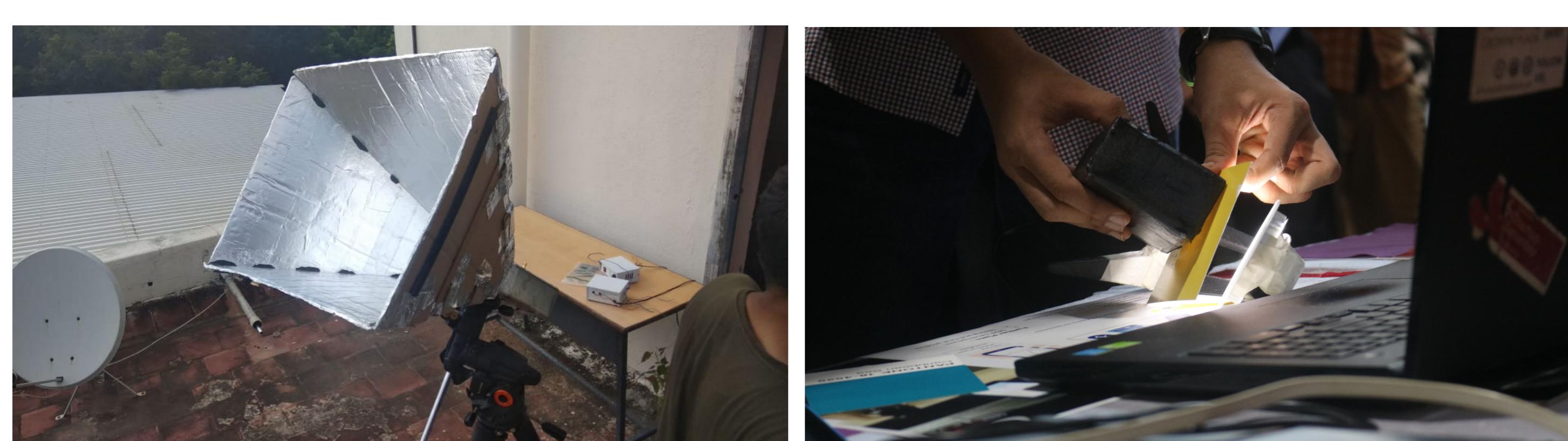
Club activities

Projects

Being a club under Centre For Innovation, projects forms a major vertical in the club.

Over the years we have finished a great number of student led projects. The projects are learning based, research based or competition based. Some of the notable recent or ongoing projects include quantum chess, spacecraft orbit simulator, exoplanet detection using machine learning, radio data analysis (see section 2.1), Tesla coil, muon detector, radio horn antenna, sounding rocket and hand-held smartphone controlled spectrometer.

Low cost Sounding rocket project is a part of an international competition called Intercollegiate Rocket Engineering Competition. The smartphone controlled hand-held spectrometer project has been converted into a start-up called 'InfyU', currently under pre-incubation.



Observation sessions

The club organises frequent observation sessions whenever sky clears up. These sessions are open to all of campus community and generally take place on the Humanities and Sciences Block's rooftop. Knowledge of astronomy and astrophysics is also shared at the time.

For special occasions such as eclipses or prominent meteor showers, we book a big ground in campus and host a grand scale event. A crowd of 1500 had turned up for the lunar eclipse on 31/1/2018.



Theory sessions

The club organises theory lectures in lecture halls. These sessions are delivered by club coordinators. Recent sessions include introduction to astronomy, introduction to special relativity, history of astronomy, birth and death of stars, eclipses et cetera.

In last three semesters we have had close to 20 sessions overall.

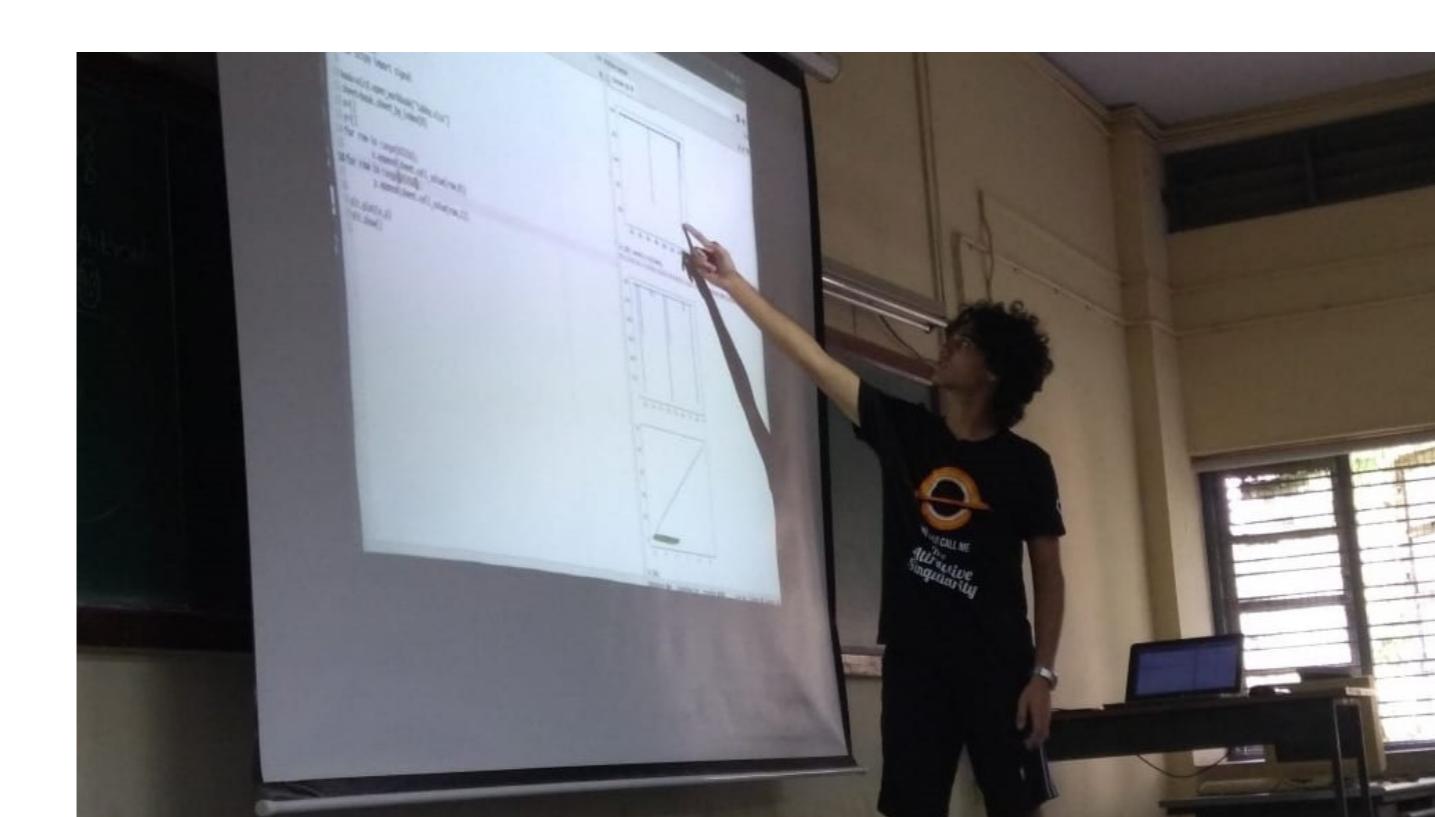
Popular lectures

The club invites distinguished scientists to deliver guest lectures at IIT Madras. Notable recent speakers include Prof. V Balakrishnan (accomplished theoretical physicist, professor emeritus at IITM), Prof. Bharat Ratra (accomplished theoretical cosmologist at Kansas state university), Prof. Avinash Deshpande (celebrated radio astronomer at Raman Research Institute), Prof. Sriramkumar Lakshmanan (cosmologist at IIT Madras).



Boltzmann sessions

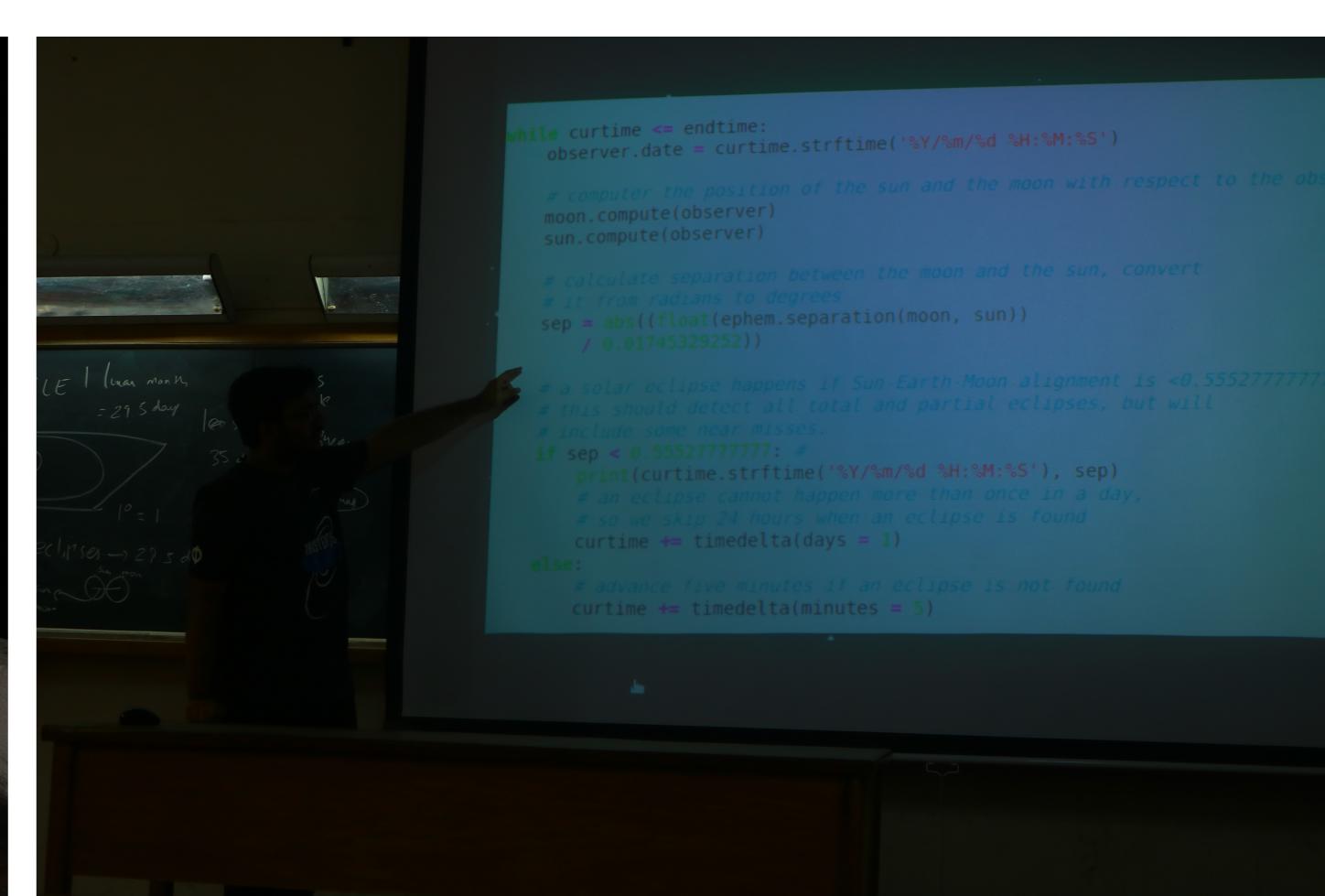
Started in 2004, the Boltzmann group is a group of students deeply interested in enjoying physics. These students meet weekly and discuss interesting theories/ phenomenon/ papers they have come across. Usually there is a presenter who presents the subject while the others contribute and discuss together. Recently we began discussing the summer research done by undergraduate students in the Boltzmann sessions.



Workshops

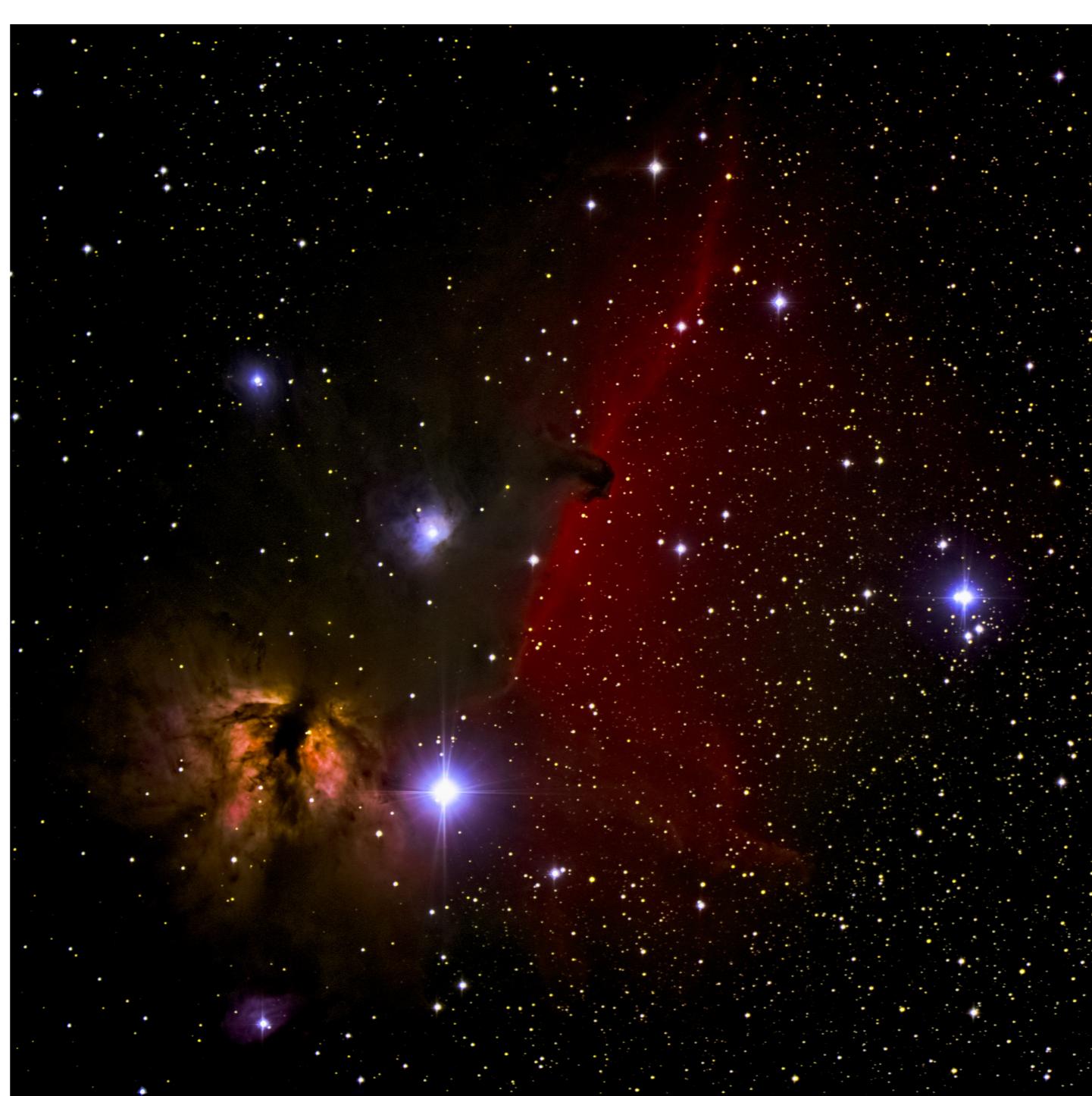
The club collaborates with Shaastra, the annual grand technical festival of IIT Madras to host workshop(s) each year. In 2019 we had a telescope handling workshop and eclipse prediction workshop. Earlier we had spectroscopy workshop.

We also have workshops on regular semester days.



Astrophotography

The club possesses the kit required for high quality astrophotography (see section 1). While Chennai sky limits the scope of astrophotography, we often go outside in darker areas in suitable times to take some good photographs. We also process these images and perform analysis.



Summer school

Every year along with the other clubs of CFI, the club organises typically a week-long summer school in astronomy/physics. In 2018 topics such as history and basics of astronomy, orbital dynamics, telescope handling and objects spotting and coding in astronomy were discussed in the summer school.



Competitions

The club hosts inter-hostel competitions in techsoc- technical society of IIT Madras. In the odd semester of 2018, we organised a computational competition where the participants were supposed to find the date after being provided the coordinates of prominent objects.

We hosted 2 competitions in 6th Inter-IIT tech meet held at IITM, namely; orbital simulator and exoplanet detection. The club participates in the astronomy related competitions in the Inter-IIT Tech Meet every year. Messier Marathon in 2017 and Star Cluster Identifier in 2018.

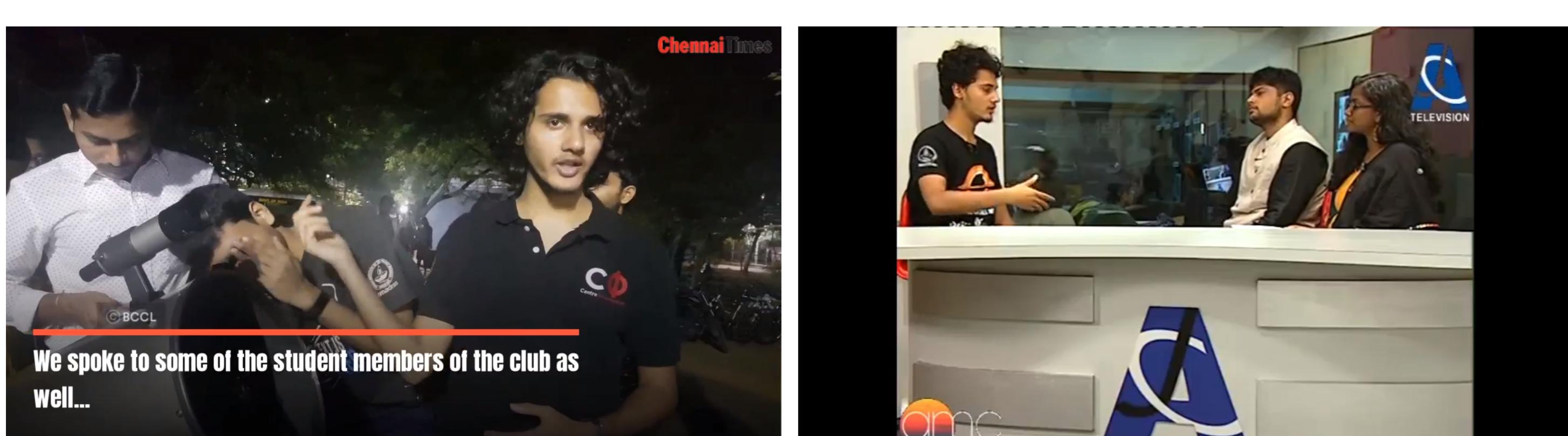
Apart from this the club participated in NASA SpaceApps challenge in 2017 and other miscellaneous competitions.

The club presently is preparing for the international Inter-collegiate Rocket Engineering Competition. We are building a low cost solid propellant sounding rocket for the same.



Club in Media

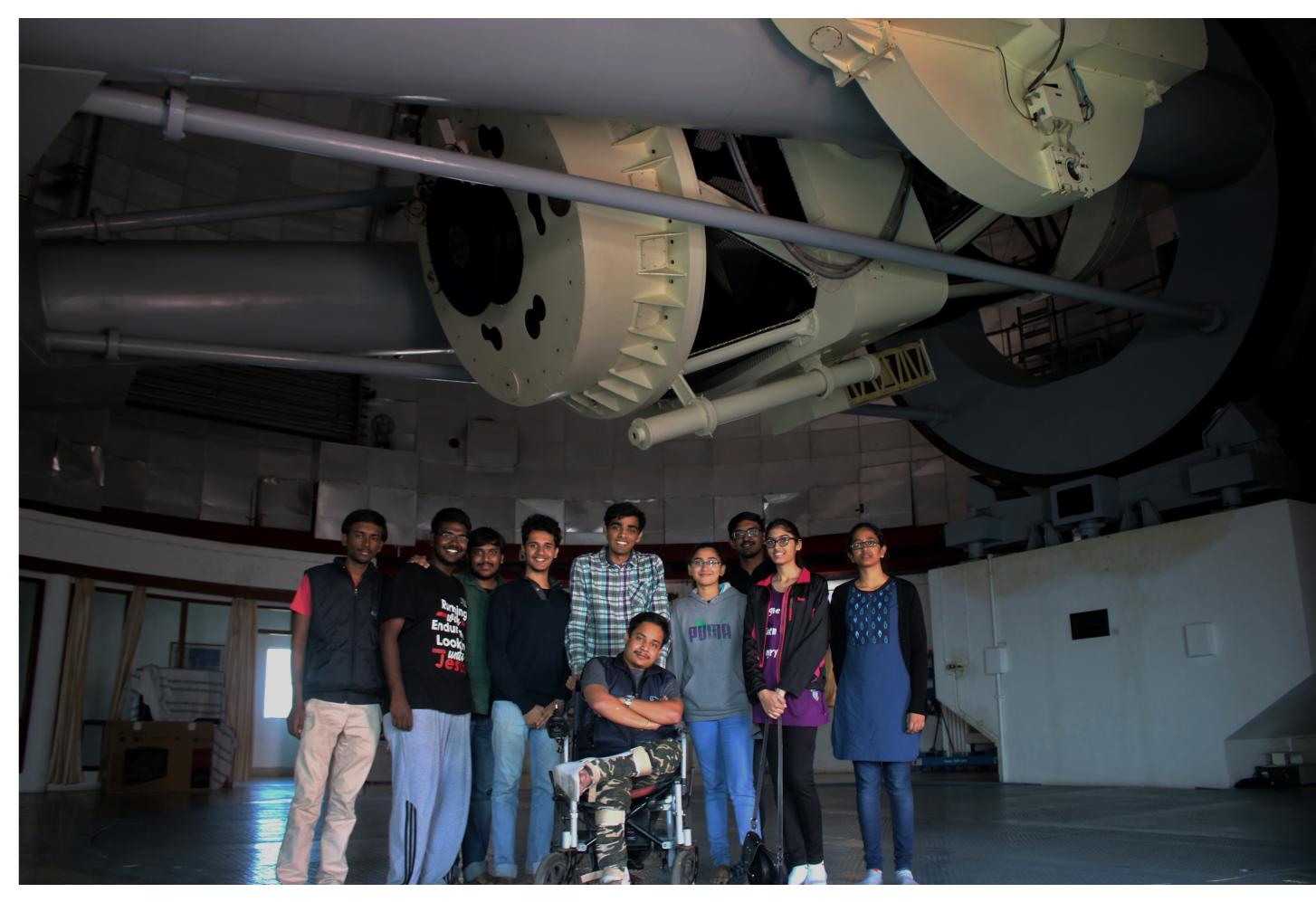
We have been in the media frequently. The Hindu covered our event on zero shadow day/subsolar point in April 2018. Club head Yashodhan M was interviewed by ACJ news live. We were covered by Chennai times Facebook page in Saarang 2019.



Trips

Every year we organise a trip to observatories/ dark sky areas/ research institutes. In 2018 we visited the Vainu Bappu Observatory under Indian Institute of Astrophysics. The SWAN team visited the Gauribidanur radio telescope observatory. Before that we went to Yelagiri mountains with a huge crowd.

Students aspiring to be club coordinators are taken with us. At Vainu Bappu Observatory we are given access to big motorised telescopes, and we also take our own telescopes with us. We also collaborate with IIT for Villages (iVil) organisation in IITM and conduct observation sessions in the villages of Tamil-Nadu.



Miscellaneous

To catch interests of freshers, the club involves them under mini-projects which are learning based DIY projects in astronomy/physics.

Club's Facebook and Instagram handles are quite active and we share popular science articles, news, our astrophotography, self made fact-cards with sources etc for science popularisation. The club sometimes screens cinemas such as 'The theory of everything'. The club also has a YouTube channel and soon plans to upload good content.

1 Club inventory

Over the years the club has built up its inventory. We have been granted a room on the Humanities and Sciences Block's rooftop.
We currently possess :

- 12" f/5 reflecting dobsonian telescope.
- 8" f/5 reflecting equatorial telescope.
- 6" f/5 reflecting alt-az telescope.
- 4 4.5" f/7 reflecting alt-az telescopes.
- Celestron automated mount (currently under repair)
- Various high quality lenses from 6mm to 32mm.
- Coloured filters, Moon filter, Solar filter.
- Canon 750D DSLR camera
- More items to be soon added.

2 Collaborations and faculty guidance

2.1 SWAN-Collaboration with RRI

The club has a direct collaboration with Raman Research Institute. Sky Array Watch Network (SWAN) is an ambitious large scale project undertaken by Raman Research Institute (RRI). The project aims to place radio telescope arrays all across India in prominent institutes. These telescope arrays will be manufactured and operated by undergraduate/postgraduate students.

Through radio interferometry, SWAN is proposed to get an angular resolution of microarcseconds and an effective aperture of the size of India.

The club has formed a SWAN team, which is directly mentored by Prof. Avinash Deshpande. This is a long term project.

2.2 Faculty guidance

Prof. Suresh Govindarajan is our faculty advisor. He is a theoretical physicist working in string theory at IIT Madras.

Prof. Avinash Deshpande is the mentor for the SWAN team. He is a radio astronomer working at RRI.

Prof. Sivarama Krishnan is the mentor for our spectrometer project. He is a physicist working in ultrafast lasers at IIT Madras. The project members work in his lab.

Dr. Suresh Mohan is our mentor in astrophotography. He is a medical doctor by profession and flamboyant in astrophotography.

3 Future plans

The club plans to expand in size and involve people from diverse backgrounds. The verticals in the club such as the SWAN team and IREC team will get more concrete and autonomous. The next club coordinators will have specific responsibilities such as concept and design, sessions, projects etc; these will evolve into departments.

The physics part of the club will also evolve into a motivated vertical. There is a need for an optical astronomy vertical in the club.

4 Points worth mentioning

We have observed over the years that people involved in the club go on to pursue careers in research, especially in astronomy.

Alumni from 2018 include Somayajulu Dhulipala (PhD scholar at Massachusetts Institute of Technology), Sunil Simha (PhD scholar at University of California, Santa Barbara), Vishal Upendran (PhD scholar at Inter-University Centre for Astronomy and Astrophysics), Shoy Ouseph (PhD scholar at Purdue university).

The club has been regularly in the media. Recently the Hindu covered our event on Zero-Shadow day, club head Yashodhan M was interviewed live on TV by ACJ news and so on.

A start-up named **InfyU** has emerged from a club project. The start up aims to manufacture and distribute the hand-held spectrometer they created.