RAD@home India Citizen Science Diplomacy at the International Astronomical Union Symposium 375, Nepal

Megha Rajoria[a,*], Ananda Hota[a,b]

[a]RAD@home Astronomy Collaboratory, India

[b]UGC-faculty, UM-DAE Centre for Excellence in Basic Sciences, University of Mumbai, India

**Corresponding author: megharajoria3@gmail.com*

"When you look at the stars and the galaxy, you feel that you are not just from any particular piece of land, but from the solar system" - Kalpana Chawla

The striking words of Kalpana Chawla give us a reason to believe that all of us are just a dot in the Universe. And we are separated by human-made borders, although astronomically, we belong to one of the solar systems. RAD@home Astronomy Collaboratory, which is India's first citizen science research project in astronomy, has gone beyond the Indian border and was part of the International Astronomical Union's (IAU) Symposium 375, "The multi-messenger chakra of blazar jets", held in Kathmandu, Nepal between 5-9 December 2022. Leading members of the Collaboratory presented their recent discovery of a black hole galaxy system RAD12(1-3) and also conducted an Astronomy workshop for Nepali citizens. The collaboratory has been active in India for almost a decade now. It enables the science-educated masses from across the country in discovering Radio Galaxies by training them with the support of various Indian institutes.



Figure 1. RAD@home Astronomy Workshop, an outreach event as part of IAU symposium 375, Kathmandu, Nepal

It was the first outreach program organised in Nepal under the guidance of Indian scientists and citizen scientists. As part of the IAU symposium, this outreach program aimed to teach astronomy to Nepali citizens (school students, college graduates and citizens) that can lead to publishable discoveries. The event was held in collaboration with the leading local astronomy agency, the Nepal Astronomical Society (NASO). The collaboratory was financially and logistically supported by IAU to conduct RAD@ home Astronomy Workshop as part of the symposium.

Nepal and India enjoy excellent bilateral relations. These relations found their roots in the same cultural, historical and matrimonial ties. Also, the religious similarity due to Hinduism and Buddhism plays a crucial role in keeping the two nations together. India's neighbourhood first policy, the treaty of peace and friendship (1950) between the two nations brings closeness.

India - Nepal shares immense potential in Science, Technology and Innovation cooperation. India is one of the largest providers of higher education which depicts its soft power diplomacy with neighbouring countries. And such institutional collaborations allow a bottom-up approach toward educational empowerment in our neighbouring countries.

In the long term, RAD@home plan to train Nepali students and citizens in astronomy and lead them toward astronomical discoveries using the Indian telescope facility and Nepali human resources. It will require collaborations and MOUs, which is a work in progress. Such collaborations, if executed well, can be mutually advantageous on several levels. RAD@home also taps into Nepal's STEM population and ensures scientific development of Nepalese. Access to Indian scientists will enhance scientific networks and educational interchanges in Nepal.

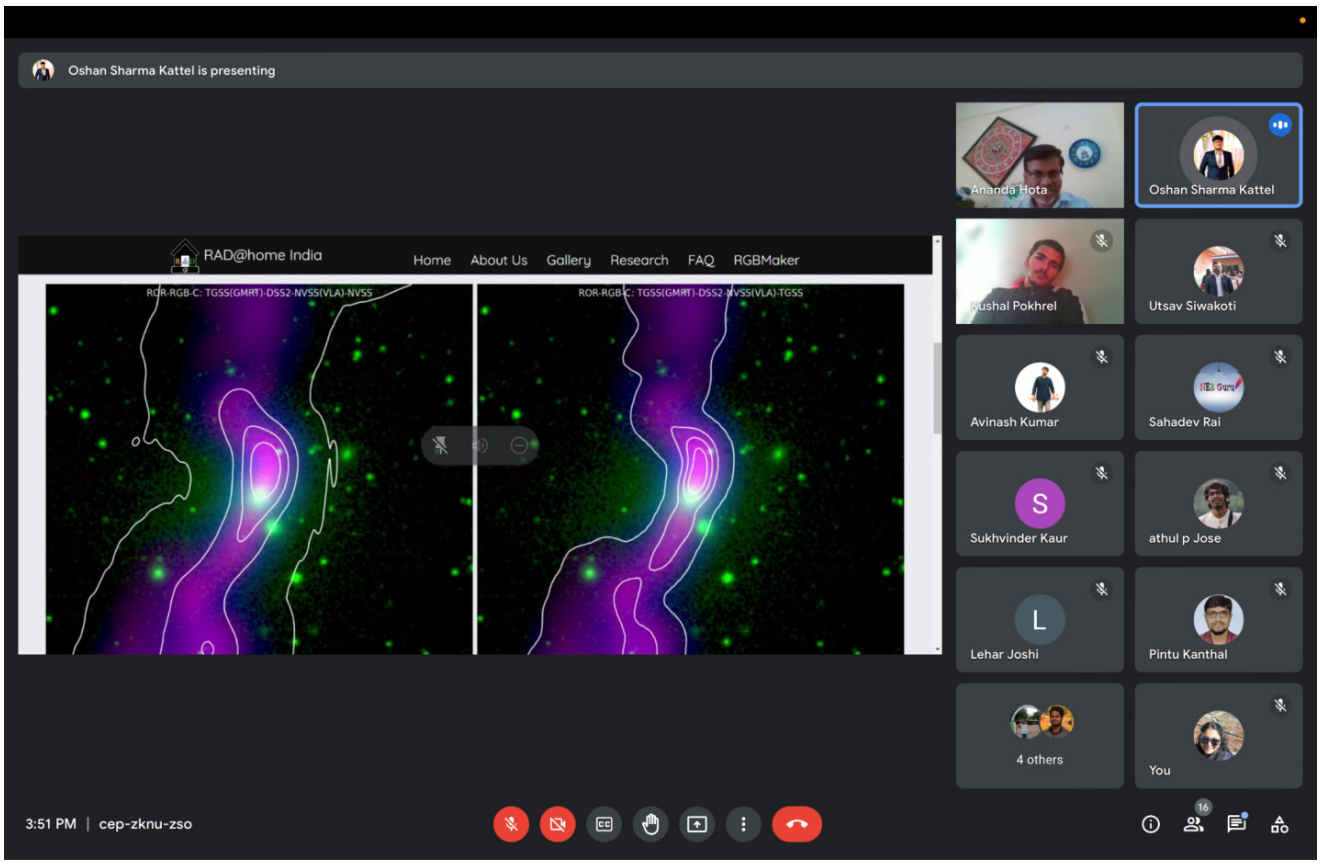


Figure 2. RAD@home online e-class during weekends training the Nepali citizens/students for citizen science research with RGB-image analysis

Moreover, they would be encouraged to participate in the ongoing GMRT Observation of Objects Discovered by RAD@home Collaboratory (GOOD-RAC) observational project at the Giant Metrewave Radio Telescope (GMRT) near Pune, which is primarily used by the collaboratory for its discoveries. It would benefit the Indian science community as well. Given it is a citizen science collaboratory, the discoveries will be from an Indian telescope with the Indian scientists' collaborations.

Such collaborations will increase our international footprints and the formation of a community that is working beyond borders. With the power of the internet and freely available tools, Nepalese are already getting trained through weekly e-classes. These e-classes empower them to understand the basics of multi-wavelength (UV-Optical-IR-radio) extragalactic astronomy by making Red-Green-Blue (RGB) images of the various types of galaxies with/without active black holes, using the RAD@home RGB-maker web-tool. It provides hands-on training to the participants aiming to become e-astronomers or trained citizen scientists. This way e-astronomers become part of the collaboratory and achieve co-investigatorship in GMRT research proposals and co-authorship in international publications. The plan is to expand this partnership to other nations within the SAARC countries.

If numbers are to be interpreted beyond adjectives, over 200 people had registered online for our outreach/educational programmes, and over 100 got the training during the in-person event. Nepali media also highlighted the participation of scientists in the IAU375 symposium from India, China, United States, Russia, Germany and United Kingdom. The RAD@home educational/outreach programme gathered huge public participation. Promoting the use of GMRT and AstroSat (the Indian space telescope) in people from SAARC countries will facilitate the growth of human resources, and the RAD@IAU-375 event is just the beginning of that era.

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