



LETTER TO THE EDITOR

Towards a BRICS Astronomy Network

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As emerging economies, the BRICS countries face a specific set of challenges, but are also uniquely placed to act on the opportunities that the fourth industrial revolution presents. With this in mind, and recognising that Astronomy is at the forefront of science and technology as a key driver of innovation, as well as an important catalyst of human capacity for the knowledge-based economy of the future, the BRICS Science, Technology and Innovation Inter-Ministerial Group selected, in 2015, Astronomy as one of five priority areas for STI cooperation¹.

Following on its mission to promote cooperation between the BRICS member countries in the field of astronomy, the BRICS Astronomy Working Group (BAWG) has developed a series of workshops in the past five years, which served as a platform to engage on policy issues and explore mechanisms for promoting BRICS cooperation in astronomy. As a culmination of this process, and a breakthrough outcome from the 2019 BRICS Astronomy Workshop in Rio de Janeiro² – whose scientific contributions are presented in this volume – a Flagship Astronomy Programme was built by BAWG as a major scientific enterprise, drawing on the strengths of all five BRICS partners,

and seeking to address in-country development challenges through strategic cooperation in astronomical research (Buckley et al. 2021).

The emergence of global data networks, coupled with tremendous advances in imaging technologies and automation, has led to an explosion in the detection of transient phenomena in astronomy. In the next decade, large-scale all-sky surveys across the electromagnetic spectrum will produce enormous amounts of data and provide unprecedented discovery opportunities. The field is now a driving force expanding the frontier of modern astrophysics. Multi-wavelength observations of all types of transient signals, from nearby Solar System objects to the most distant and energetic sources in the Universe, are revealing previously unknown phenomena and unlocking the nature of the extreme Cosmos. Thanks to their unique, worldwide geographical distribution, BRICS countries are well placed to take the global lead in this quickly evolving and compelling research field.

The Flagship Programme, named *BRICS Intelligent Telescope and Data Network*, will focus on the two key areas of wide-field multi-wavelength imaging sky surveys and detection of transient and time-variable

¹<https://www.bricsastronomy.org>.

²<http://lnapadrao.lna.br/eventos/brics-astronomy-working-group-2019>.

phenomena in the Universe, both of which are central pillars of modern astrophysics. It will develop a network of astronomical telescopes and an associated intelligent data network which is the enabler for the science programme. This will leverage existing and planned telescope and cyber facilities within the BRICS countries, aiming to establish a novel, global network of optical telescopes with the unprecedented ability to observe the entire sky continuously on a timescale of less than an hour, thus greatly increasing our ability to monitor the changing cosmos. New science in astronomy would not happen without strong synergies with multi-band instrumentation and big data science methods and systems, and the project brings together teams within BRICS to lead programmes in both areas in each partner country.

Framing development imperatives in the context of the United Nations Sustainable Development Agenda, the Flagship Programme will aim at a clear and direct impact in Quality Education (SDG 4), Industry, Innovation & Infrastructure (SDG 9) and Global Partnerships (SDG 17), while storing potential to advance other SDGs. It will also have a strong component of Capacity Building, particularly in relation to the 4th Industrial Revolution, through the training of students and young researchers.

The Collaboration plans to include academia and industry from partner countries and will focus on developing technologies of the Industry 4.0. An associated human capital development programme is designed to create a new generation of data-savvy scientists and engineers within BRICS, strengthening the scientific community in the Global South. Cross-disciplinary will be a key focus of the project, with the goal of accelerating

technological spin-offs and working actively to promote science for development.

Overall, the rationale beyond the initiative, which was formally proposed to the BRICS Inter-Ministerial Group at the 2020 BAWG Workshop organised by Russia, and whose full text is available from the BAWG webpage³, is that the depth and breadth of the Network will benefit the BRICS participants beyond what each could achieve as individual countries. Furthermore, with the support of the International Astronomical Union (IAU) – in particular through its Office of Astronomy for Development – and the United Nations Open Universe Initiative, lead by the United Nations Office for Outer Space Affairs (UNOOSA), the project is committed to the principles of open science and to improve the accessibility and sharing of astronomical data from many different facilities, thus aiming to strengthen the impact of the scientific programme in the training of young scientists and community outreach through a citizen science approach.

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³https://www.bricsastronomy.org/wp-content/uploads/2020/09/BRICS_ITDN_fin.pdf.

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