



9TH BRICS Young Scientist Forum Announcement and Call for Abstracts

Date: 18 – 22 November 2024

Venue: Sochi, Russia

FOR SOUTH AFRICAN YOUNG SCIENTISTS ONLY

1. Background Information

In accordance with par. 9 of the Brasília Declaration, adopted at the 2nd STI Ministerial Meeting (Brasília, March 2015), the proposal on the creation of a BRICS Young Scientist Forum (BRICS YSF) was adopted. The participants of the BRICS Young Scientist Forum should come from the scientific community and must be under 40 years of age.

During the VII BRICS Summit in Ufa, Russia BRICS countries decided to hold the Forum annually starting from 2016. The BRICS Young Scientist Forum is to be hosted by the country currently presiding in BRICS.

The Young Scientist Forum is one of the most effective platforms for expanding the network of international contacts among young scientists, including through the exchange of experience and best practices in supporting scientific research with the participation of young scientists and postgraduate students from the BRICS countries. It helps to promote initiatives and to establish an integral system of international cooperation among the future representatives of the science and innovation systems of the BRICS countries. These activities ensure the sustainable development of the BRICS cooperation, promote the development of the leadership position of the BRICS countries in the area of science, technology and innovation.

The 9th Young Scientist Forum will also host the 7th BRICS Young Innovator Prize - a special recognition of young talented entrepreneurs and researchers, whose outstanding innovations (inventions, products, applications, and services) will make a profound impact on the socio-economic, environment and conditions of life in BRICS societies. The BRICS Young Innovator Prize is a platform for BRICS young scientists and entrepreneurs to share their best practices in innovation and venturing. This initiative was introduced in 2018 during South Africa's BRICS chairship. Since then the BRICS Young Innovator Prize has been held 6 times successfully and it has become a significant event for BRICS youths to display their innovation talents and strengthen exchanges and cooperation.

In 2024 Russia is organizing the 9th BRICS Young Scientist Forum and the 7th BRICS Young Innovator Prize on 18-22 November in Sochi, Russia.



2. Objectives

The BRICS Young Scientist Forum aims at offering opportunities for young scientists to share home country experiences, incentives, constraints and opportunities for pursuing education, research and entrepreneurship in science, engineering and allied disciplines and to enumerate their career pathways and choices for advancement of skills and research competencies in view of STI emerging developments. The BRICS Young Scientist Forum is instrumental in cultivating a cohort of well-prepared, innovative thinkers who are poised to drive progress in their respective fields and contribute to the advancement of knowledge, science and society at large. The main objectives of the Forum encompass:

- enhancing interaction among young people of BRICS countries to consolidate knowledge in addressing common social problems through research and innovation;
- promoting skills and research development of young scientists of the BRICS countries under the age of 40;
- strengthening the BRICS role in the international arena in the field of science and technology with the help of creative young people who have the potential and capacity to accelerate innovation;
- encouraging the development of transnational research networks and partnerships that can drive innovation and advance scientific knowledge;
- strengthening BRICS STI and youth policies, enhancing the skills of talented young people and developing entrepreneurial principles.

3. Description of Thematic Areas of the BRICS YSF

The 9th BRICS Young Scientist Forum will comprise 4 parallel sessions on thematic areas:

- Nature-like and Convergent Technologies as drivers for sustainable future
- Environmental and Climate Technologies
- Digital Humanities
- Artificial Intelligence

The detailed description of the thematic areas are as follows:

A. Nature-like and Convergent Technologies as drivers for sustainable future

The intersection of nature-like and convergent technologies is poised to revolutionize the pursuit of a sustainable future. As the world grapples with the challenges of climate change, resource depletion, and environmental degradation, researchers are turning to nature-inspired solutions to inform the development of cutting-edge technologies. Nature-like technologies, which mimic the intricate patterns and processes found in nature, have already shown remarkable potential in addressing complex environmental issues. Nature-like and convergent technologies promise unprecedented and previously unimaginable possibilities. The basis of convergent technology is connecting the capabilities of modern digital technologies, such as microelectronics, with the creations of nature. Advances in electronics, nanoscience, bioscience, information technology, cognitive science, social sciences and humanities, and their integration, will allow us to develop previously unachievable human-centred utilities and services to improve our lives and leapfrog traditional impediments. These technologies are also referred to as frontier technologies since they are innovative, fast-growing, deeply interconnected and interdependent. The areas of nature-like technologies are interdisciplinary and may include, but are not limited to:

- technological reproduction of living nature systems, including nature-like energy systems;



- developing materials, devices, and systems that mimic the properties and functions of biological systems, such as self-healing materials, adaptive structures and responsive surfaces;
- neuromorphic artificial intelligence systems;
- cyber-physical additive manufacturing complexes;
- medical systems, including those based on regenerative technologies;
- forming key elements of anthropomorphic and group biorobotics;

As these nature-like and convergent technologies continue to evolve and intersect, they will undoubtedly accelerate our ability to address the pressing challenges facing our planet, ultimately paving the way towards a more resilient and sustainable future.

B. Environmental and Climate Technologies

It has been recognized that climate change is one of the most significant threats to the future of well-being and prosperity of our planet and all its inhabitants. Climate change affects ecosystems, society, food and water security, exacerbates disease outbreaks and increases natural disasters. It is imperative for science to focus its efforts on researching climate adaptation and mitigation technologies, such as:

- monitoring the state of the climate system based on Earth observation technologies and AI methods;
- enhancing ecosystem resilience and increasing sequestration potential of ecosystems;
- climate change mitigation technologies in information and communication technologies aiming to reduce their energy use and carbon footprint;
- reduction of greenhouse gas emissions related to energy generation, transportation and buildings, e.g. housing, house appliances or related end-user applications;
- climate change mitigation technologies related to wastewater treatment or waste management;
- capture, storage, sequestration or disposal of greenhouse gases.

As the technology continues to evolve, we can expect to see even more innovative applications, one of them being digital twin technologies. The digital twin is an emerging technology that builds on the convergence of computer science, mathematics, engineering, and the life sciences. Digital twins have the potential to revolutionize climate sciences in particular, as they could be used, for example, to create global-scale interactive models of Earth to predict future climate conditions over longer timescales.

Earth system digital twins require exceptional digital technologies to address the opportunities and challenges associated with extreme scale computing and big data. Higher-resolution simulations of the Earth system are based on models that are more realistic than those in the past; better ways to combine observed and simulated information from the Earth system; and interactive and configurable access to data, models, and workflows. More realistic simulations at the global scale could translate to information at the regional scale that better supports decision-making for climate adaptation and mitigation through tight integration and interaction with impact sector models.

C. Digital Humanities

Contemporary social science and humanities investigate human beings as complex subjects of social relationships, encompassing biological, psychological, political, and socio-economic aspects. They also examine the evolution of complex social and cultural systems, various types of social interactions and the means by which they are realized: linguistic, cultural, political, and economic mechanisms.



The last 20 years saw the revolution in modern social science and humanities associated with the use of big data analysis methods and new digital tools for mathematical modeling. Digitalization has introduced new highly efficient analysis methods not only for statistical data, but also for narrative sources, expanding the research toolbox and bringing the studies to a new level. Moreover, mathematical methods have enhanced linguistic research and created powerful technologies for machine translation and text processing. The use of electronic computer systems featuring elements of artificial intelligence for analyzing and modeling long-term development dynamics represents another area of studying. By analyzing long statistical series, one can build verifiable dynamic models, which opens up unique opportunities for the forecasting based on the combination of mathematical models and expert assessments of socio-economic development.

D. Artificial Intelligence

Artificial Intelligence is a field of research in computer science that deals with the development of programs and systems capable of performing tasks that require human-like intellectual abilities. These systems can perceive their environment, learn, make decisions, and tackle challenges that previously only humans could handle. Artificial intelligence finds applications across various domains such as medicine, finance, manufacturing, transportation, and more. Over the past few decades, the field of artificial intelligence has witnessed significant advancements, revolutionizing how we approach complex problems and tasks. With the advent of big data analysis methods and cutting-edge digital tools, artificial intelligence has enabled researchers to understand human behavior, societal structures, and cultural dynamics. By harnessing the power of machine learning algorithms, neural networks, and natural language processing, artificial intelligence has empowered machines to comprehend language, translate text, and process information at unprecedented speeds and accuracy. Moreover, the integration of artificial intelligence into computer systems has paved the way for studying long-term development dynamics through advanced analytical tools. By leveraging artificial intelligence capabilities to analyze extensive statistical data sets, researchers can construct dynamic models that offer insights into socio-economic trends and facilitate forecasting based on a combination of mathematical models and expert assessments. New steps in the field of Artificial Intelligence are related to the use of advanced computational tools, such as photonic and quantum co-processors.

4. Eligibility

This call is open to early career researchers/ scientists/ engineers/ technologists/ innovators/ science journalists-educators-science, science literacy and popularizing professionals/ specialists in translational aspects of research and technology integration in society to market, up to the age of 40 years who are South Africans. Applicants should meet the following criteria to participate:

- Be a South Africa citizen
- Be under the age of 40
- Must be a Doctoral student or Post-Doctoral Fellow or a young faculty member who has completed a PhD degree in the above-mentioned areas/ topics
- Have current ongoing research in the conference themes
- Commit to be present and active for the duration of the conference
- Submit an abstract that will be the basis for a presentation at the conference

Note: The chosen presenters are asked to not simply focus on their research but should engage with the theme(s) and answer its requirements. Presentations that address challenges pertaining to BRICS countries and provide possible recommendations are preferable. The conference format is a Forum, which is a discussion group, where ideas



related to a subject under discussion can be raised and evaluated on a (more-or-less) equal and informal basis.

Applicants who have already participated in previous editions of the BRICS Young Scientist Conclaves are NOT eligible to apply.

5. Forum Participation and Application

The Department of Science and Innovation (DSI) and the Academy of Science of South Africa (ASSAf) invite online submissions of abstracts for oral presentations on the themes indicated above. Further information about the forum will be circulated to successful applicants.

Access the online application at: [APPLY HERE](#) and submit your **CV (2 pages maximum)** to kholani@assaf.org.za by **10 September 2024**.

6. Funding support

International air travel related expenses (airfare, medical insurance, per diem as per ASSAf's rates) and ground travel in South Africa shall be met by the DSI whereas local hospitality i.e. food, accommodation and local transport in Russia will be supported by the Russian government for the entire duration of stay in Russia. We request those applying to be in possession of a valid Passport as well as obtaining a yellow fever certificate (You need to have the vaccine at least 10 days before travelling) for ease of logistics. Both documents will be obtained at own cost. This however does not mean automatic selection.

7. Call for Abstracts

Abstract Format and Submission

Abstracts should follow the following format:

- Must not be more than 300 words (excluding Title, Author and Institution) in the online application form
- Must be written in English
- The title must be in boldface, capital letters (lowercase) and centred
- The font must be Century Gothic 11 with A4 set up margins

Must include the following information:

- Title, Author(s), Institution(s)
- Name of first author should be underlined (Please do not underline co-authors)
- Institutional affiliations for all authors
- The superscript numbering must be in front of each initial and surname of each author

Where appropriate, the text may be structured using the following headings:

- Introduction or Objectives
- Discussion
- Recommendations
- Conclusion

General Conference Information

For any further information on the forum please contact:

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Application Deadline: 10 September 2024