

Citation: South African Institute of Physics (SAIP) Gold Medal 2022

The SAIP Gold Medal Award is made *for outstanding achievements in any of the following facets of any branch of Physics: research, education, technology and industrial development. As the highest standards are applied, the award is intended to be the greatest distinction that is conferred in South Africa for achievements in Physics.*

Professor Hendrik B Geyer



The 2022 SAIP Gold Medal is awarded to Prof Hendrik Belsazar Geyer for his fundamental and novel contributions in the field of non-Hermitian quantum mechanics, leadership in building the field of Theoretical Physics in South Africa and significant contributions to education and training of students.

Prof Geyer maintained the highest standard in research over a period spanning over 40 years, in which he made important contributions to the areas of nuclear and particle physics in particular and quantum physics in general. In a seminal 1992 paper, Prof Geyer and collaborators considered the requirements for setting up a consistent quantum mechanical framework for theories based on non-Hermitian Hamiltonians and understood how to properly define physical observables in such systems. The Gold Medal Award recognises his international pioneering work in establishing this new area of study in the field of non-Hermitian quantum mechanics and making important contributions to it over the course of his career. This topic has developed into a lively and rapidly growing experimental and theoretical field of research.

The paper by Musumbu, Geyer and Heiss in 2006 is cited as a benchmark example that explicitly demonstrates how the metric in a non-Hermitian system needs to be modified and how different metric operators lead to different types of physical systems with a different content of observable operators.

Prof Geyer held a B1 NRF rating and was the recipient of several academic accolades, including an Alexander von Humboldt Fellowship for research in Germany on two occasions, the Stellenbosch University Rector's Award for Excellent Research and in 2015, the Stellenbosch University Chancellor's Award. Prof Geyer is an elected fellow of the Royal Society of South Africa, the Academy of Science of South Africa and the African Academy of Sciences.

Prof Geyer was the chair of the Working Committee for the establishment of a National Institute of Theoretical Physics (NiTheP). In the development phase and founding years (2006 - 2008) he served as the NiTheP Interim Director. His leadership in this role established the Institute as an important body that makes the South African Physics community visible on international stage at the highest level, by providing an exchange mechanism and visiting programme for international scientists. NiTheP formed the solid basis from which the National Institute for Theoretical and Computational Sciences (NiTheCS) is currently being launched.

His leadership role is also evident from his Directorship of the Stellenbosch Institute of Advanced Studies (STIAS) from 2008 to 2020. In this capacity he championed interdisciplinary research and under his guidance significant financial contributions were sourced for the activities of STIAS. The quality and reputation of the STIAS programme is firmly established internationally. In addition to the above roles, his involvements with the broader intellectual community are also evident from his positions on the advisory board of the African Institute for Mathematical Sciences (AIMS), the STIAS Board of Directors, and the iThemba LABS Board of Directors. He served as an SAIP Council member for two terms.

Prof Geyer provided inspiring mentorship to many successful postgraduate students and he played a formative role in the renewal of physics, and particularly theoretical physics programmes at Stellenbosch University. He established a space and found the resources that allowed a generation of physics students to form a community with an enduring love for pursuits of the mind in general and theoretical physics in particular. Many members of the current South African theoretical physics community had their first encounter with the frontiers of physics thanks to the very influential series of international Chris Engelbrecht summer schools that Prof Geyer played an instrumental role in organizing. His postgraduate students worked on diverse topics on the frontiers of current research, as is evidenced by the excellent publication record. These students have careers as academics at various physics institutions in South Africa, and in the international finance and IT sectors. This bears testimony to the high quality education and supervision they received.

As an ambassador for science, Prof Geyer has a long history of involvement in radio panel discussions and a popular science column in *Die Burger* newspaper.

By awarding the 2022 SAIP Gold Medal to Prof Geyer, the SAIP bestows onto him the greatest distinction that is conferred in South Africa for achievements in Physics.