[Panda Lecture] Nobel Laureate Gerardus ’ t Hooft on How Differences Drive Innovation and Science Transcends Borders

Campus focus

The Department of Physics held a high-profile Tamkang Clement and Carrie Chair Lecture at 2 p.m. on November 14 at the Chang Yeo Lan Hall of the Hsu Shou-Chlien International Conference Center, inviting Dr. Gerardus ’ t Hooft, the 1999 Nobel Prize in Physics laureate and professor at the Institute for Theoretical Physics of Utrecht University, Netherlands, to deliver a speech titled “Education and Collaboration in Fundamental Science as Bridges Between Nations.” The event was livestreamed online. More than 310 faculty, students, and researchers from both within and outside the university attended, including members of Tamkang University, Tamkang University Golden Eagle Club President Chien-Hsiang Lin, and representatives from Academia Sinica, National Taiwan University, National Tsing Hua University, Tamkang High School, Bailin High School, and Blessed Imelda’s High School.

College of Science Dean Hung-Chung Hsueh introduced Prof. ’ t Hooft as one of the world’s most influential particle theory physicists. The mathematical model he developed, in collaboration with his advisor Professor Martinus J. G. Veltman, successfully predicted the interactions of subatomic particles and fundamental forces in the universe, laying the foundation for the revival of high-energy physics, an achievement that earned them the Nobel Prize. This year, Prof. ’ t Hooft was also awarded the Special Breakthrough Prize in Fundamental Physics. A short video was played to showcase his groundbreaking scientific contributions.

Vice President for Academic Affairs Hui-Huang Hsu noted that the lecture represented a major accomplishment of the Taiwan Bridges Program. Prof. ’ t Hooft is the second Nobel laureate to visit Tamkang University, underscoring TKU’s commitment to advancing international academic exchange. He expressed gratitude to Uwe Morawetz, Chairperson of the World Peace Foundation, for facilitating this exceptional academic event, and

announced that two more Nobel laureates are expected to visit TKU in the near future.

In his lecture, Prof. ' t Hooft used CERN as an example to illustrate that cutting-edge science requires large-scale collaboration across borders. In describing the Large Hadron Collider (LHC), he emphasized that thousands of scientists from more than 20 countries work together to explore the most fundamental physical laws of nature. At CERN, nationality, religion, and politics are set aside, while science becomes the universal language.

When discussing the value of diversity, Prof. ' t Hooft stressed that scientific progress emerges from the collision of different ideas, methods, and cultures. Some researchers focus on conducting challenging experiments, others design large-scale instruments, and still others engage in thought experiments in their minds. These differences are not obstacles, but rather the driving force behind scientific and civilizational evolution. He highlighted the contributions of international education institutes, such as Abdus Salam International Centre for Theoretical Physics (ICTP), founded by Nobel laureate Abdus Salam, which helped bring advanced scientific training to developing countries and cultivate major scientific talents. He further explained how the Netherlands fostered many Nobel laureates in the 20th century, thanks to statesman Johan Rudolf Thorbecke's modernization of the national education system, which laid the groundwork for sustained research competitiveness by providing universal access to training in language, mathematics, and science.

Turning to technological trends, Prof. ' t Hooft discussed the rise of India and China in science and technology, showing that rapid advancement is possible when scientific research is treated as a national priority. Doing so enhances national status, inspires young people to pursue science, and creates a positive cycle of innovation.

He then explored topics such as AI and quantum computing, expressing particular interest in the potential of Super-Human Artificial Intelligence (SHAI). He noted that AI's impact will far exceed current expectations and could even understand and simulate human emotions. He urged the scientific community to uphold a strong sense of ethics, stressing that if properly

guided, advanced intelligent systems could help the world prevent disasters and strengthen global security and cooperation.

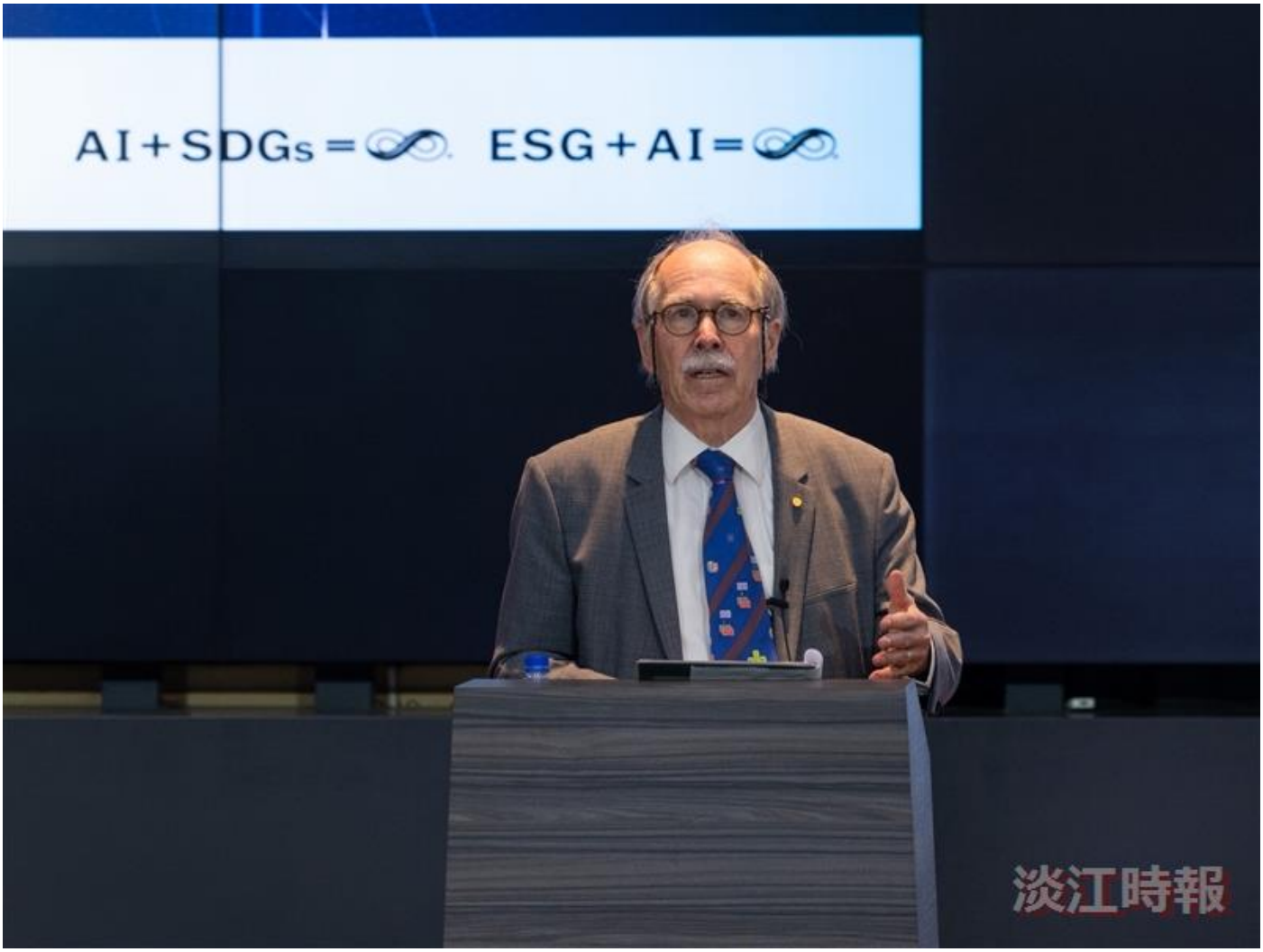
In conclusion, Prof. ’t Hooft encouraged students to be bold in questioning, actively engage in academic exchanges, and pursue science with openness, honesty, and precision. Science, he emphasized, is not only a path to truth but also a bridge connecting nations and addressing global challenges together.

“To become a member of a global community that speaks the language of science, one must develop true expertise in a specific field and have the courage to learn from mistakes.”

Earlier that day, Prof. ’t Hooft and his spouse, together with Chairman Morawetz, were accompanied by Vice President Hsu, Dean Hsueh, and Physics Department Chair Cheng-Hao Chuang to visit TKU President Huan-Chao Keh and Chairperson of the Board Flora Chia-I Chang, respectively. President Keh and Chairperson Chang extended their warm welcome and introduced the origin of the Tamkang Clement and Carrie Chair, presenting commemorative gifts including the Panda trophy, TKU’s 75th-Anniversary beer, and a special edition vase decorated with calligraphy from celebrated masters Chi-Mao Lee and Ben-Hang Chang, featuring TKU campus scenery and the school song lyrics.

Prof. ’t Hooft shared that the interdisciplinary nature of the lecture topic was a challenge for him, but he hoped it would help the diverse audience better understand the ideas presented. They then exchanged views on global education. President Keh emphasized TKU’s long-standing dedication to “Globalization,” hosting about 1,500 international students and employing many international scholars. Prof. ’t Hooft noted that the Netherlands has always had a global perspective, which encourages learning the languages of its trade partners—French, German, Spanish, and English. He revealed that he began the research that eventually earned him the Nobel Prize at a very early stage, but it still took more than 20 years before the achievement was recognized. He also pointed out the differences in development and scope between mathematics and physics, stating that today’s challenge in physics lies in a lack of technology, which requires

new innovations to drive breakthroughs. During his stay in Taiwan, he enjoyed cultural experiences arranged by TKU, including traditional therapy, Taiwanese tea, local cuisine, and beer, as well as a visit to the Beitou Hot Springs, which left a deep impression.

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Tamkang Clement and Carrie Chair
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Education and collaboration in fundamental science as bridges between nations.
Prof. Gerardus 't Hooft
Nobel Prize in Physics 1999
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