

Professor David J GROSS

Citation

Prof David J Gross, the 2004 co-winner of the Nobel Prize for Physics, is a man drawn to the probing of the secrets of the universe. He is also a man who is comfortable with paradoxical thinking. He says, for example, that “The more we know, the more aware we are of what we know not. Indeed, the most important product of knowledge is ignorance.” He has spent his whole life asking intelligently “ignorant” but big questions about the universe.

He is a scientist who is duly respectful of Nature, and to whom “Theorists can be wrong. Nature is always right”. When he delivered his Nobel lecture he did not forget to do the unusual thing of thanking Nature itself.

Prof Gross has lived a blessed life. Unlike other boys his age who dreamed of being firemen or cops, he had the advantage of knowing exactly what he wanted to be at the age of thirteen — a theoretical physicist. He is at his absolute best in asking the big and important questions. In fact his Nobel Prize was in recognition of the big questions he asked more than 30 years ago, except he had to wait that long for Nature’s and the Nobel Committee’s verdict.

Before Prof Gross made his important discovery, the field of theoretical physics was rich in experimentation but poor in theories. He was very much at home in speculative physics, and specifically in the pursuit of the enormous challenge of unifying all the forces of nature. In Prof Gross’s own words, “Of the four forces observed

in nature, only gravity and electromagnetism were well understood. The other two forces, the weak force responsible for radioactivity and the strong nuclear force that operated within the nucleus, were largely mysterious.” In the community of theoretical physicists, the general feeling was that the nuclear force is a phenomenon that was almost “unfathomable”. One scientist, Freeman Dyson, even predicted that the right theory would not come along “for the next hundred years.” Prof Gross defied that prediction and shortened the waiting period for this major theoretical breakthrough by three quarters of a century.

Prof Gross received his Nobel Prize in 2004, but the award was given in recognition for his solving in 1973 the “last great remaining problem of what has since come to be called the Standard Model”. In other words, he was honored for his discovery with his co-recipients of how the nucleus of atoms works. Physicists have always wanted to understand the fundamental forces of nature, and understand what the fundamental building blocks are. Thanks to Prof Gross and his two other co-winners, we now know what these fundamental building blocks are. His “Asymptotic Freedom” theory describes the physics of quarks, the matter from which we are “to a very large extent built”.

Prof Gross has the benefit of an international education. He received his bachelor’s degree in physics from the Hebrew University in Jerusalem and his PhD in physics from the University of California, Berkeley. This was followed by

a junior fellowship at Harvard University. He subsequently moved to Princeton University where he was eventually named Eugene Higgins Professor of Physics and Thomas Jones Professor of Mathematical Physics. In 1997 he became the Director of the Kavli Institute for Theoretical Physics and has been the Frederick W Gluck Chair in Theoretical Physics at the University of California, Santa Barbara. He has demonstrated that scientific leadership can co-exist with administrative stewardship.

From the mid-1980's onwards, prizes and awards landed on the good professor's lap almost every year. These honors, of which the Nobel Prize was the crowning glory, were international in scope. He was the recipient of the J J Sakurai Prize of the American Physical Society in 1986, the Dirac Medal from the International Center for Theoretical Physics in 1988, the Oscar Klein Medal of the Royal Swedish Academy in 2000, the Harvey Prize, Technion-Israel Institute of Technology 2000, the High Energy and Particle Physics Prize of the European Physical Society 2003, the Grande Medaille D'or de L'Academie des Sciences, France 2004, the Golden Plate Award, Academy of Achievement 2005 and the San Carlos Boromero Award, University of San Carlos, Philippines in 2008.

Similarly, he was almost yearly showered with honorary doctorates and honorary professorships beginning in 2000 from international universities such as Cambridge, Montpellier, Sao Paulo, Ohio State, and Zhejiang and Xian among others. He served on scientific advisory boards and review committees too numerous to name.

But the one honor that has remained unnamed was that one of the other two co-recipients of his Nobel Prize in Physics was his graduate student at

Princeton University. It was an indirect tribute to this great teacher who believes in collaboration, preferring to involve his students in his on-going work rather than working in isolation. It was no doubt excellent training for his students. When Prof Gross won the Nobel Prize, it was as if he had won it twice over.

The scientific world is indebted to Prof Gross for helping to solve a cosmic puzzle— understanding the dynamics of universe that has been expanding since the big bang. Before his standard model, we mortals could not go back further than 200,000 years after the big bang. Thanks to Prof Gross we can now probe the universe to very early times. What's more, as Prof Gross himself says, one of the most important implications of asymptotic freedom is the insight it yields into the unification of all nature's forces, including gravity. It takes a large soul and a stupendous intellect to provide this theoretical unification.

Mr Pro-Chancellor, on behalf of the Council of the Hong Kong University of Science and Technology, I have the great honor to present to you Prof David J Gross, Director of the Institute for Theoretical Physics and holder of the Frederick W Gluck Chair in Theoretical Physics at the University of California, Santa Barbara for the award of Doctor of Science *honoris causa*.