Dear Vice-Chancellor Professor de la Rey, dear Director of the Center for the Advancement of Scholarship Professor Ogude, dear Martha Boeyens, dear officials, colleagues, family and friends

It is nearly 25 years ago that I first came to South Africa, for a meeting at Malelane Lodge in the Krüger Park. Soon the first Indaba followed, and I have participated in all eight Indabas. I have been at a number of other conferences and visited many of the Universities and research institutions in South Africa. In 2001, as an Alexander von Humboldt / South Africa awardee, I was a guest in Jan Boeyens' lab for 2 months. I can not count how many times I have been in this beautiful country, I just know that this is the first time I visit here without meeting Jan Boeyens. I miss him, as a dear friend most of all but also as a scientist, teacher, scholar; as someone who tested his new ideas on me, someone who asked me questions about the importance and background of my new ideas, someone who questioned my science, and someone who asked me to dispute his ideas. We have spent much time together on his farm, talking about science (and other important features of life), and Jan has spent four sabbaticals in my lab at Heidelberg, where we had long discussions that also included my students. This is what I am now missing: an honest, intelligent, demanding and open partner for thorough scientific discussions. When Jan was honored three years ago at the African Crystallography meeting in Bloemfontein and I was asked to introduce him, I said that "Every community needs outstanding personalities, leaders, heroes if you want, giants. When the light goes on, someone needs to be on center stage, although the spotlight in your face might produce some shadow around you but someone needs to stick out his neck. Every community, South Africa, but also our scientific community, need giants, leaders, outstanding personalities. An important part of humanity is the strive for progress. Science, the search for knowledge, the desire to understanding the world around us keep our society alive. Mediocrity, ordinariness, normality lead to stagnation, standing still, the prevention of further development, evolution and progress. Our society needs outstanding scientists, colleagues who are more than normal, highly motivated, restless on the search for knowledge." For me as for many others, Jan was one of these giants. A brilliant scientist, a very enjoyable personality, a good friend. Supportive of and patient with young colleagues, and receptive for new ideas.

Jan Boeyens had degrees in Chemistry, Physics and Mathematics from the University of the Free State, and a doctoral degree from Pretoria. One of the results of his holistic view of science is that, in the early 1990's he founded the Center of Molecular Design at Wits University, where he held the chair for crystallography and theory. The Molecular Design center was one of the first of its kind in the word, a think tank in the Wits Chemistry Department and an internationally visible school for computational chemistry. The last decades have seen the publication of a seemingly never-ending series of Jan Boeyens monographies on theories for chemists – eight altogether, written in 12 years. Fundamental and based on a deep knowledge of physics and the history of quantum theory, texts such as these on the nature of matter, space, time and relativity, are creative, brilliant, different, novel and therefore disputable – disputable in a positive sense. As I have said before, scientific dispute is the breeding ground for development.

"The Quantum Gamble". The manuscript was finished just hours before Jan passed away – the week before, on his farm and at the Indaba, we were discussing his new book and he wanted to send it to me and wanted me to read and comment on it. Werner Gries had already discussed it with him in depth and he and others had suggested some minor changes, mainly regarding the structure and layout. When Jan's family, friends, colleagues and the Center of Advanced Scholarship decided to ask me to help publish this book, Jannie Pretorius was a great help: he sent me the manuscript in a form that allowed me to negotiate with a publisher. Springer was my first choice – Springer is internationally one of the top science publishers. Jan has published with Springer before and I know some of the senior editors. The little work I had to do - carefully reading the manuscript, negotiating a contract, get the book laid out and correcting the proofs - was done in less than a year. Since last September, "The Quantum Gamble" is available. A great book. Get it. Read it.

This book is different from Jan's earlier monographs. It is written for a general readership, for intelligent people with a high-school knowledge of science, especially for students and lecturers of undergraduate chemistry courses. When you start studying chemistry, a solid theoretical basis is of importance. Quantum theory clearly is an appropriate fundament. If used as the basis, you need to understand it. And to really understand quantum theory, a deep knowledge of its history is required. This is often ignored in teaching – among others because the lecturers do not know the history, and exactly here, "The Quantum Gamble" fills an important gap. Jan Boeyens tells us exactly how quantum theory developed, where it could have progressed along other

directions, and how this might have changed our current understanding of science.

I have had the luck that in my second year when studying chemistry at ETH Zurich, the teacher in my first course in theoretical chemistry was Hans Primas – a theoretician of the capacity of Jan Boeyens. Jan was deeply impressed by him but unfortunately they never had a chance to interact with each other – Primas passed away in 2014. About ten years ago I have invited Primas for a lecture to Heidelberg on "Do Molecules really exist?" Both Hans Primas and Jan Boeyens had uncommon ideas in quantum chemistry, and both are not appreciated enough for this. One of the first remarks in Primas' lecture course to us undergraduates was "Facts are invented not discovered" (this is a quote from his book on "Elementary Quantum Chemistry" and not related to current US politics – I think both Jan Boeyens and Hans Primas would have appreciated alternative facts but certainly not in the way Trump is misusing it). It is also for this reason – fact and fiction – that you all should read "The Quantum Gamble" and, more importantly, carefully try to understand it – this is possible for all of us. stablished scientists can also learn something new from this book. I have thoroughly enjoyed reading it and learnt a lot again. "The Quantum Gamble" combines many fundamental ideas of Jan's earlier monographs and as in his earlier books, "The Quantum Gamble" is based on a deep knowledge of history. Jan Boeyens has searched for all the sources (letters from Schrödinger, Einstein, Bohm, Born, Heisenberg and others), and he has put them in perspective with respect to each other and in respect to scientific publications and the current interpretation and understanding of quantum theory.

An important and central point of discussion in "The Quantum Gamble" is "Space, Time and Matter", specifically the description of matter and the curvature of space – important points where Jan Boeyens asks for a change of paradigms. Alexander von Humboldt said in the context of new ideas, the change of paradigms: "First people will deny a thing, then they will belittle it, then they will decide that it had been known long ago." This problem is not uncommon but with some of Jan Boeyens' most important and novel ideas in "The Quantum Gamble" this last step, leading to general acceptance still needs to be done – and be it under the condition that all was known. It is interesting to note here that Humboldt had a strong influence on Jan Boeyens because the Alexander von Humboldt Foundation has helped him to interact with international scientists (his five visits to Germany and mine to South Africa were supported by the Humboldt Foundation). The interesting conclusion of

the Chapter “Space, Time and Matter” is that “Physical science has no meaning without a clear understanding of matter…. A richer formalism of nonliner matter-wave mechanics in non-Euclidean, covariant, four-dimensional space-time is the minimum requirement.” This is one point where Jan Boeyens shows that what he presents is not only history but includes new ideas born out from a deep understanding of history. Therefore, the next chapter on “Matter-Wave Mechanics” starts with “The easy part … has now come to an end. The more onerous responsibility that flows from this is to indicate the direction in which an alternative approach should develop in order to produce a theory of matter,” and this idea is taken up again in the “Epilogue” of the book.

Chapter 3 of “The Quantum Gamble” is for me another central part of Jan Boeyens’ research, of the history of quantum theory, of its current development and its future but also on general social behavior. “What happened….” is a subtitle, why did quantum theory develop the way it did? It was a decision, an agreement between the authorities, Schrödinger, Einstein, de Broglie, Pauli, Born, Bohr, Heisenberg, the "who is who" in quantum theory, Nobel Prize winners, many of them strong personalities. Where were the decisions made? Where and when was the interpretation of quantum theory decided? How was the decision made, who were the strong men and who has lost out? Was it at the Solvay Conference 1927 in Brussels, by Bohr and Heisenberg in 1927 in Copenhagen or later in the USA? Jan analyzed reports of the Brussels Conference, the Copenhagen agreement, letters between several of the authorities, Nobel lectures, papers, reports and books, also including Karl Popper’s analysis in “Quantum Theory and the Schism in Physics”.

An important message in the “Epilogue” of “The Quantum Gamble” is that … “The purpose of this essay has not been to belittle the efforts of quantum pioneers but to caution against the construction of scientific theories by acclaim. By constant probing it is possible to expose possible flaws, even in the most reputable theory.”

One last word: one of Jan Boeyens’ most enjoyable and important assets was, and I have said this before, that he kept asking important questions, much in the sense also of Karl Popper who insisted that true ignorance is not the lack of knowledge but the refusal to acquire knowledge. To honor Jan Boeyens’ life also means not to fall into depression but accept his high standards and continue his scientific mission. Let’s do it – a thorough study of “The Quantum Gamble” is a good start.