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## Curriculum Vitae Professor Dr Samuel C. Ting

**Name:** Samuel Chao Chung Ting

**Date of birth:** 27 January 1936



**Research Priorities:** Elementary-particle physics, quarks, charm quarks, photon-matter interaction, J/psi particle, mesons, nuclear collisions, Alpha Magnetic Spectrometer (AMS), International Space Station (ISS), anti-matter

Samuel Chao Chung Ting is a US-American physicist. His research priorities include elementary-particle physics, the elementary particles known as quarks, and the interaction of photons and matter. He and the American physicist Burton Richter jointly received the 1976 Nobel Prize in Physics for their discovery of the subatomic particle J/psi.

### Academic and Professional Career

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| since 1977  | Professor, Thomas Dudley Cabot Institute, Massachusetts Institute of Technology (MIT), Cambridge, USA |
| 1969 - 1977 | Professor of Physics, MIT, Cambridge, USA   |
| 1967 - 1969 | Associate Professor of Physics, MIT, Cambridge, USA   |
| 1966 - 1969 | Team Leader, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany                                  |
| 1965 - 1967 | Assistant Professor in Physics, Columbia University, New York City, USA                               |
| 1964 - 1965 | Lecturer in Physics, Columbia University, New York City, USA  |
| 1963 - 1964 | Ford Foundation Fellow, European Organization for Nuclear Research (CERN), Geneva, Switzerland        |
| 1962        | PhD in Physics, University of Michigan, Ann Arbor, USA  |
| 1960        | Master of Science, University of Michigan, Ann Arbor, USA   |

1959            BSc in Physics and Mathematics, University of Michigan, Ann Arbor, USA

### **Functions in Scientific Societies and Committees**

since 1980      Member, Editorial Board, Mathematical Modeling  
since 1977      Member, Editorial Board, Nuclear Instruments and Methods  
since 1970      Associate Editor, Nuclear Physics B

### **Project Coordination, Membership in Collaborative Research Projects (selected)**

since 1989      Member, Collaborative Research Project “Third Large Electron-Positron (LEP) Collider experiment (L3) Collaboration”, European Organization for Nuclear Research (CERN), Geneva, Switzerland  
1996 - 2007    Member, Collaborative Research Project “Omni-Purpose Apparatus for LEP(OPAL)”, CERN, Geneva, Switzerland  
1996 - 2007    Member, Collaborative Research Project “Detector with Lepton, Photon and Hadron Identification (DELPHI)”, CERN, Geneva, Switzerland  
1996 - 2007    Member, Collaborative Research Project “Apparatus for LEP Physics (ALEPH)”, CERN, Geneva, Switzerland

### **Honours and Awarded Memberships**

2018            Theodore von Karman Lecture, American Institute of Aeronautics and Astronautics (AIAA), USA  
2017            Award for Compelling Results in Physical Sciences, National Aeronautics and Space Administration (NASA), USA  
2013            Doctor Honoris Causa, Gustavus Adolphus College, St. Peter, USA  
2013            Member, American Association for the Advancement of Science, USA  
2012            University Distinguished Professor, University of Hawai’i at Mānoa, Honolulu, USA  
2011            Erice Prize for Peace, World Federation of Scientists  
2005            Honorary Doctorate, Hong Kong University of Science and Technology, Hong Kong  
2005            Honorary Doctorate, National Central University, Taoyuan City, Taiwan  
2004            Honorary Member, Tata Institute of Fundamental Research, Mumbai, India  
2004            Honorary Doctorate, Rhine-Westphalian Technical University (RWTH Aachen), Aachen, Germany

2003	Member, Real Academia de Ciencias Exactas, Físicas y Naturales de España, Spain
2003	Honorary Doctorate, National Chiao-Tung University, Hsinchu, Taiwan
2002	Honorary Doctorate, National Tsing Hua University, Hsinchu, Taiwan
2001	Exceptional Public Service Medal, National Aeronautics and Space Administration (NASA), USA
1996	Forum Engelberg Prize, Forum Engelberg Prize Award Foundation, Zürich, Switzerland
since 1995	Member, Russian Academy of Sciences, Russia
since 1994	Member, Chinese Academy of Sciences (CAS), China
1993	Honorary Doctorate, University of Bucharest, Bucharest, Romania
since 1993	Member, Hungarian Academy of Sciences, Hungary
1991	Honorary Doctorate, M. V. Lomonosov Moscow State University, Moscow, USSR
1990	Honorary Doctorate, Columbia University, New York City, USA
1990	Honorary Doctorate, University of Science and Technology, China
since 1989	Member, Soviet Academy of Sciences, USSR
1988	DeGasperi Award in Science from the Government of Italy, Italy
1988	Gold Medal for Science and Peace from the city of Brescia, Brescia, Italy
1988	Honorary Doctorate, University of Bologna, Bologna, Italy
1987	Honorary Doctorate, Chinese University of Hong Kong (CUHK), Hong Kong, China
since 1984	Member, Pakistani Academy of Sciences (PAS), Pakistan
1978	Honorary Doctorate, University of Michigan, Ann Arbor, USA
since 1977	Member, National Academy of Sciences, USA
1977	A.C. Eringen Medal, Society of Engineering Science (SES), USA
1976	Nobel Prize in Physics (jointly with Burton Richter), Royal Swedish Academy of Sciences, Stockholm, Sweden
1976	Ernest Orlando Lawrence Award, Department of Energy's Office of Science, USA
since 1975	Member, Academia Sinica, Taiwan
since 1975	Member, American Academy of Arts and Sciences, USA
1963	Fellow, Ford Foundation, New York City, USA

## Research Priorities

Samuel Chao Chung Ting is an US-American physicist. His research priorities include elementary-particle physics, the elementary particles known as quarks, and the interaction of photons and matter. He and the American physicist Burton Richter jointly received the 1976 Nobel Prize in Physics for their discovery of the subatomic particle J/psi.

The J/psi particle is a heavy meson (subatomic particle). Mesons are created in the first phase following a nuclear collision, for example in particle-accelerator experiments. The J/psi particle owes its double name to the two researchers Ting and Richter, who worked independently of one another. Ting and his group used a particle accelerator at the Brookhaven National Laboratory, while Burton and his team used one at Stanford. Both discovered new particles when particles collided – and gave them different names: Ting named it the J-particle, Burton psi. The new particle retained both names and, compared to other mesons, proved extremely durable. This indicated a new type of quark – a charm quark – an elementary particle that had already been theoretically predicted. Thanks to the discovery of the new particle, Ting and Richter proved the quark's existence.

Furthermore, Samuel C. Ting discovered the anti-nuclear matter of the anti-deuteron. An anti-deuteron is an anti-nucleus which consists of a bound state of an anti-proton and an anti-neutron. This is the anti-particle of the deuteron, a form of heavy hydrogen. In addition, he and his research group successfully carried out a precision measurement of muon charge asymmetry, demonstrating for the first time the validity of the Standard Electroweak Model (Weinberg, Glashow and Salam). This model is based on a weak electromagnetic force that unites the gauge group  $SU(2) \times U(1)$ . The gauge bosons, initially massless, obtain their required mass via spontaneous symmetry breaking.

In recent years Ting has led and advanced the development of the Alpha Magnetic Spectrometer (AMS) at the particle research centre CERN. The AMS has been used at the International Space Station (ISS) since 2011, where it measures cosmic rays and, in particular, detects particles consisting of anti-matter (positrons).