

Professor Guralnik Awarded 2010 J. J. Sakurai Prize

Physics Professor Gerald Guralnik is one of six recipients around the world of the 2010 J.J. Sakurai Prize, awarded by the American Physical Society (APS) for outstanding achievement in particle theory. The citation from APS praises the six researchers for “elucidation of the properties of spontaneous symmetry breaking in four-dimensional relativistic gauge theory and of the mechanism for the consistent generation of vector boson masses.”

Endowed in 1984, the J. J. Sakurai Prize is considered one of the most prestigious prizes in physics. Several previous awardees went on to win the Nobel Prize in physics for work that was initially recognized by the Sakurai Prize.

The six co-recipients of the prize produced three independently formulated papers, published in *Physical Review Letters* in 1964, which examined the theoretical mechanism from three discrete perspectives. Each paper made a unique contribution. Collectively, they laid the foundation for the 1979 Nobel Prize in physics given for the unified electroweak theory. These papers also led to the prediction of the “God Particle” or “Higgs boson,” a particle which is the focus of research for many high energy physicists.

This award is “particularly gratifying”, notes Physics Department Chair Chung-I Tan, because it recognizes Guralnik’s “influential work on perhaps the most exciting current development in modern particle physics – the hunt for the so-called Higgs particle at the Large Hadron Collider (LHC) at the huge CERN Laboratory in Geneva. We are delighted by this timely recognition of Gerry's work.”

Guralnik recently published a paper, "The History of the Guralnik, Hagen and Kibble Development of the Theory of Spontaneous Symmetry Breaking and Gauge Particles" (IJMPA. 24, 2601, 2009), which examines the origins of the idea from its initial quantum field theory beginnings and the contributions spelled out by all three of the papers published in 1964. Those three papers showed how a massless particle could acquire mass through a process of symmetry breaking. It was a new and revolutionary idea which many distinguished physicists of that era found difficult to accept. Guralnik’s personal and accurate account led to renewed appreciation by contemporary physicists of this remarkable accomplishment in particle physics over four decades ago. Carl Hagen, one of the six Sakurai recipients, noted that “In part, this [award] may well be due to widespread discussion based on this July 2009 paper by Gerry Guralnik.”

Guralnik's current research is focused on quantum field theory, general relativity, and related computational methods. In addition, he applies his expertise in large-scale computations to Brown’s Ersatz Brain Project, which has the ultimate goal of designing a computer that simulates various processes of the brain.

A member of Brown’s physics faculty since 1967, Guralnik came to Brown from the University of Rochester, where he worked as a postdoctoral research associate. Prior to his stint at the University of Rochester, he was a postdoctoral research associate at Imperial College, London, where he conducted his prize-winning research under a National Science Foundation Postdoctoral Fellowship. Guralnik received his Ph.D. in physics from Harvard. He is a fellow of the American Physical Society and was an Alfred P. Sloan Research Foundation Fellow.

The Sakurai Prize will be formally presented on February 14, 2010, at the annual meeting of APS in Washington, DC. The \$20,000 award will be divided among Guralnik, Carl Hagen of the University of Rochester, Tom Kibble of Imperial College, Peter Higgs of the University of Edinburgh, and Robert Brout and Francois Englert, both of the Université Libre de Bruxelles. The scientific achievement of this elite group of theoretical physicists was historic and far-reaching for its contribution to an essential part of the theory of fundamental particles.