2008

2nd Annual Dasari Lecture
Takeshi Oka, University of Chicago
"H3+ in the central molecular zone of the Galactic center"

Takeshi Oka is the world leader in the infrared spectroscopy of molecular ions. Born in Tokyo in 1932, Professor Oka received his Ph.D. degree at the University of Tokyo in 1960. He was at the National Research Council of Canada from 1963 to 1981 and in 1975, he joined the prestigious Herzberg Institute of Astrophysics in Ottawa, working with the Nobel Laureate Gerhard Herzberg, where, in 1980, he measured the fundamental spectrum of the H_3^+ molecule. Shortly after his discovery of the H_3^+ spectrum, Professor Oka moved to the University of Chicago as Professor of Chemistry and Astronomy and Astrophysics to establish his own laboratory, affectionately known as the Oka Ion Factory. He was appointed Robert A. Millikan Distinguished Service Professor in 1989, and Emeritus in 2003.

The unifying theme of Professor Oka's studies is the understanding of the quantum mechanics and dynamics of fundamental molecular ions and their behavior in both laboratory and astronomical environments. His work has ranged over many oxygen, nitrogen and carbon-bearing molecular ions, but his name will always be especially associated with H_3^+.

As the simplest of all poly-atomic molecular ions, H_3^+ has proved a test-bed for chemical and spectroscopic studies, in the laboratory and in theory, which Professor Oka has spearheaded. H_3^+ has also proved a starting point for the techniques, experimental and theoretical, used by the Oka Ion Factory to measure and interpret dozens of molecular ion spectra over the past two decades. The H_3^+ ion is the main initiator of chemical pathways that give rise to complex molecules in the interstellar medium, the vast gas clouds that lie between the stars and out of which stars and planets form. Without the molecules derived from H_3^+ star formation would be inefficient. Professor Oka was the first to detect this molecule in the interstellar medium (in 1996), as a result of great perseverance and personal ingenuity. He has now detected H_3^+ in the Galactic center, raising issues about the composition and radiation environments there, which, in turn, are provoking new and exciting lines of research. Professor Oka also put together a coalition of scientists who, in 1989, discovered H_3^+ in the atmosphere of Jupiter.

Professor Oka has thus been a great contributor to the community of spectroscopy for three decades. His students can be found in the world's leading spectroscopy laboratories, and provide key personnel for industry and commerce. He is an all-round scientist, a student of Sanskrit, and a past runner in the Boston marathon. He has received many awards and honors, and was elected to Fellowship of the Royal Society (1984) and the American Academy of Arts and Sciences (1987), and was recipient of the Meggers Award of the Optical Society of America (1997). He was awarded an honorary degree from University College London (2004). In 1992 he

became the first Lord Lecturer at MIT. Through his close personal friendship with the eminent cosmologist and Nobel Laureate, Subrahmanyan Chandrasekhar, during the later years of the Dr. Chandrasekhar's life.