Biography of The Speaker

Douglas Osheroff

Nobel Laureate, Physics, 1996; Professor of Physics and Applied Physics, School of Humanities and Sciences, Stanford University

Douglas Osheroff is a Nobel Laureate in Physics, the J.G. Jackson and C.J. Wood Professor of Physics and the Gerhard Casper University Fellow for Undergraduate Education at Stanford University. His Ph.D. thesis work resulted in the discovery of three superfluid phases of liquid $^3$He.

Osheroff worked in the physical research division at Bell Laboratories for 15 years where he became head of the Low Temperature and Solid State Research Department. There, he worked in collaboration on these newly discovered superfluid phases of liquid $^3$He, as well as studied the nature of nuclear spin order in solid $^3$He and made the first observations of weak localization in thin disordered metallic films. Osheroff’s research still focuses on the properties of condensed matter near absolute zero. He was a member of the Columbia Accident Investigation Board, which determined the causes of the accident that destroyed Columbia on re-entry.

Osheroff has received numerous honors, among them, the Sir Francis Simon Memorial Award, Oliver E. Buckley Condensed Matter Physics Prize, MacArthur Prize Fellowship Award, and the 1996 Nobel Prize for Physics. Stanford University gave him their Walter J. Gores Award for Excellence in Teaching. He is a member of the American Academy of Arts and Sciences and the National Academy of Sciences. Osheroff earned his bachelor’s in physics at Caltech and his Ph.D. at Cornell University.

Abstract:

Based on the analysis of trapped gas in ice cores from Greenland and Antarctica, it is clear that the CO2 levels in our atmosphere now exceed the levels seen in the previous 400,000 years.

The level has risen sharply over the past 100 years, and correlates strongly with the burning of fossil fuels and destruction of our forests. At the same time, average ocean temperatures have risen about 1 degree Celsius, and there is growing evidence that this is having a profound impact on our environment, including the melting of much of the Antarctic ice shelf, ground water percolation through the Greenland ice cap, the melting of glaciers around the world at an accelerating rate, and the wide destruction of coral colonies.

In the next 50 years, largely due to development in India and China, we expect that the CO2 level in our atmosphere will again double, unless a concerted effort world wide is undertaken to limit our production of CO2 through conservation and a shift to alternate energy sources. While it is not easy to predict through the highly non-linear models the consequences of such high levels of CO2, it is clear that the time required to remove the gas from our atmosphere is long, and that whatever changes occur, they will not be easily reversed.

Probable changes include a rise in ocean levels as a result of the melting of fossil ice, shifts in climate, and stress and possible extinction of native species unable to adapt to the rapid changes. It is essential that we begin to confront this technological and economic challenge now.