Research team predicts the next big thing in the world of particle physics: supersymmetry

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(PhysOrg.com) -- A better understanding of the universe will be the outgrowth of the discovery of the Higgs boson, according to a team of University of Oklahoma researchers. The team predicts the discovery will lead to supersymmetry or SUSY — an extension of the standard model of particle physics. SUSY predicts new matter states or super partners for each matter particle already accounted for in the standard model. SUSY theory provides an important new step to a better understanding of the universe we live in.

Howard Baer, Homer L. Dodge Professor of High Energy Physics in the OU Department of Physics and Astronomy, and his colleagues were the first in the world to show what SUSY matter might look like at colliding beam experiments. Baer has published books and papers on SUSY; most recently, a paper on implications of recent evidence of the Higgs boson at the Cern Large Hadron Collider for SUSY theory.

Baer has studied SUSY for 25 years and believes the discovery of the Higgs boson will open the door to a whole new world of super particles. The Higgs boson is the standard-model particle that gives all other particles mass. According to Baer, “Finding the Higgs boson is like looking for a needle in a haystack, but the Higgs boson is only the tip of the iceberg of SUSY matter.”

“With SUSY,” says Baer, “we are talking about the next level of the laws of physics. If there is SUSY, then we will find super partners, which will provide a new perspective for the origin and evolution of the

universe. At that point, we can say we are on the road to a much deeper comprehension of nature."

SUSY may be the next big step in understanding cosmology and the origin of dark matter, the so-called invisible particles that dominate the matter density of the universe. OU has several theorists and experimentalists working to validate SUSY theory. Baer has developed computer code over a 25-year period that calculates super particle masses and production rates for the LHC located at Cern in Switzerland.

The LHC is already looking for SUSY, but has had no success so far. Atlas and CMS experiments will provide new analysis on SUSY in March 2012. In the next three years, the LHC will double the energy required to prove the SUSY theory—another important step in understanding the universe as we know it today.

Provided by University of Oklahoma

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