

# UNIVERSITY OF TEXAS AT DALLAS - DEPARTMENT OF PHYSICS

## PHYSICS COLLOQUIUM

<http://www.utdallas.edu/physics/lectures/info/>

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Wednesday, October 17, 2007; 4:00-5:00 PM  
Kusch Auditorium, FN 2.102

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### Precision Studies in High Energy Collider Physics

**Professor Bennie Ward**

*Department of Physics, Baylor University*

Since Glashow, Salam and Weinberg received the Nobel Prize in 1979 for the successful unification of the weak and electromagnetic forces using non-Abelian gauge theory ( $SU_{2L} \times U_1$ ), there has been a systematic effort to find the limits of their unified electroweak theory and its companion non-Abelian gauge theory of the strong force, *QCD*, whose special behavior at very short distances was discovered by Gross, Wilczek and Politzer already in 1973. This effort hinges on precision tests of the quantum loop predictions of these theories. In this colloquium, I will present the interplay of the attendant precision theory of quantum loop corrections and the corresponding experimental precision measurements that have made the Standard Model (the union of these two theories) a firmly established part of the fundamental laws of physics and that are in preparation for future exploration of the limits of this Standard Model at the Large Hadron Collider and at the proposed International Linear Collider. Some implications for quantum general relativity will also be discussed.

**About the speaker:** Dr. B.F.L. Ward is a Distinguished Professor of Physics at Baylor University. He received his B.S. degrees in Mathematics and Physics from MIT and his Ph.D. in Physics from Princeton University. His research interests are in Theoretical Particle Physics, particularly in Standard Model phenomenology. Dr. Ward has found a new way to analyze classes of quantum gravity graphs (which may otherwise have been expected to produce divergences) thereby providing a fruitful new approach to the long-standing problem of quantizing gravity. This work has recently received an honorable mention in an international essay competition conducted by the Gravity Research Foundation that sought "the most pioneering essays in research on the subject of gravitation, its theory, application or effects."