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Standard Model Signals and New Physics Constraints

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Fermilab's Tevatron is the energy frontier machine for high energy physics experiments. It remains the best place to observe electroweak scale processes, both those that are expected in the context of the standard model and those arising from as yet undetermined new physics. The two general purpose experiments at the Tevatron, CDF and D0, have now collected and analyzed over 2 fb^{-1} of data. We use a wide variety of final states to search directly for new particles and interactions, and to look for indirect evidence of new physics. This requires a precise understanding of standard model processes, many of which are interesting in their own right. Some low-rate standard model processes are just coming within reach of experimental observation. In this talk, I will summarize the challenges, analysis techniques, and results from CDF and D0 for a range of topics, including single top production, diboson production, signature-based searches, and constraints on supersymmetric models and other beyond the standard model physics.