Graduate Physics Seminar
20.12.2010 from 4 PM
University of Nova Gorica, Ajdovščina site
Auditorium

ElectroWeak symmetry breaking without a Higgs boson at the LHC

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Abstract:

One or more heavy spin-1 fields may in principle replace the Higgs boson in keeping perturbative unitarity up to a few TeV while at the same time accounting for the electroweak precision tests. I shall discuss the viability of generic Higgs-less models at low energies when compliance with electroweak precision observables and unitarity constraints at the LHC energy scale are imposed.

Our recent analysis shows that a consistent description can be achieved even with a single light vector state $m_V < 0.5$ TeV. Introducing an additional axial-vector state, m_V is still predicted to be light (below 1 TeV) while typical values of m_A span over the window $1.2m_V < m_A < 1.4m_V$. Then I shall consider the Drell-Yan production of heavy vector and axial- vector states in generic Higgsless models at hadron colliders. I will focus in particular on the l^+l^-, WZ, and three SM gauge boson final states. In the l^+l^- case, present Tevatron data already restricts the allowed parameter space of these models. In particular, it disfavors the single vector resonance scenario. The two and three gauge boson final states (especially WZ, WWZ, and WZZ) are particularly interesting in view of the LHC, especially for light axial-vector masses, and could shed more light on the role of spin -1 resonances in the electroweak precision tests.