

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
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Seminar Notice

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Theoretical Physics Department

Title:	Heavy-Lifting of Gauge Theories By Cosmic Inflation
Speaker:	Soubhik Kumar, Department of Physics, University of Maryland, USA
Date:	January 2, 2018 (Tuesday)
Time:	11:30 a.m.
Venue:	Theoretical Physics Seminar Room (C406), 3rd Floor, Centenary Building, IACS
Abstract:	Future measurements of primordial non-Gaussianity can reveal cosmologically produced particles with masses of order the inflationary Hubble scale and their interactions with the inflaton, giving us crucial insights into the structure of fundamental physics at extremely high energies. We study gauge-Higgs theories that may be accessible in this regime, carefully imposing the constraints of gauge symmetry and its (partial) Higgsing. We distinguish two types of Higgs mechanisms: (i) a standard one in which the Higgs scale is constant before and after inflation, where the particles observable in non-Gaussianities are far heavier than can be accessed by laboratory experiments, perhaps associated with gauge unification, and (ii) a "heavy-lifting" mechanism in which couplings to curvature can result in Higgs scales of order the Hubble scale during inflation while reducing to far lower scales in the current era, where they may now be accessible to collider and other laboratory experiments. In the heavy-lifting option, renormalization-group running of terrestrial measurements yield predictions for cosmological non-Gaussianities. If the heavy-lifted gauge theory suffers a hierarchy problem, such as does the Standard Model, confirming such predictions would demonstrate a striking violation of the Naturalness Principle. While observing gauge-Higgs sectors in non-Gaussianities will be challenging given the constraints of cosmic variance, we show that it may be possible with reasonable precision given favorable couplings to the inflationary dynamics.

All are cordially invited to attend the seminar