DEPARTMENT OF PHYSICS

High Energy Physics Seminar

Friday, November 17, 2017 @ 4:00 PM
Room 4138
Physics Research Building

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Hosted by Prof. Stuart Raby

CP Violation from a Symmetry Principle

Understanding the origin of CP violation offers a new starting point to address the Standard Model flavor and strong CP puzzles. Group theoretically, the physical CP transformation of the SM is a special outer automorphism ("symmetry of symmetry") of the theory and I will explain what that means in detail. Equipped with this, we can understand that there can be other outer automorphisms beyond the usual C,P or T transformations. On the other hand, certain classes of symmetries do preclude the existence of CP transformations altogether in which case CP is violated by calculable ("geometrical") phases. I will explain this based on two explicit example models: In a special three Higgs doublet model the presence of outer automorphisms beyond CP allows for a super simple calculation of VEVs, a reduction of the size of the parameter space by a factor of 24, anticipating the boundaries of the RGE flow and most interestingly, the prediction of quantized CP violating phases. A second explicit example is a "Scalar-QCD" type of model in which the SU(3) gauge group is spontaneously broken to the small discrete subgroup T7. In this case CP violation originates with quantized phases while the theta angle is protected at 0.

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