



Theory Seminar

Christopher Kelly of **Columbia University**



"Progress Towards the First Measurement of Direct CP-Violation in $K \rightarrow \pi \pi$ Decays From First Principles"

The direct violation of the CP symmetry, an essential component for describing the asymmetry between matter and antimatter in the universe, was first observed in the late 1990s in the decays of a kaon into two pions. Since that time the experimental measure of CP violation in this channel has become quite precise. However until recently it has not been possible to calculate this quantity directly from the Standard Model as it receives large contributions from QCD in the hadronic regime in which perturbative calculations are not possible. This is unfortunate because these decays are highly sensitive to Beyond the Standard Model sources of CP violation, and a comparison between the Standard Model prediction and the measured value could potentially lead to the discovery of new physics. Now, using lattice QCD, and combining decades of theoretical and computational developments, such a calculation has become feasible.

The RBC & UKQCD collaboration have recently published the first calculation of the $K \rightarrow \pi \pi$ decay amplitude in the $I=2$ channel. I will discuss the techniques used for this calculation and then describe our progress towards the more difficult task of measuring the decay in the $I=0$ channel, which represents the last hurdle before a full ab initio value for the measure of CP-violation can be obtained.

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