



Πανεπιστήμιο
Κύπρου

ΤΜΗΜΑ ΦΥΣΙΚΗΣ

Το Τμήμα Φυσικής του Πανεπιστημίου Κύπρου
σας προσκαλεί την

Παρασκευή, 31 Μαΐου 2019, ώρα 13:00
στην αίθουσα B228, στο κτίριο 13 στην Πανεπιστημιούπολη

στην παρουσίαση της Διδακτορικής Διατριβής του Simone Bacchio

"Simulating maximally twisted fermions at the physical point with multigrid methods"

We develop multigrid methods for simulating lattice QCD with physical values of the quark masses within the twisted mass fermion formulation. We employ the developed multigrid both for the calculation of the quark propagators needed for the extracting of hadronic matrix elements as well as to accelerate the simulations of gauge field ensembles with two degenerate flavors of the light quarks ($N_f=2$). For the computation of the quark propagators we improve the performance by two orders of magnitudes as compared to conjugate gradient enabling to perform the analysis of key nucleon observables. For the simulation an order of magnitude speedup was achieved at the physical light quark mass. Extension of the multigrid approach is carried out for including the simulation of dynamical strange and charm quarks where one needs the calculation of the square root of the non-degenerate twisted mass operator. We solve the square root with an optimal rational approximation and employ multigrid methods in the solution of the shifted linear system. In such a way we accelerate simulations with $N_f=2+1+1$ flavors of fermions all tuned at their physical value. These methods are used for the production of four ensembles, two with $N_f=2$ and two with $N_f=2+1+1$, which are state-of-the-art worldwide. We use them for obtaining quantitative description of hadron structure and observables that can probe new physics beyond the standard model. The physical results presented include low-lying hadron masses, meson decay constants, and pion and nucleon electromagnetic form factors.

Για περισσότερες πληροφορίες παρακαλώ επικοινωνείτε: Τμήμα Φυσικής, τηλέφωνο: 22892820