

Strong Interactions

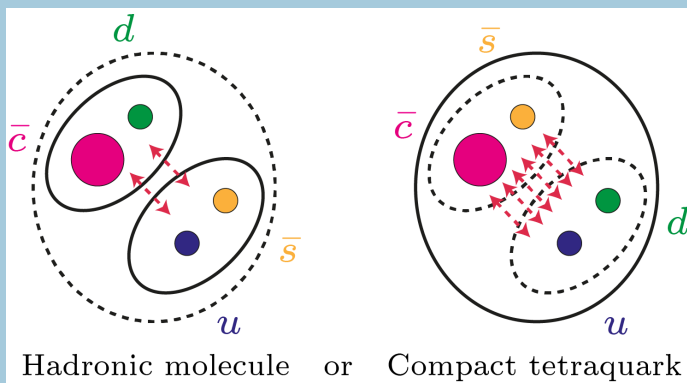
INFN gruppo 4 Roma 1

Strong interactions, governing the dynamics of quarks and gluons, are described by Quantum Chromodynamics (QCD), a gauge quantum field theory with an exact $SU(3)$ symmetry.

Strong interactions are strong, and so QCD has a rich phenomenology which requires advanced techniques to be studied.

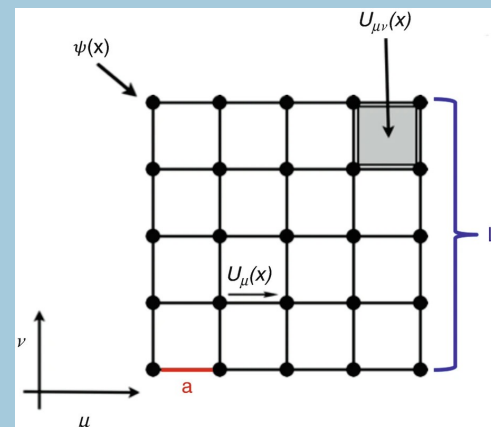
Exotic hadrons

Many heavy resonances have been discovered experimentally, and they seem to be hadrons with 4 or 5 quarks. Understanding their structure and properties is an open problem



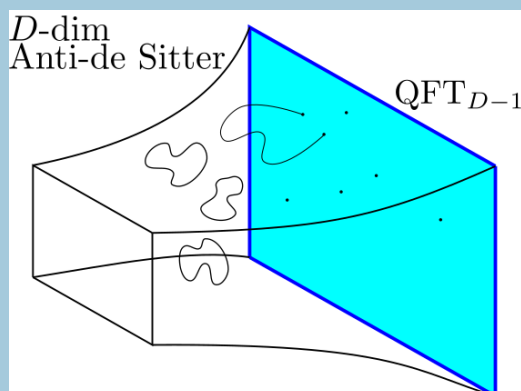
Non-perturbative lattice QCD

Perturbative techniques fail when the coupling is large. Non-perturbative computations can be carried out numerically in a discretised spacetime



Large- N QCD and string theory

Formal developments of quantum field theories allowed to discover interesting properties of gauge theories and links to gravity. Potential for a deeper understanding of our universe and for new computational techniques



Precision LHC phenomenology

Discovering tiny signals of new particles requires a very precise knowledge of Standard Model processes. High precision QCD predictions are thus mandatory, and require sophisticated computational techniques

