

Nuclear Physics: Lattice QCD

Objective: Understand strong interactions that bind quarks and gluons together.

Implications: Explain new phases of matter that might form in heavy-ion collisions (in LHC, for example).

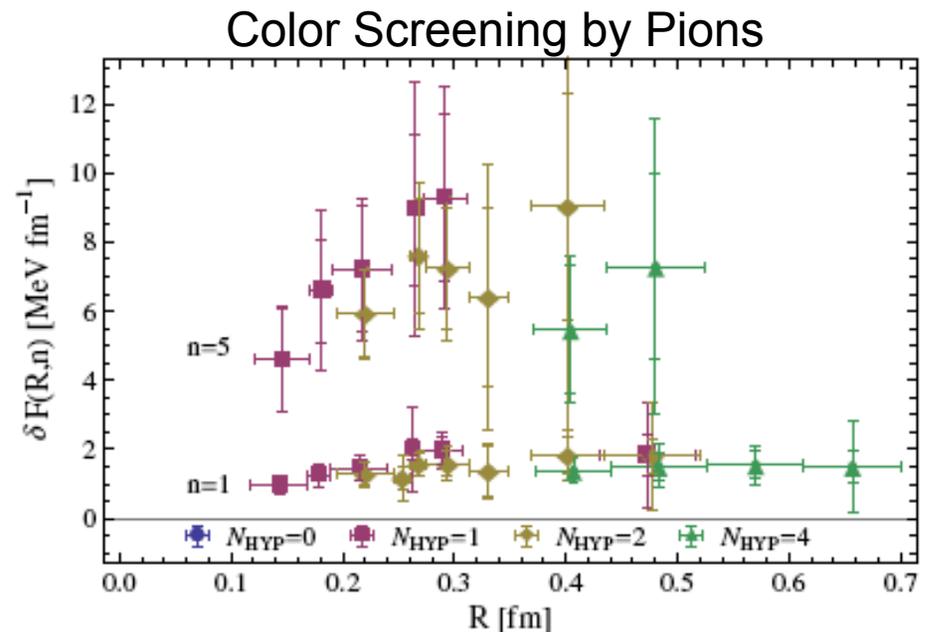
Accomplishments: Cited by DOE in 2010 Congressional Budget Request as one of 3 major accomplishments in Theoretical Nuclear Physics in 2008/9.

- First ever QCD calculations of:
 - Three-body force between hadrons.
 - Screening of color forces between quarks by a background of hadrons.
 - a three-baryon system.

NERSC:

- QDP++/Chroma on Franklin; 10M+ hours
- Mostly 4k cores per job

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Contribution to the radial quark-antiquark force at two pion densities. The attractive force is found to be reduced by the pion screening. This is a first step toward a more systematic exploration of hadronic effects with lattice QCD.

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