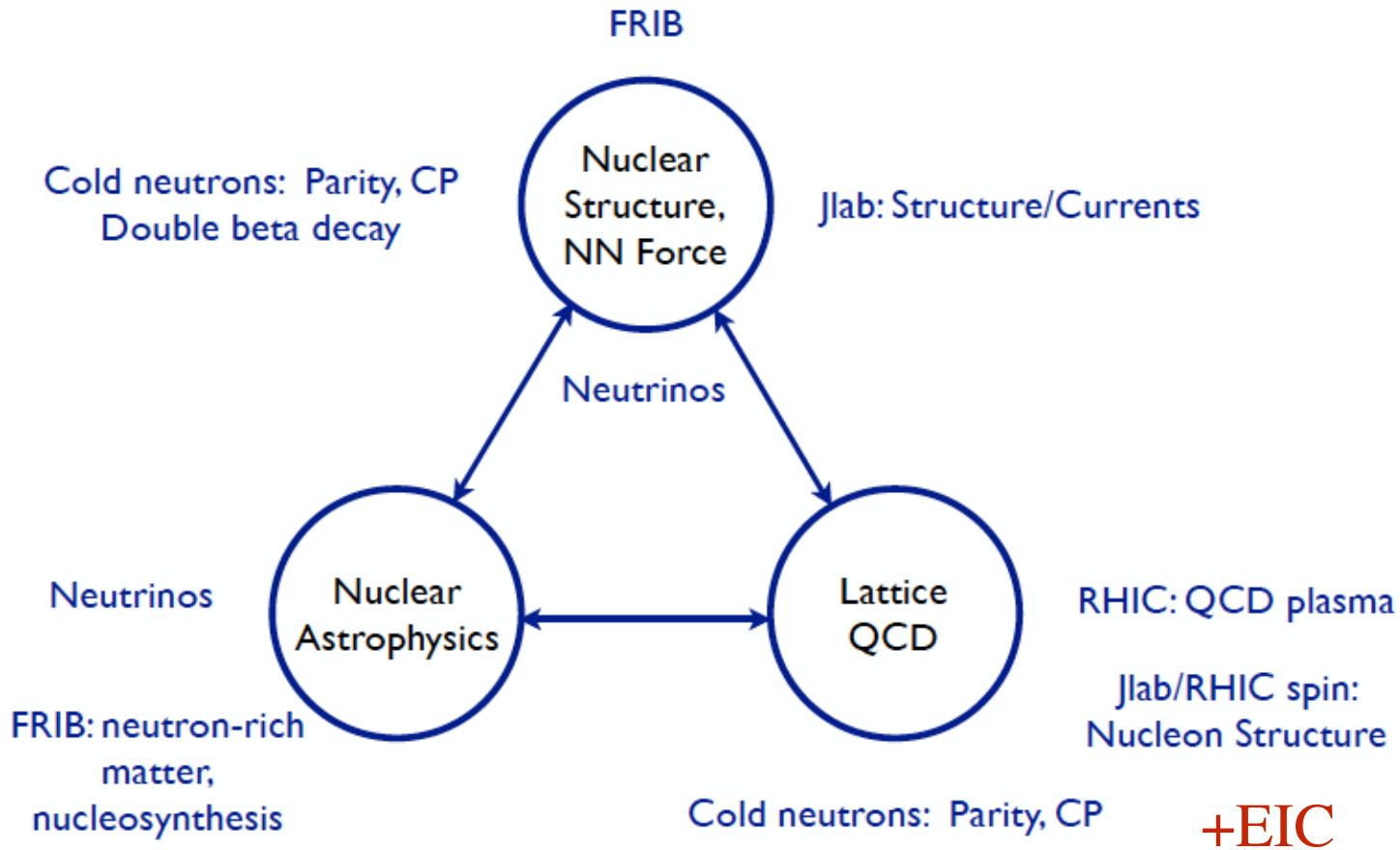
Computational NP Meeting 2014

- Met July 14–15 in Washington, D.C. (SURA headquarters)
- Purpose:
  - Review the status, objectives, and opportunities for computational nuclear physics
  - Determine the human and computational resources needed to advance nuclear physics research over the next ten years
- Attendees:
  - Theorists from all subfields of nuclear physics: hot and cold QCD, nuclear structure and reactions, nuclear astrophysics, fundamental symmetries
  - Users of both leadership class and high-end computers
  - DOE representatives from NP and ASCR; NSF representative from Nuclear Theory
- Outcomes: white paper with recommendation/request
  - Presentations to *all* other town meetings
  - Each requested to endorse recommendation

Supports, Drives and Interprets Expt



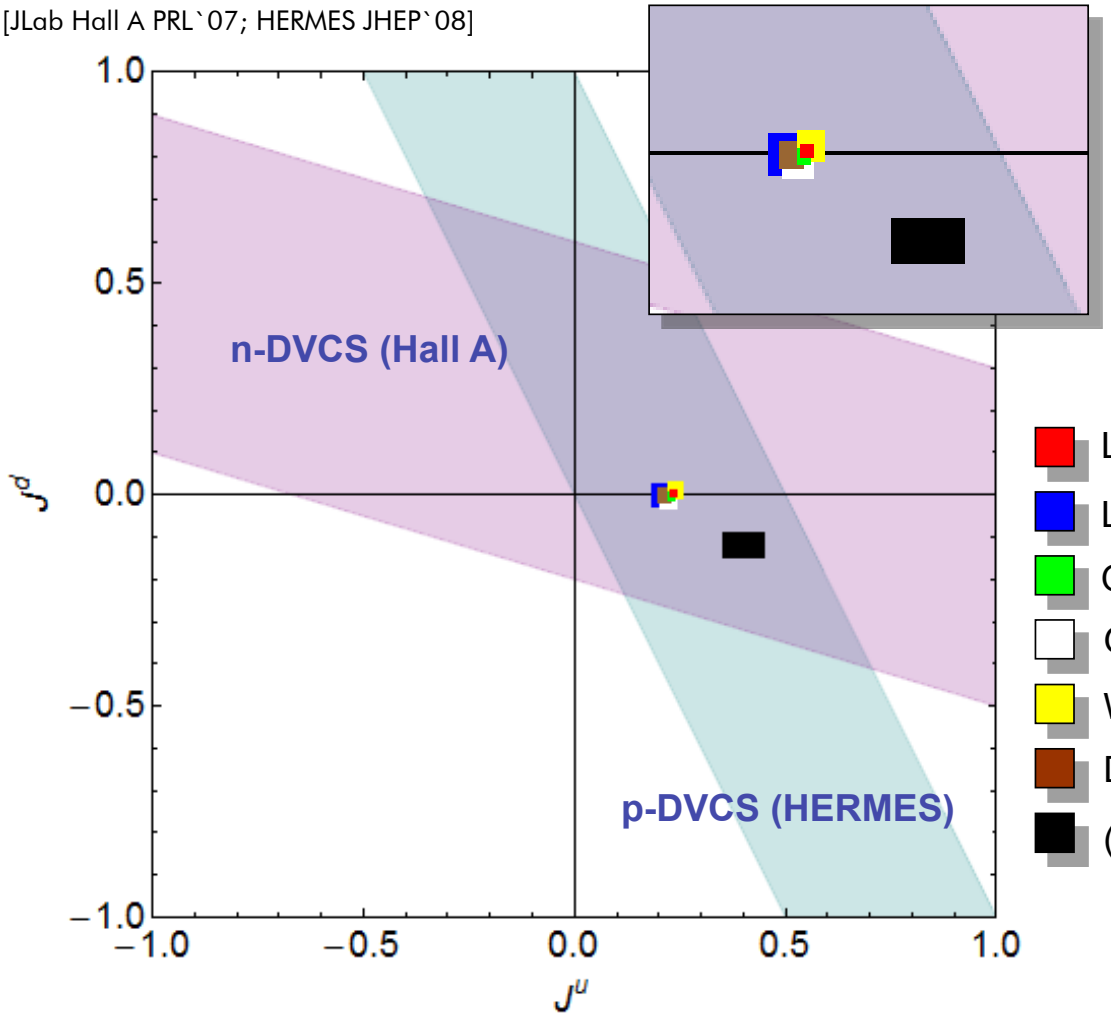
. . . *and* builds bridges:

lattice QCD $\leftrightarrow$ NN potentials $\leftrightarrow$ nuclear structure $\leftrightarrow$ $0\nu\beta\beta$

nuclear structure $\leftrightarrow$ neutron-rich nuclei $\leftrightarrow$ r-process path in supernovae

Origin of Nucleon Spin - I

[JLab Hall A PRL`07; HERMES JHEP`08]

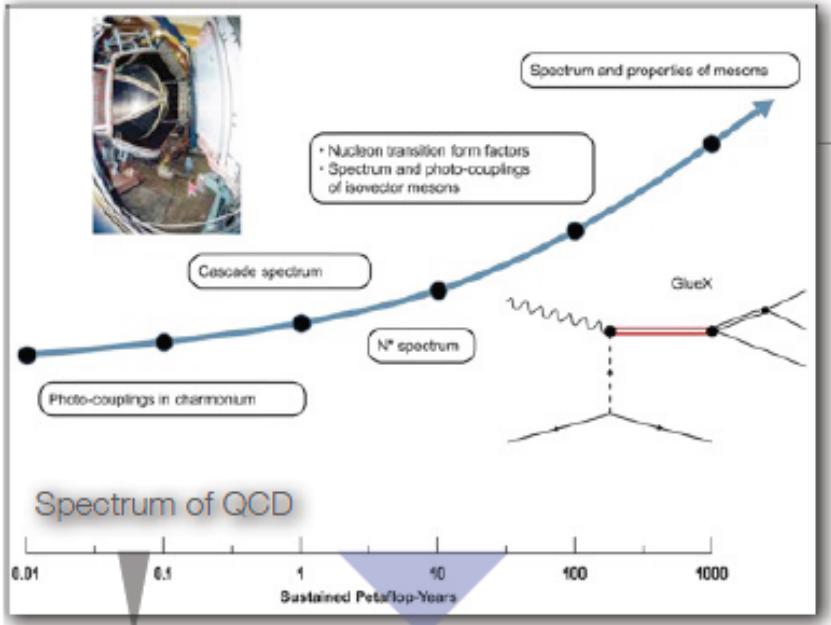


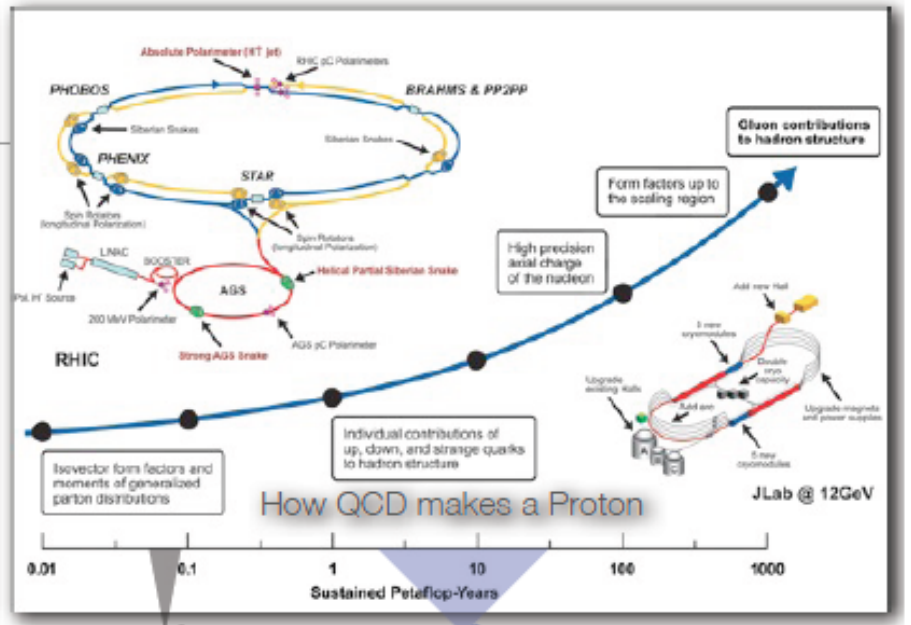
Ph. Hagler, Menu 2010

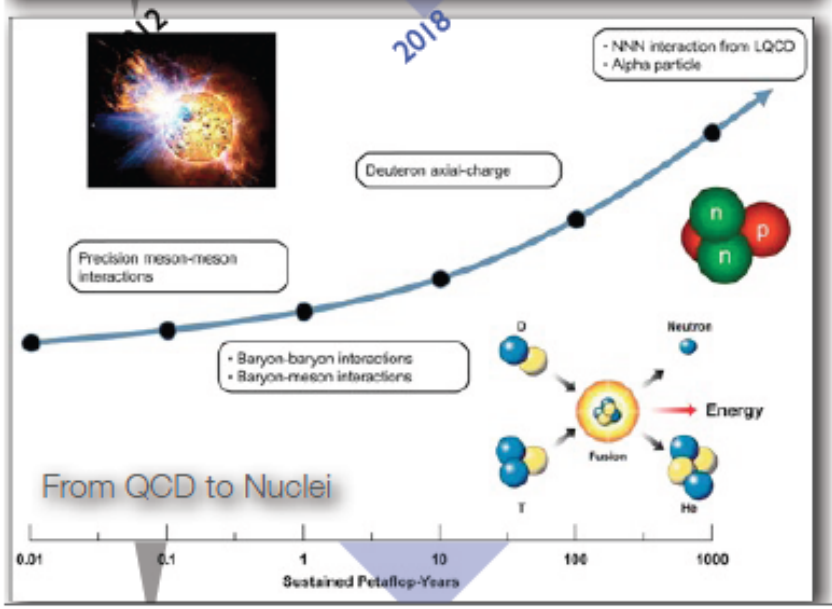
- LHPC arXiv:1001.3620 (this work)
- LHPC PRD `08 0705.4295
- QCDSF (Ohtani et al.) 0710.1534
- Goloskokov&Kroll EPJC`09 0809.4126
- Wakamatsu 0908.0972
- DiFeJaKr EPJC `05 hep-ph/0408173
- (Myhrer&)Thomas PRL`08 0803.2775

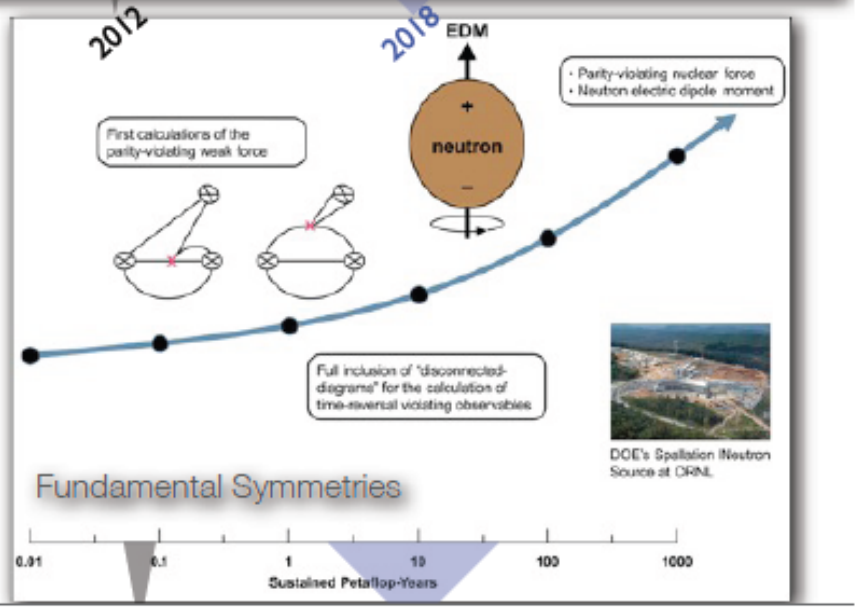
$\overline{\text{MS}}$ at 4 GeV^2

Scientific Grand Challenges ⟹ Toward exascale (2009)







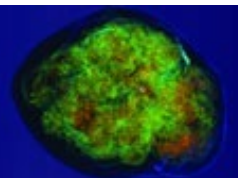


COMPUTATIONAL MEETING RECOMMENDATION

"A plan should be developed within the theoretical community and enabled by the appropriate sponsors that permits forefront computing resources to be exploited by nuclear science researchers and establishes the infrastructure and collaborations needed to take advantage of exascale capabilities as they become available."
***Exploring the Heart of Matter,* NAS Decadal Study (2013)**

Realizing the scientific potential of current and future experiments demands large-scale computations in nuclear theory that exploit the US leadership in high-performance computing.

Capitalizing on the pre-exascale systems of 2017 and beyond requires significant new investments in people, advanced software, and complementary capacity computing directed toward nuclear theory.



Computational-Meeting Request

To this end, we ask the Long-Range Plan to endorse the creation of an NSAC subcommittee to plan a diverse program of new investments in computational nuclear theory. We expect this program to include:

- new investments in SciDAC and complementary efforts needed to maximize the impact of the experimental program;
- development of a multi-disciplinary workforce in computational nuclear theory as called for in the Tribble Report;
- deployment of the necessary capacity computing to fully exploit the nation's leadership-class computers;

with support ramping up over five years towards a level of ~$10M per annum.