

Proposal: Lattice Hadron Physics (LHP)

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Lattice Hadron Physics

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In view of EuroHPC, AI Giga-Factories etc.: Community Town Meetings (EuroLat)

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EuroLat is not the best name (will change):



Lattice Hadron Physics: Scope

Lattice QCD calculations are needed for the full exploitation of the potential of a number of major Hadron Physics infrastructures in Europe and beyond.

- ▶ Broad umbrella proposal of the Lattice Hadron Physics Community
- ▶ There should be interaction with other theory and experimental initiatives
- ▶ Research activities include
 - ▶ Nucleon structure
 - ▶ Matrix elements for electroweak physics
 - ▶ QCD under extreme conditions
 - ▶ Advanced Hadron spectroscopy
- ▶ Clear relation to CERN (e.g., ALICE, AMBER, LHCb), ELSA, GSI/FAIR (CBM, PANDA), LNF activities, MESA as well as Belle II, BESIII, JLab and EIC@BNL

We wish to coordinate efforts by the European Lattice QCD community, support their infrastructure-related research activities and develop relevant tools.

Support needed for Networking Activities, training and community efforts, in particular the International Lattice Data Grid (ILDG).

Lattice Hadron Physics: Planned Activities

- ▶ Data curation and virtual access in the context of the ILDG
 - ▶ Maintenance and development of tools and standards
 - ▶ Support of the two regional grids Latfor Data Grid (LDG, Continental Europe) and UK Lattice Field Theory (UKLFT, UK)
 - ▶ Liaison with supercomputing centres and storage element providers
 - ▶ ILDG user training
 - ▶ LDG/UKLFT user support and help desk
 - ▶ Some of the technology may also be interesting for other Hadron Physics communities
- ▶ Networking activities
 - ▶ Staff and student exchanges
 - ▶ Yearly town meeting of the virtual research community “EuroLat”
 - ▶ Two focussed topical workshops, encouraging information exchange on new methods, new software and new results
 - ▶ Identification of novel observables amenable to Lattice methods through discussion with other scientists working at the infrastructures and phenomenologists
 - ▶ Linking European LHP research groups to the broader Hadron phenomenology, co-organizing two cross-activity workshops (example: EINN 2027 on Cyprus)
 - ▶ Impromptu workshops (also with other networks) to react timely to new developments

Lattice Hadron Physics: Planned Activities 2

- ▶ Research activities to benefit LHP community as a whole
 - ▶ Benchmarking of common kernels on different computer architectures and analysis of emerging HPC architectures with focus on LHP use cases
 - ▶ Research on algorithms
 - ▶ Development of optimized community application kernels and porting these to new platforms
- ▶ Training activities
 - ▶ Yearly Lattice Practices hands-on training workshops, directed at students and early postdocs, ideally at the centres offering TA, and in coordination with the LaVA (Lattice Virtual Academy) E-learning platform that emanated from the STRONG-2020 Lattice Hadrons networking activity.
 - ▶ Content development for the LaVA platform
 - ▶ ECT* (already offering VA for LaVA) is essential for the success of the training activities

Budget request

(Co-)financing of the ambitious networking, workshop and training programme:

€ 40,000/year.

In addition, 1 FTE times four years is necessary for

- ▶ User support
- ▶ Running the LDG/UKLFT help desk
- ▶ Software maintenance, development and support, as a service to the LHP community
- ▶ Benchmarking of kernels on novel platforms

We do what we can but these tasks require an additional dedicated researcher.

In the past there clearly was underinvestment in this direction in Europe.

Thank you.

Questions?