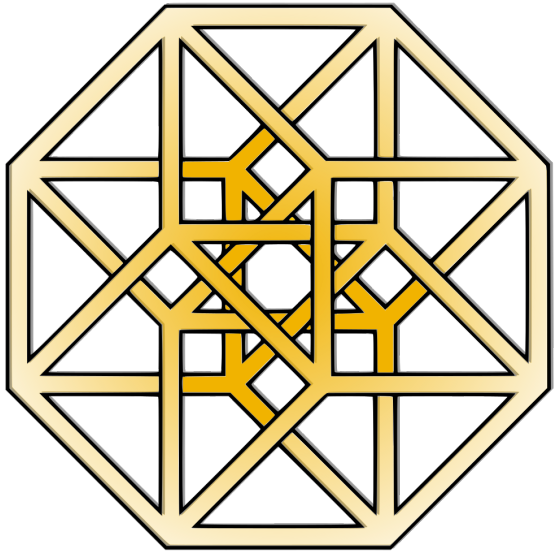


OPEN
LATtice
initiative

OPENLAT AND THE ILDG

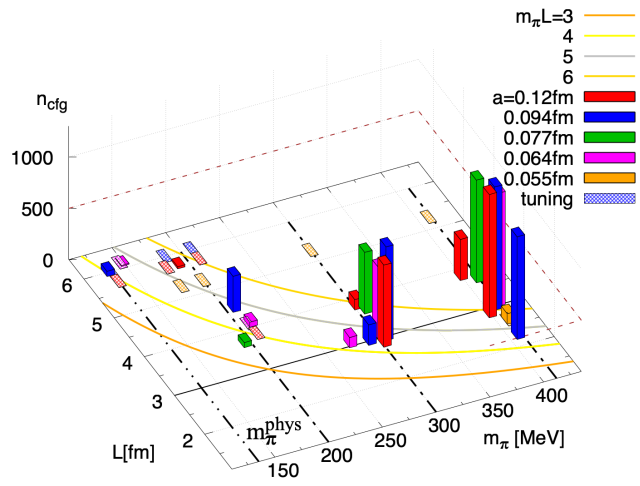
LDG Meeting - Odense 2025

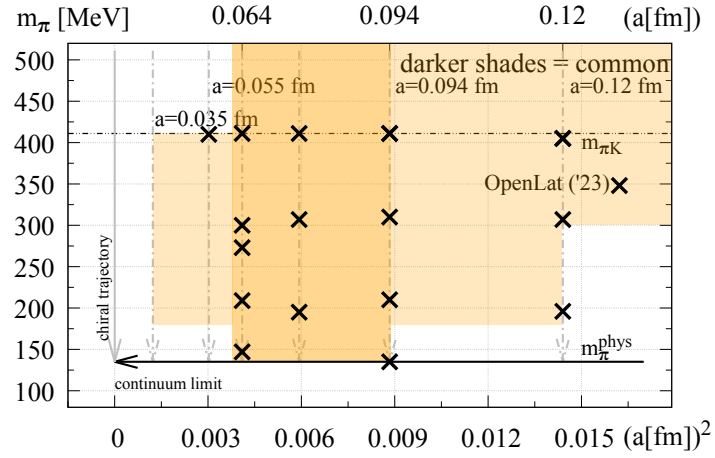
April 4th, 2025 | Giovanni Pederiva |

JÜLICH
Forschungszentrum

Ensemble Overview

- Gauge field ensembles with 2+1 fermion flavors with lattice spacings $a = 0.055, 0.064, 0.077, 0.094, 0.12$ fm
- Pion masses at m_π =412, $\simeq$300, $\simeq$200, $\simeq$135 MeV.
- Volumes with $m_\pi L \gtrsim 4$ and $L \gtrsim 3$ fm.
- Fixed mass matrix $Tr[M]$ =const. tuned at the $SU(3)_F$-point with $m_{\pi,K} = 412$ MeV.
- Reweighting factors close to unity (so far $\delta \lesssim 5\%$).
- Produced with resources in France, Finland, Germany, Italy and the USA.





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Data Management Plan

Management plan:

- Redundancy through mirrors (TPCC, NERSC)
- Long term storage planned, currently tape option used
- All metadata preserved on disk and in online repository
- Main contacts: GP, Andre Walker-Loud, Savvas Zafeiropoulos, Anthony Francis

Metadata:

- Detailed provenance policy (runner, machine, code-version, time-stamps)
- Auxilliary measurements include:
  - Run observables: plaquettes, δH, iteration counts, acceptance
  - Wilson flow observables: energy density (two operators), topological charge
  - Hadronic observables: pp, ap correlators
  - Other observables: reweighting factors, lowest eigenvalues, spectral range
- Data integrity:
  - all configurations contain the plaquette in header
  - list of checksums for all configurations provided (using md5sum)

Data accessibility:

- All configurations and metadata are made openly available at time of publication.
- We are **strongly** in favor of uploading our ensembles to the ILDG as it alignes with the core values of our collaboration

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Total Ensemble Data

- **Stage 1.:** $SU(3)$ flavor symmetric point, $M_\pi = M_K = 412\text{MeV}$
  $\rightarrow$ 4 ensembles mostly completed, 35 TB
- **Stage 2.:**
  $\rightarrow$ 4 ensembles in production at $M_\pi = 300\text{MeV}$, 23.6 TB
  $\rightarrow$ 4 ensembles in production at $M_\pi = 200\text{MeV}$, 14.7 TB
- **Stage 3.:** physical point $M_\pi = 135\text{MeV}$
  $\rightarrow$ 2 ensembles in production 2 are being tuned, 45.5 TB

We have a total of 120 TB so far, but we are now in production for stage 2 and some of stage 3, so in the next year we already expect a factor 2-3 in storage requirements

OpenLat Experience with ILDG

- Gauge field format and packing needs to be improved. We use openQCD format, need for a good converter for ILDG format
- Need for better documentation and tooling for markup and uploading, potential barrier if too complex
- Trying to look for storage possibilities, current setup at NERSC is limited. Many unsuccessful attempts :(
- A. Rago is involved in ILDG efforts, helped among other things to introduce our action into the metadata schema
- GP is involved in PUNCH4NFDI and in the further development of the backend and user tools