

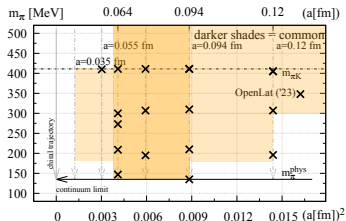
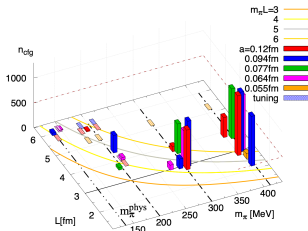
# OPEN LATtice initiative

## OPENLAT ENSEMBLE GENERATION ILDG Data Session - Lattice 2024

August 2nd, 2024 | Giovanni Pederiva |

# 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  $m_\pi = 412, \simeq 300, \simeq 200, \simeq 135$  MeV.
- Volumes with  $m_\pi L \gtrsim 4$  and  $L \gtrsim 3$  fm.
- Fixed mass matrix  $\text{Tr}[M] = \text{const.}$  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.



# 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

## Metadata:

- Detailed provenance policy (runner, machine, code-version, time-stamps)
- Auxilliary measurements include:
  - Run observables: plaquettes,  $\delta H$ , 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 aligns with the core values of our collaboration

# Total Ensemble Data

- **Stage 1.:**  $SU(3)$  flavor symmetric point,  $M_\pi = M_K = 412\text{MeV}$   
→ 4 ensembles, 35 TB
- **Stage 2.:**  
→ 4 ensembles at  $M_\pi = 300\text{MeV}$ , 23.6 TB  
→ 4 ensembles at  $M_\pi = 200\text{MeV}$ , 14.7 TB
- **Stage 3.:** physical point  $M_\pi = 135\text{MeV}$   
→ 2 ensembles ready for production, 2 still tuning, 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

- GP and A. Rago are involved in the ILDG 2.0 efforts, so a bit easier
- Need for better documentation and tooling for markup and uploading, potential barrier if too complex
- Gauge field format and packing needs to be improved. We use openQCD format, need for a good converter for ILDG format