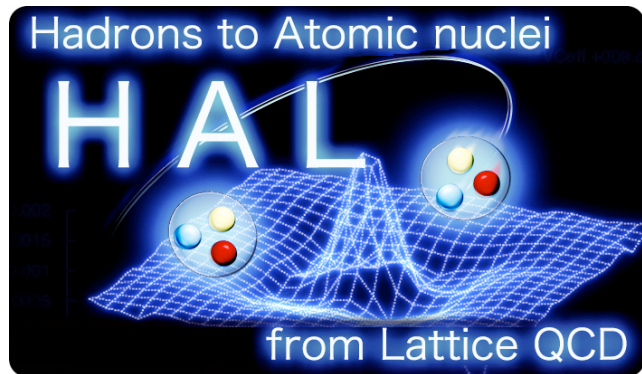


HAL QCD Collaboration



Takumi Doi
(RIKEN iTHEMS)

Hadrons to **A**tomistic nuclei from **L**attice QCD
(**H****A****L** QCD Collaboration)

[HAL-conf-2023] : physical point conf

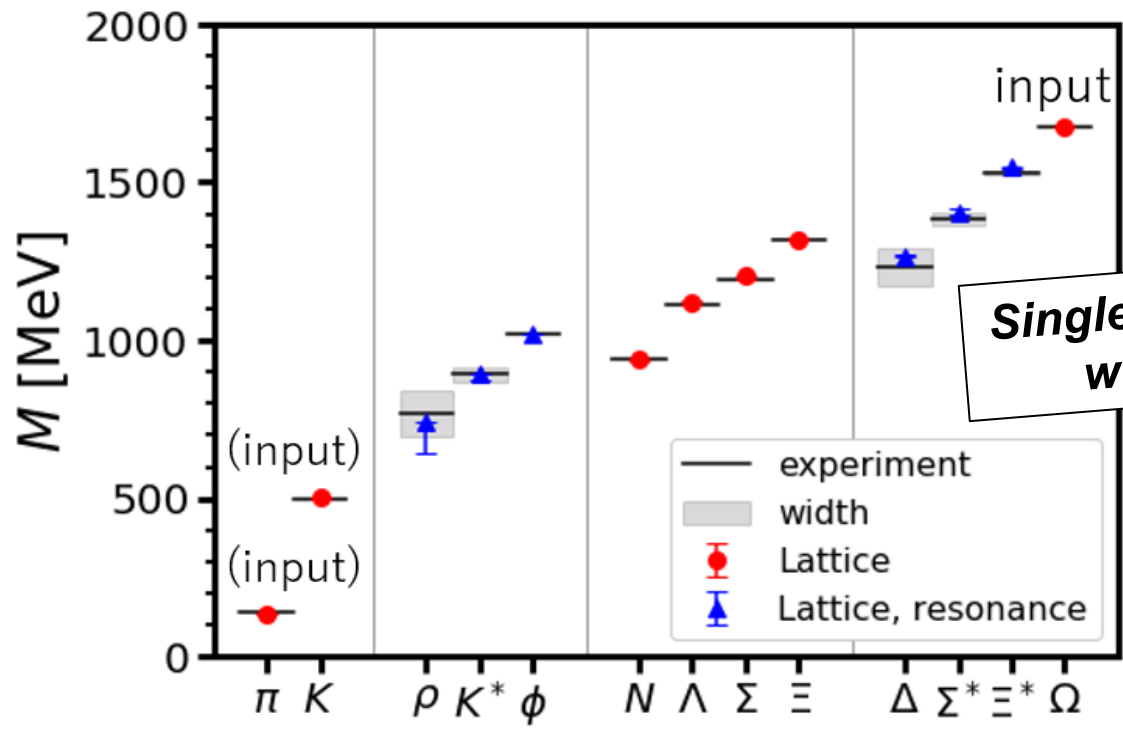
- **Nf = 2 + 1 gauge configs**

HAL QCD Coll., arXiv:2406.16665

- Iwasaki gauge + non-perturbatively O(a)-improved Wilson-clover fermion
 - 6-stout smearing w/ smearing parameter $\rho=0.1$
- $\beta=1.82$, precise scale setting by Omega mass
 - $a = 0.084372(54)(+109/-6)$ fm, $1/a = 2338.8(1.5)(+0.2/-3.0)$ MeV
- $V = (96 a)^4 = (8.1\text{fm})^4$, PBC in all directions
- DDHMC + two-fold Hasenbusch for ud-quarks, RHMC for s-quark
 - Code by K.-I. Ishikawa (private; same one used in PACS Coll.)
- 1,600 traj/MC-run x 5 MC-run = **8,000 traj**, generated on “Fugaku”
 - Starting from $m_\pi=146\text{MeV}$ conf, > 300 traj for thermalization for each run
- 1 conf/5 traj \rightarrow **1,600 confs** for measurement
- Physical point target: isospin averaged masses
 - ← Parameters from PACS10 conf (PACS Coll., PRD99, PRD100 ('19))
- **$(m_\pi, m_K) = (137, 502)$ MeV**
 - Particularly useful for hadron interactions @ phys point



Fugaku (2021-)
440PF



E. Itou



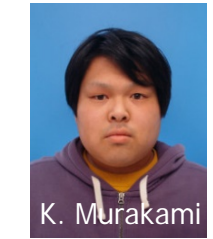
T. Aoyama



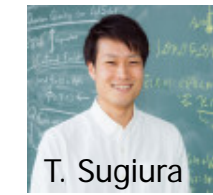
T. M. Doi



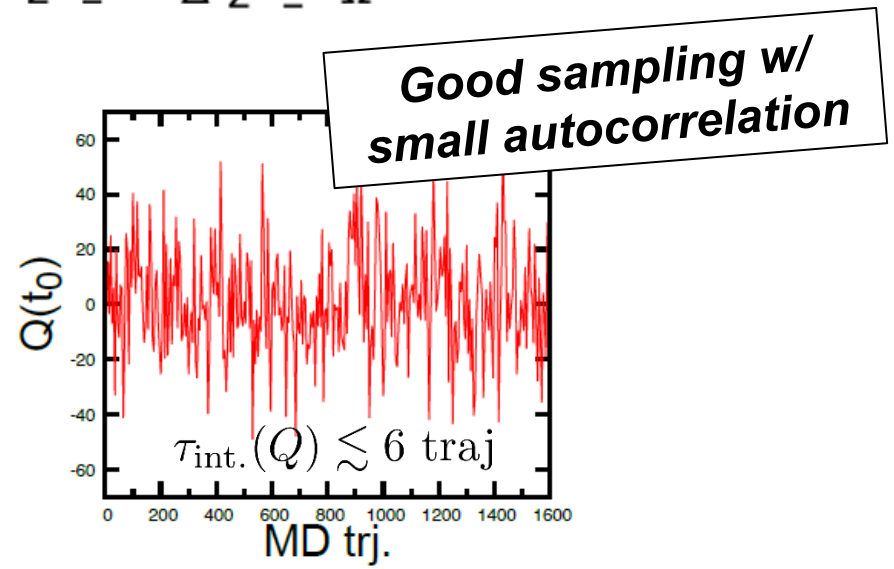
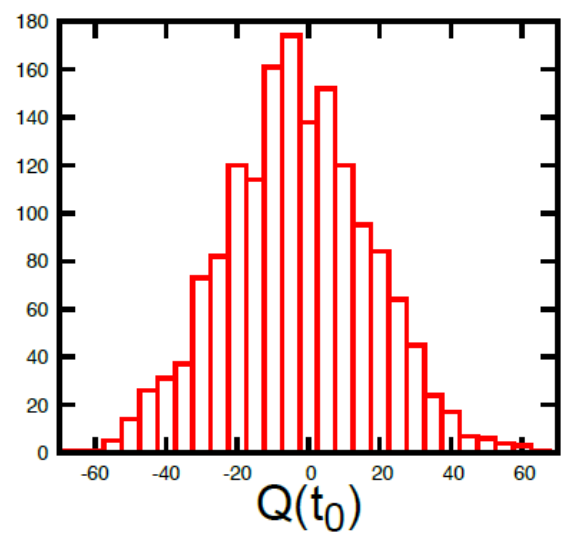
Y. Lyu



K. Murakami



T. Sugiura



+ Special thanks to K.-I. Ishikawa, I. Kanamori, Y. Nakamura

About config data

- Data management strategy
 - We plan to make config public (through JLDG/ILDG) after some embargo period (actual schedule not decided)
 - Most likely in ILDG format
 - Original confs : $1,600 \text{ confs} \times 50 \text{ GB/conf} = 80\text{TB}$
 - We may also make Coulomb gauge fixed confs public:
 $1,600 \text{ confs} \times 50 \text{ GB/conf} \times 4 \text{ rotations} = 320\text{TB}$
 - (Hypercubic symmetry is used for 4 rotations)