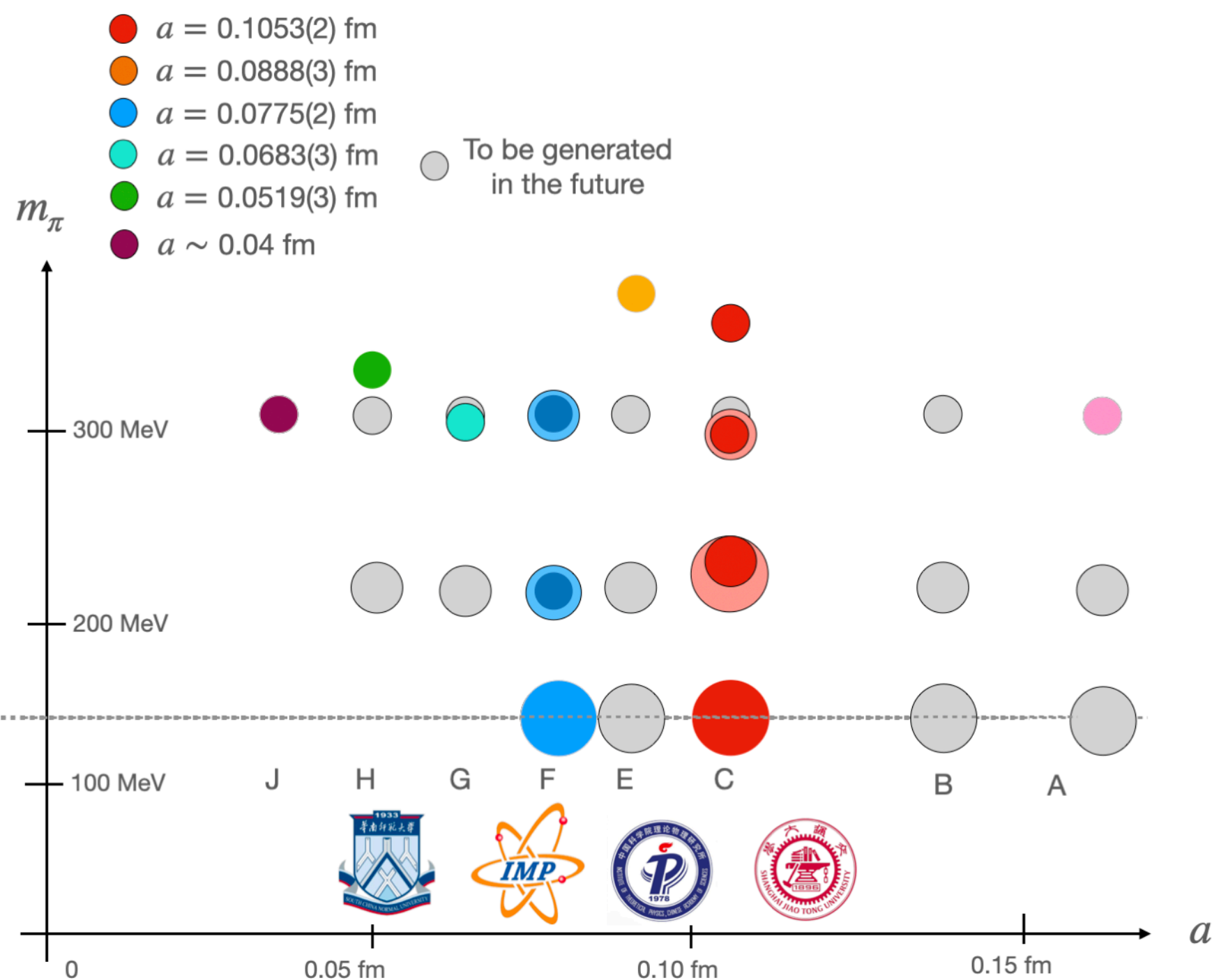


# CLQCD ensembles

## Basic information

$$S_g(g_0) = \frac{1}{N_c} \text{Re} \sum_{x, \mu < \nu} \text{Tr} \left[ 1 - 10/(g_0^2 u_0^4) \left( \mathcal{P}_{\mu, \nu}^U(x) + \frac{1}{20 u_0^2} \mathcal{R}_{\mu, \nu}^U(x) \right) \right]$$

$$S_q(m) = \sum_{x, \mu=1, \dots, 4, \eta=\pm} \bar{\psi}(x) \sum \frac{1 + \eta \gamma_\mu}{2} V_{\eta\mu}(x) \psi(x + \eta \hat{\mu} a) + \sum_x \psi(x) \left[ -(4 + ma) \delta_{y,x} + \frac{1}{v_0^3} \sigma^{\mu\nu} g_0 F_{\mu\nu}^V \right] \psi(x),$$



- Tadpole improved Symanzik gauge;
- Tadpole improved Clover fermion;
- Tadpole improvement requires fine-tuning of the tadpole factors  $u_0$  and  $u_I$ ;
- We tune those factors to the 0.001 % level, as the mistuning effect can be  $\mathcal{O}(100)$  enhanced in the hadron and quark masses.

Symbol	$\hat{\beta}$	$a$ (fm)	$\tilde{L}^3 \times \tilde{T}$	$m_\pi$ (MeV)	$m_{\eta_s}$ (MeV)
C24P34	6.200	0.10530(18)	$24^3 \times 64$	340.5(1.7)	748.99(73)
C24P29			$24^3 \times 72$	292.7(1.2)	658.29(65)
C32P29			$32^3 \times 64$	292.4(1.1)	659.22(41)
C32P23			$32^3 \times 64$	228.0(1.2)	644.36(45)
C48P23			$48^3 \times 96$	225.6(0.9)	644.58(62)
C48P14			$48^3 \times 96$	135.5(1.6)	707.06(44)
E28P35	6.308	0.08877(30)	$28^3 \times 64$	352.1(1.2)	720.31(94)
F32P30	6.410	0.07750(18)	$32^3 \times 96$	303.2(1.3)	677.6(1.0)
F48P30			$48^3 \times 96$	303.4(0.9)	676.32(62)
F32P21			$32^3 \times 64$	210.9(2.2)	660.27(94)
F48P21			$48^3 \times 96$	207.2(1.1)	663.39(65)
G36P29	6.498	0.06826(27)	$36^3 \times 108$	295.1(1.2)	693.2(1.0)
H48P32	6.720	0.05187(26)	$48^3 \times 144$	317.2(0.9)	695.9(1.3)

Z.C. Hu, B.L. Hu, J.H. Wang, et. al., CLQCD, 2310.00814

H.Y. Du, B.L. Hu, et. al., CLQCD, In preparation

# CLQCD ensembles

## Data generation, storage and code

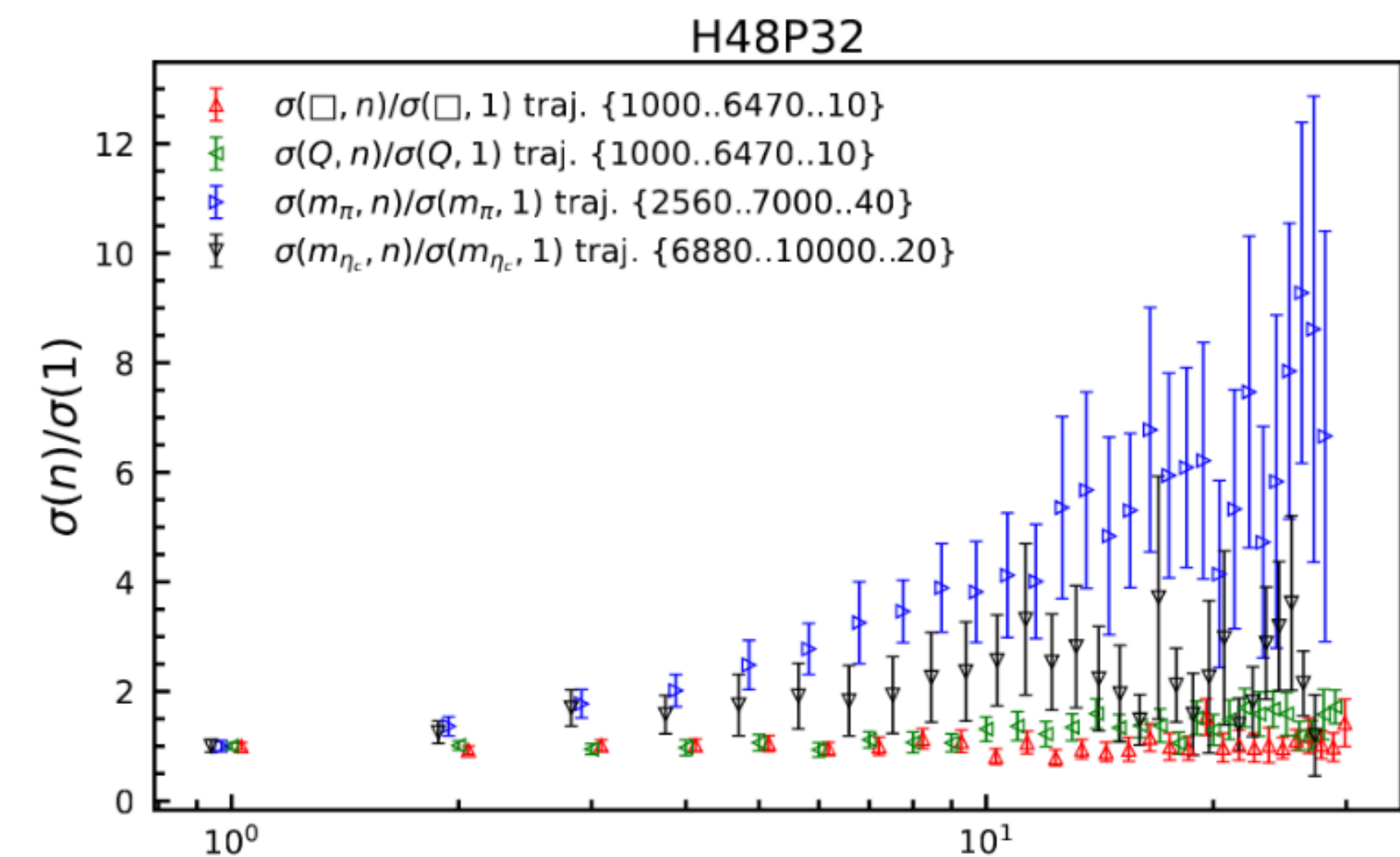


ITP/CAS  
(~2TFlops,  
~7PB)

- Generated and stored at ITP/CAS, SCNC and etc.;
- Acceptable topological charge auto-correlation at the smallest lattice spacing;
- Based on Chroma+QUDA and will be moved to pyQUDA+QUDA.

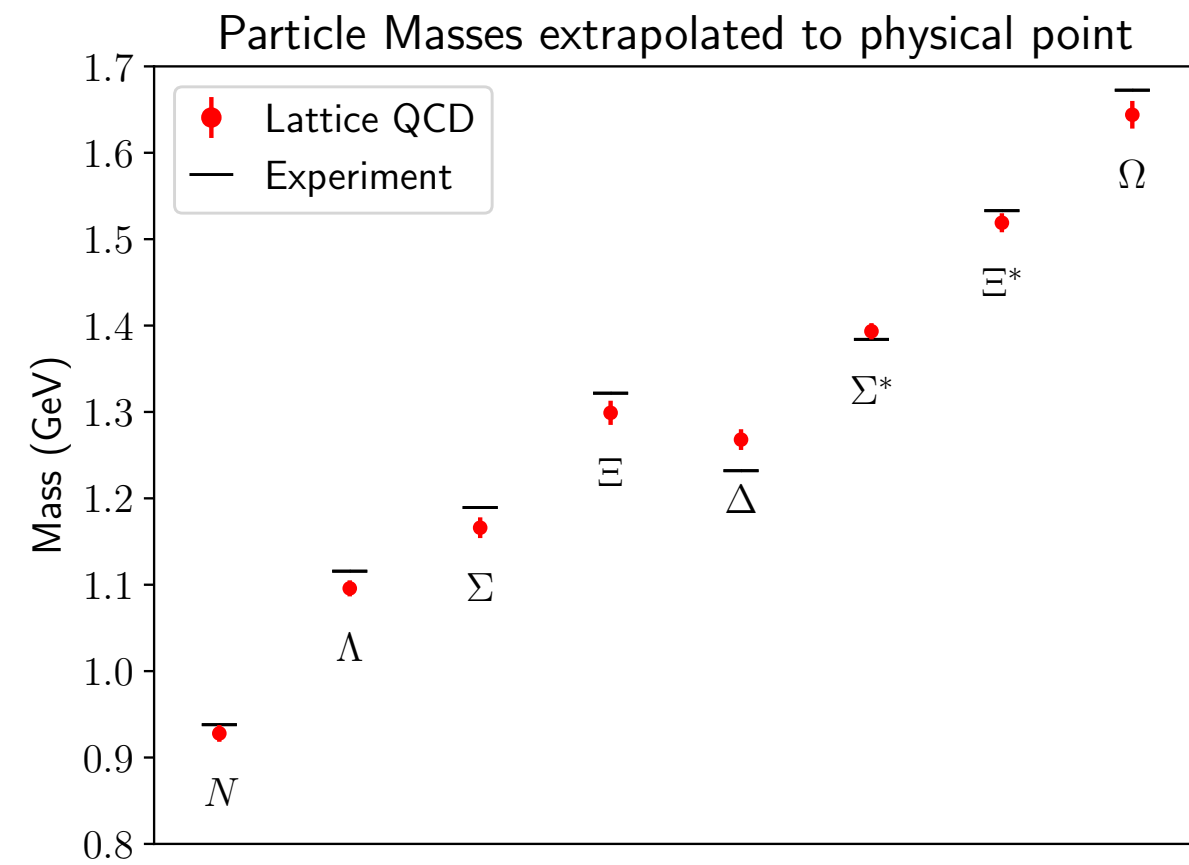


SCNC (IMP/CAS  
& SCNU,  
~3TFlops, ~5PB)

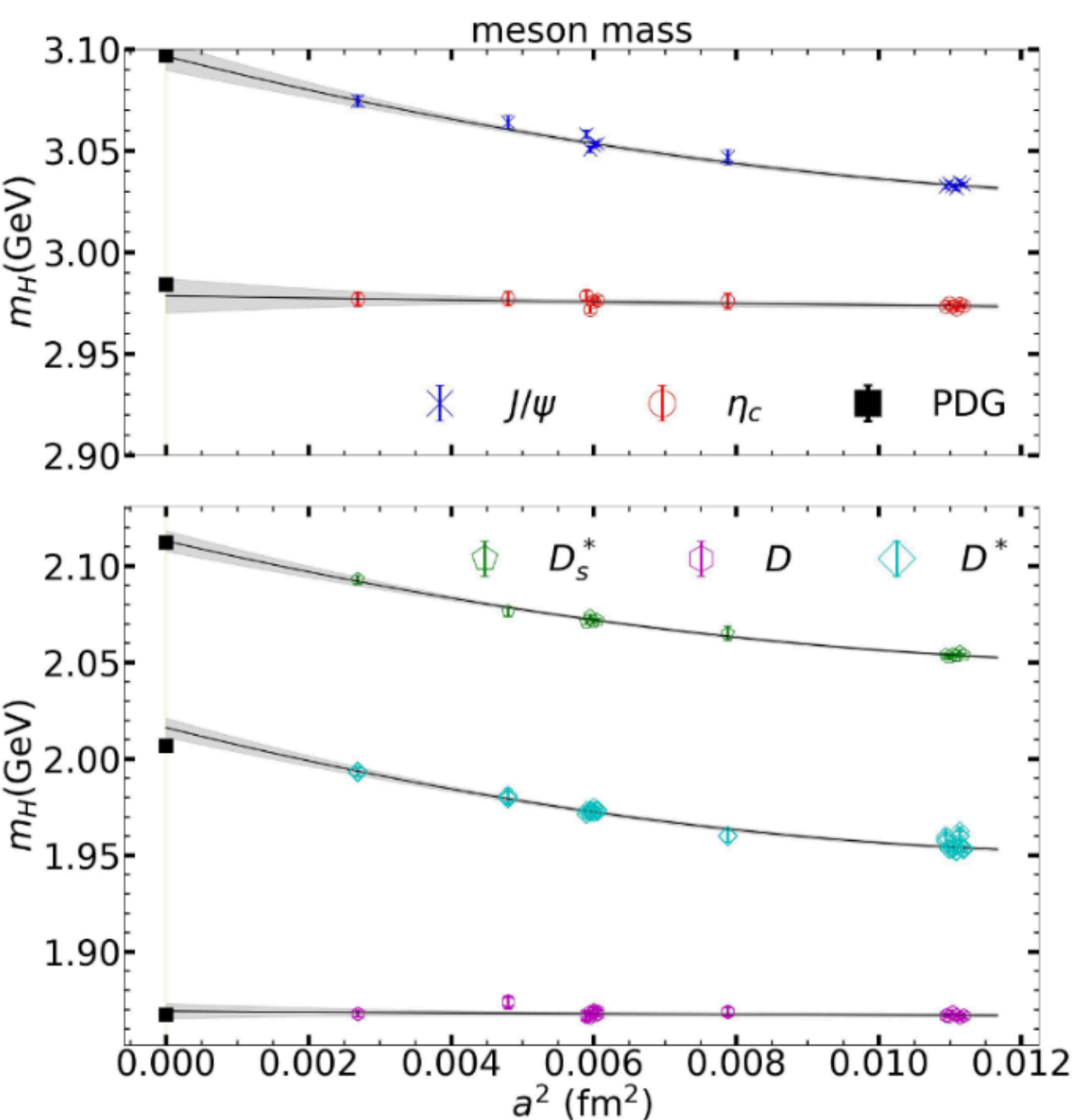


# CLQCD ensembles

## Data sharing



- Shared among the Chinese institutions, to support the Lattice QCD calculation in China;
- Website for the metadata is in progress.
- International collaboration based on CLQCD ensembles is welcome;
- International sharing of the CLQCD ensembles is still under discussion.



Z.C. Hu, B.L. Hu, J.H. Wang, et. al., CLQCD, 2310.00814

H.Y. Du, B.L. Hu, et. al., CLQCD, In preparation