

Discussion session on lattice HVP

Thanks to D. Giusti and S. Lahrtz for sending slides for the discussion session

1. Isospin-symmetric scheme dependence

see next slides

Thanks to S. Kuberski for collaboration in the focus group

2. Organization of comparisons of QED+SIB corrections:

By agreeing on the WP25 scheme, it would be good to quote explicitly $\text{amu}(\text{QCD}+\text{QED},\text{physical}) - \text{amu}(\text{WP25})$. We can think of comparing finite sets of sub-diagrams. Other thoughts?

3. Experimental input for $\text{amu}(\text{QCD}+\text{QED},\text{physical})$:

A canonical choice is $m_{\pi_0}, m_{K_+}, m_{K_0}, m_{\Omega}, m_{D_s}$. One may, however, want to use different quantities and, e.g., substitute charge lepton decay rates for the Omega baryon mass. Respective strengths and weaknesses?

Isospin-symmetric scheme dependence (RBC/UKQCD 26)

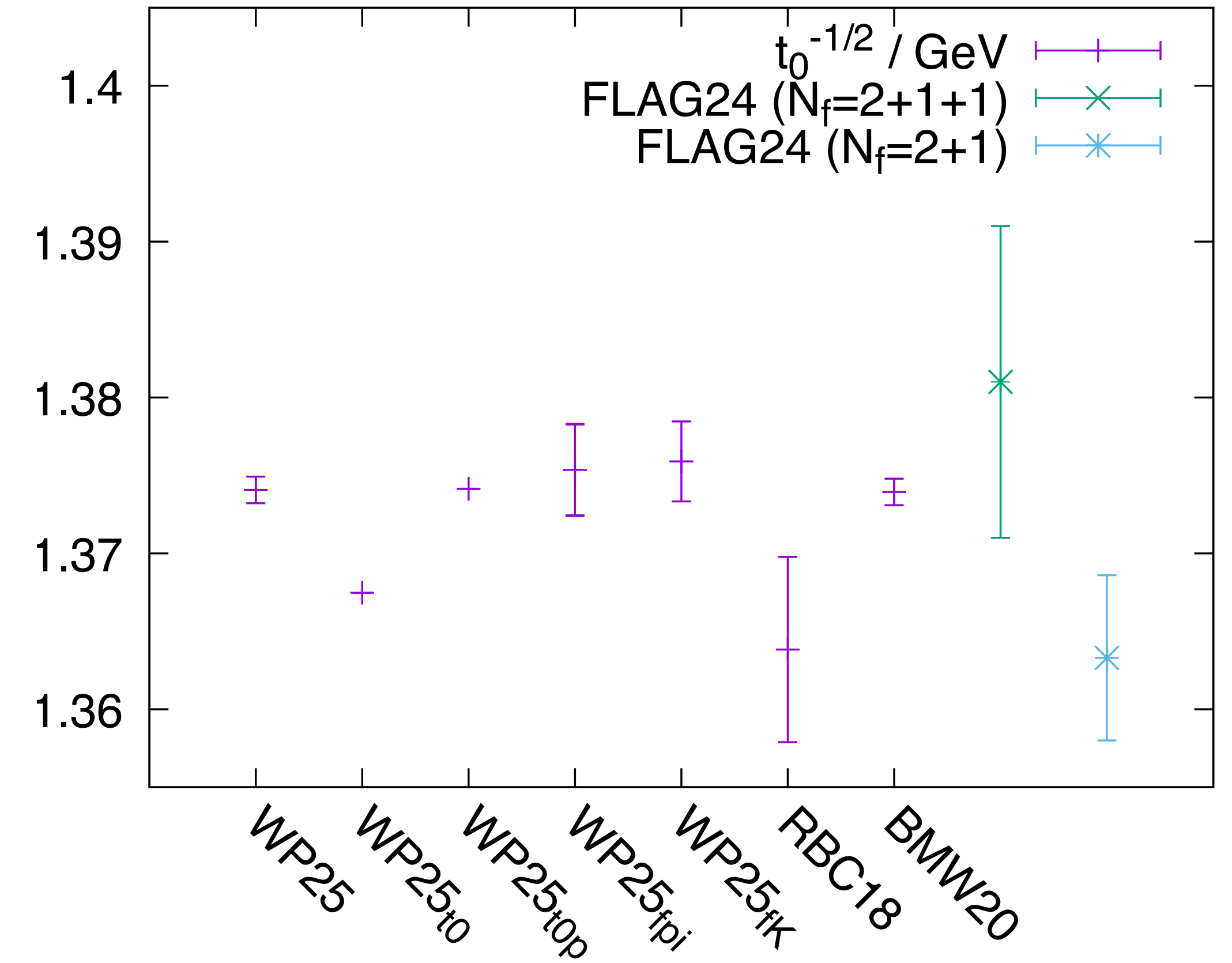
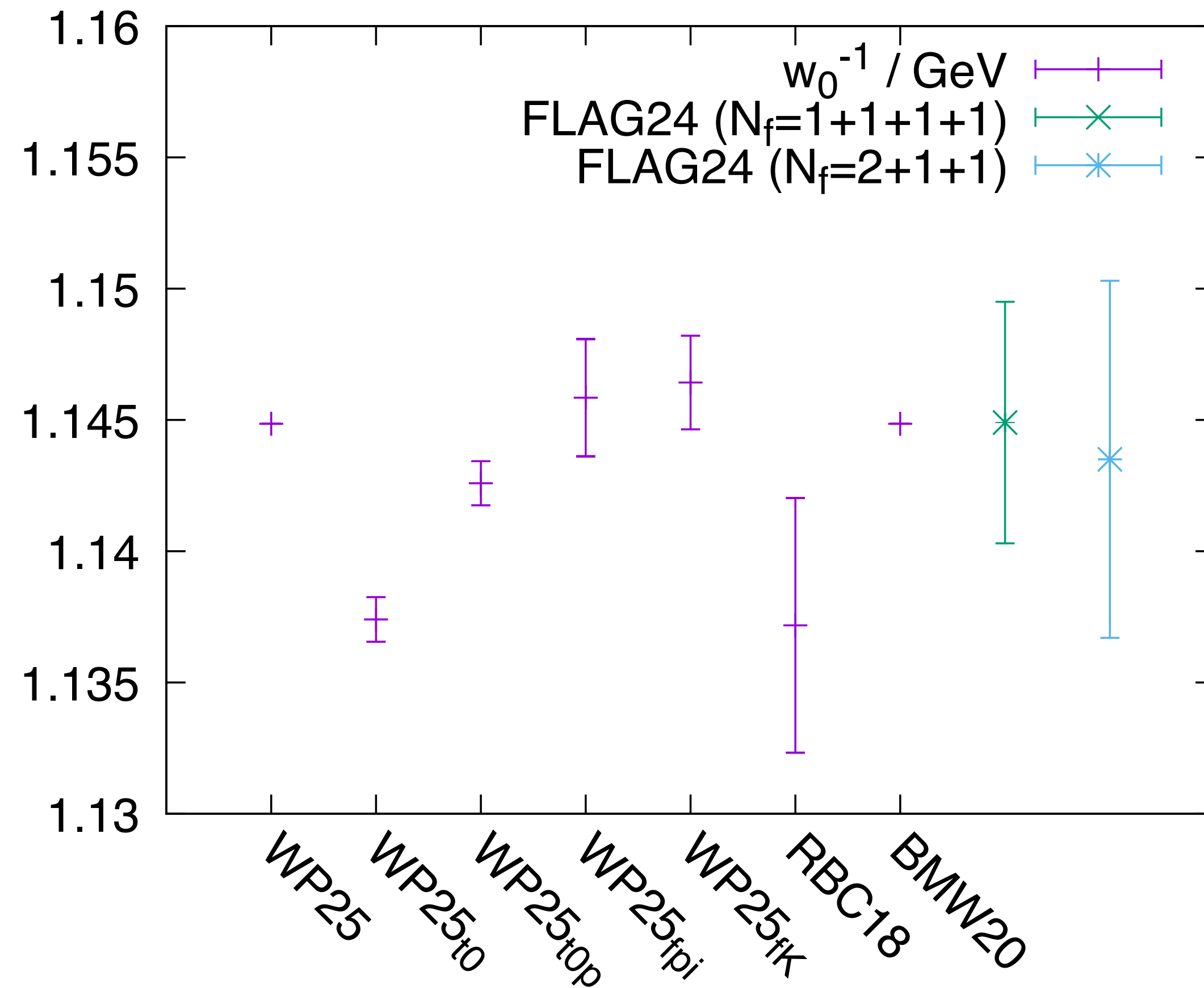
Scheme	X_1	$\overline{X}_1$	X_2	$\overline{X}_2$	Y	$\overline{Y}$
RBC/UKQCD18	m_π	0.135 GeV	m_K	0.4957 GeV	m_Ω	1.67225 GeV
BMW20	m_π	0.13497 GeV	m_{ss*}	0.6898 GeV	w_0^{-1}	$(0.17236 \text{ fm})^{-1}$
WP25	m_π	0.135 GeV	m_K	0.4946 GeV	w_0^{-1}	$(0.17236 \text{ fm})^{-1}$
WP25 _{t0}	m_π	0.135 GeV	m_K	0.4946 GeV	$\sqrt{t_0}^{-1}$	$(0.1443 \text{ fm})^{-1}$
WP25 _{t0p}	m_π	0.135 GeV	m_K	0.4946 GeV	$\sqrt{t_0}^{-1}$	$(0.1436 \text{ fm})^{-1}$
WP25 _{fpi} / FLAG / Edinburgh Consensus	m_π	0.135 GeV	m_K	0.4946 GeV	f_π	0.1305 GeV
WP25 _{fK}	m_π	0.135 GeV	m_K	0.4946 GeV	f_K	0.1557 GeV

arXiv:2608.XXXX, RBC/UKQCD

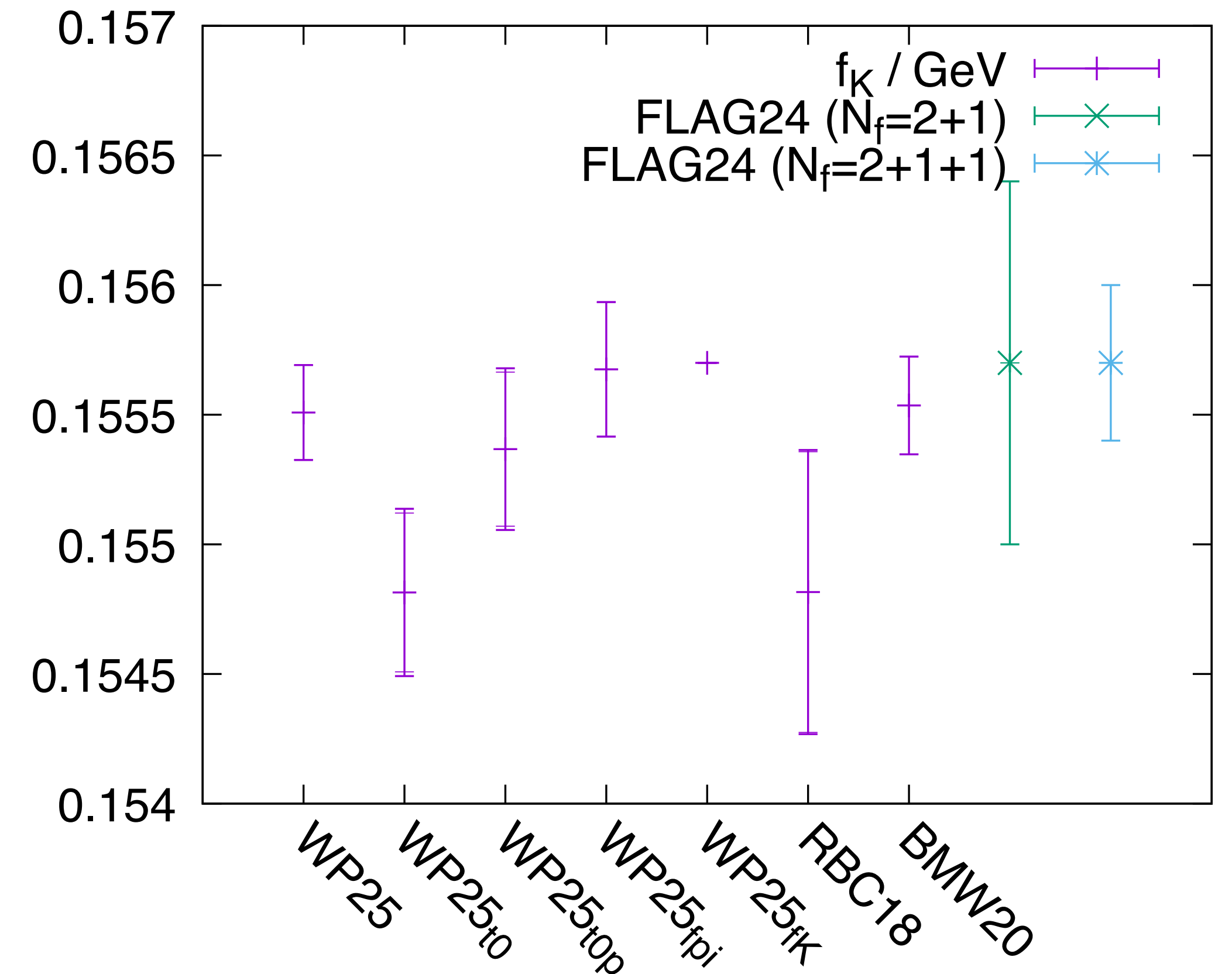
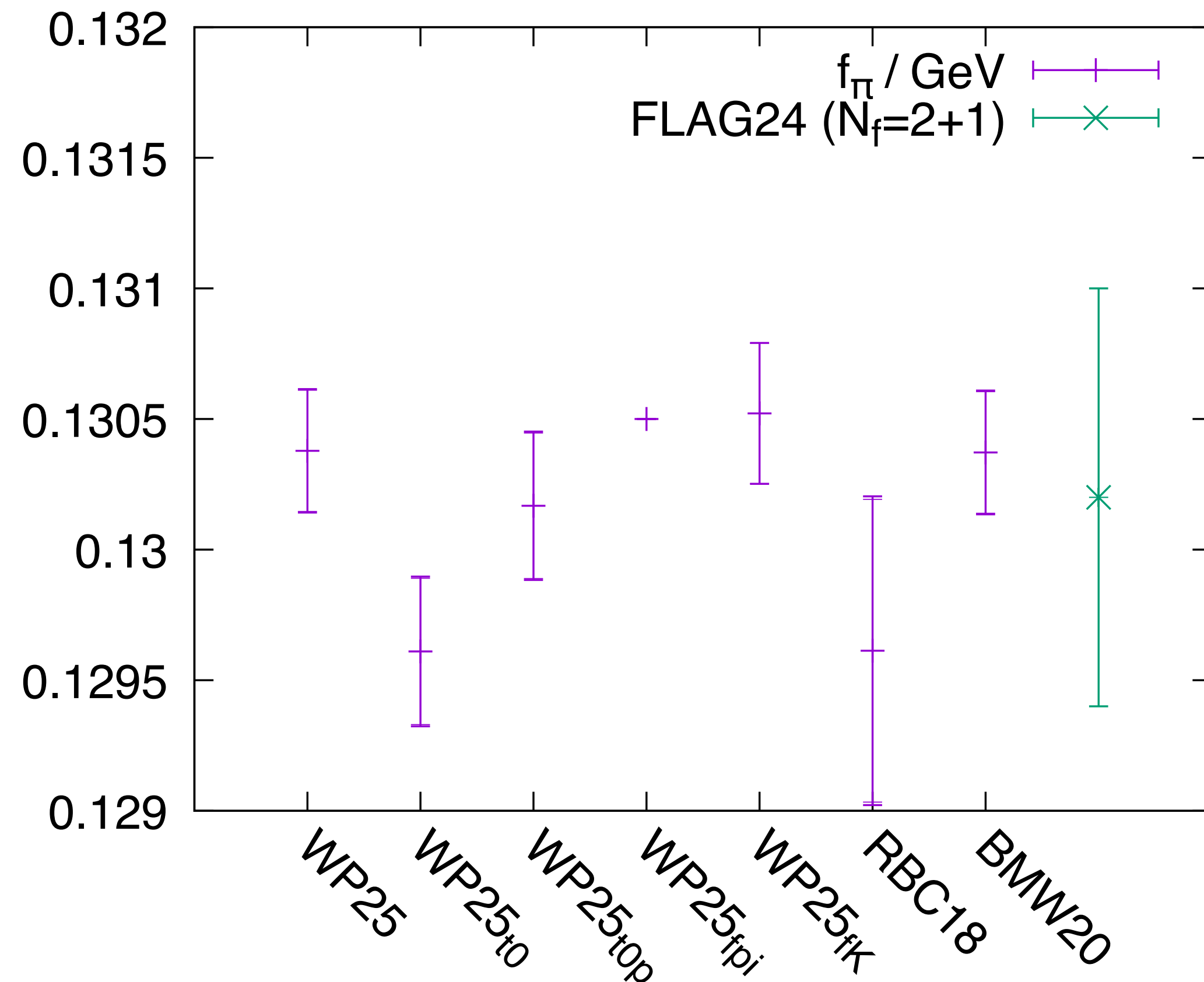
D_s mass from WP25

WP25_{t0} uses t_0 sent to me by Simon Kuberski, expected to correspond to Mainz scheme

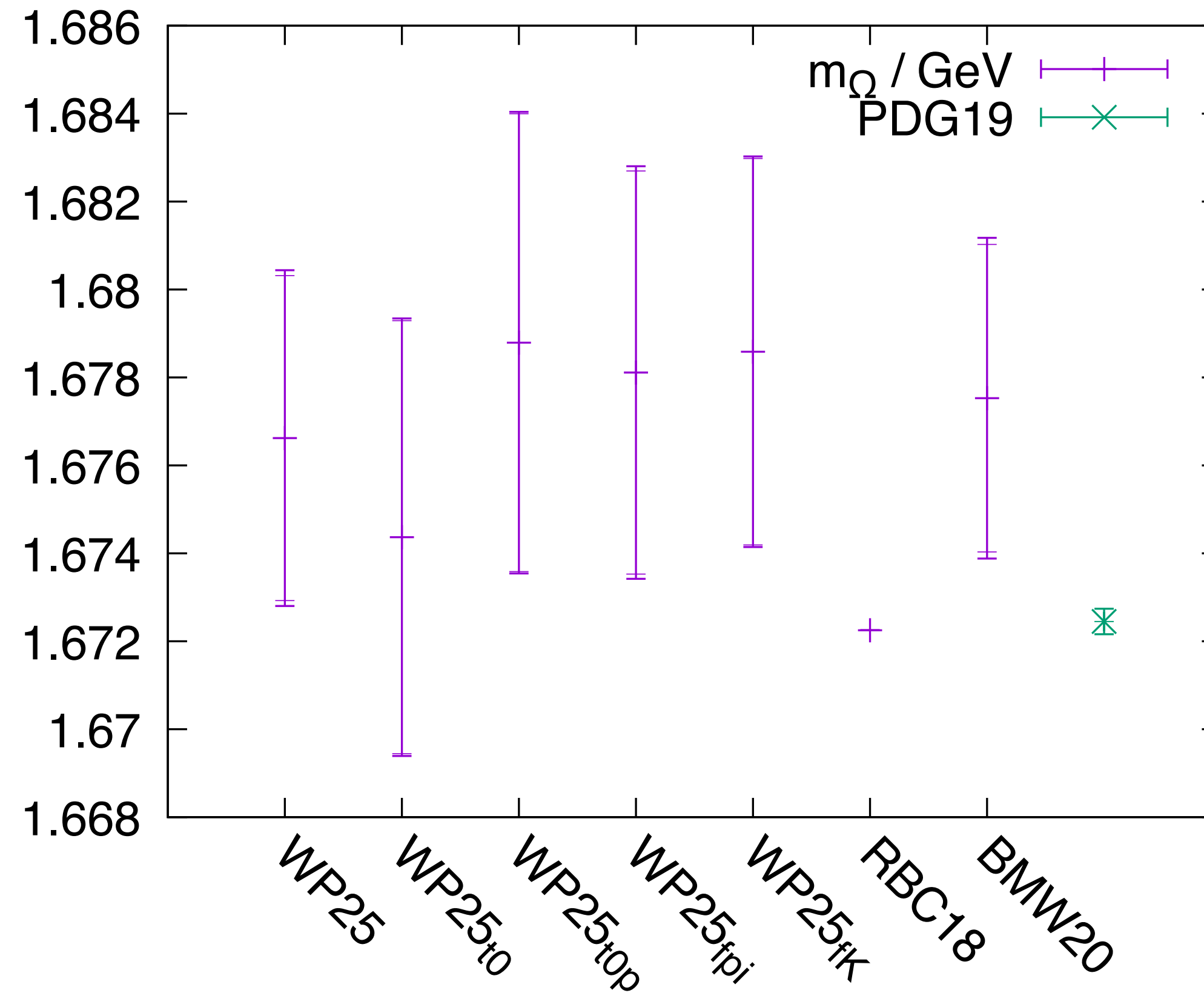
Isospin-symmetric scheme dependence (RBC/UKQCD 26)



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Isospin-symmetric scheme dependence (RBC/UKQCD 26)



$$R_{38K} = \frac{\frac{\partial a_\mu^{(3,8)}}{\partial(m_u-m_d)}}{\frac{\partial M_K}{\partial(m_u-m_d)}} = \frac{\partial a_\mu^{(3,8)}}{\partial \Delta M_K}$$
$$a_\mu^{HVP,38} = a_{\mu,em}^{HVP,38} + \left(\Delta M_K^{phys} - \Delta M_K^{lat,EM} \right) \cdot R_{38K}$$

- R_{38K} is a scheme independent and renormalized quantity¹
- pure strong isospin-breaking
- pheno estimate available
- R_{38K} can serve as cross-check between different collaborations

¹arXiv: 2505.24344 (hep-lat).

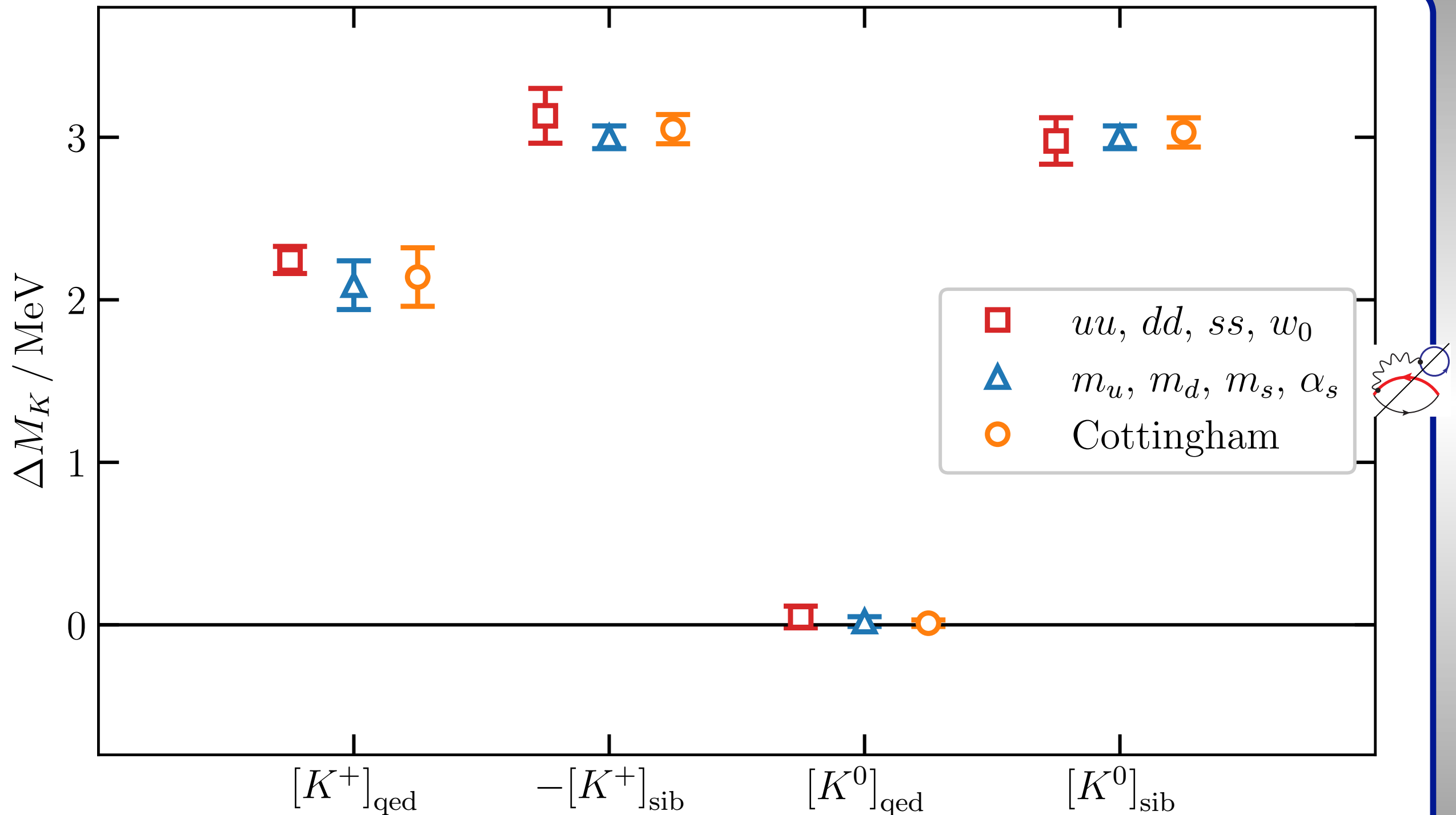
Backup: Scale Setting in Mainz

- isoQCD scheme defined by combination of f_π and f_K
- QCD+QED calculation of the Ω -mass in progress
 - QED_L
 - valence sector partially available
 - sea-quark effects planned
- full baryon octet studied¹
- expansion parameters fixed as in the $QED_L + TMR$ -approach (combination of m_{π^+} , m_{π^0} , m_{K^+} , m_{K^0})²

¹arXiv: 2312.09065 (hep-lat).

²arXiv: 2112.00878 (hep-lat).

Kaon mass decomposition



BMW

GRS [DG et al. '17]

D. Stamen et al. '22

w_0 decomposition from $w_0 F_{ud}$

