
第十届手征有效场论研讨会
2025·南京

金陵台城望秋色，菊花香里忆曾经

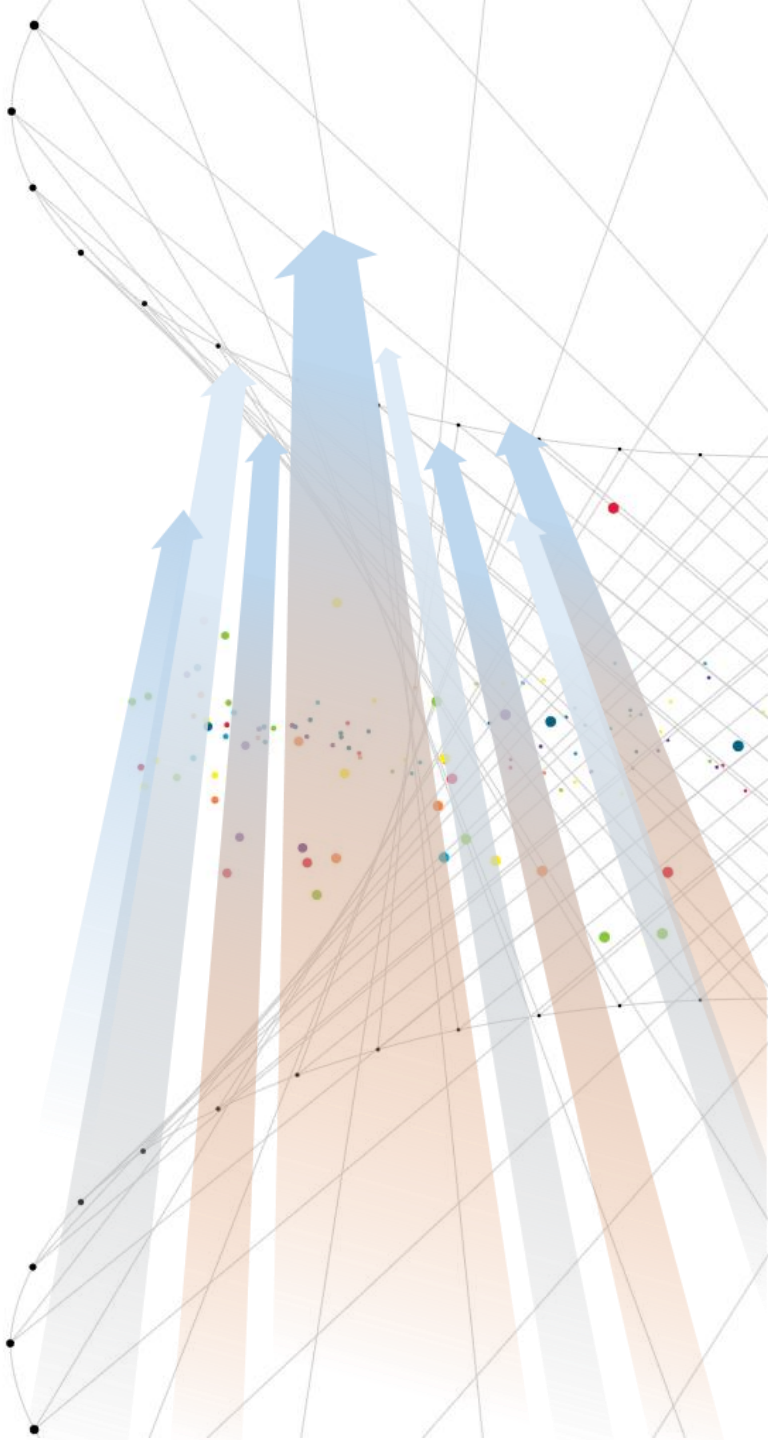
密度大、水平高、范围广：

41个报告+11个青年学者成果展示

Nature, Nature 子刊,PRL,…

三天三个会议室(音乐厅、中大楼、100号);

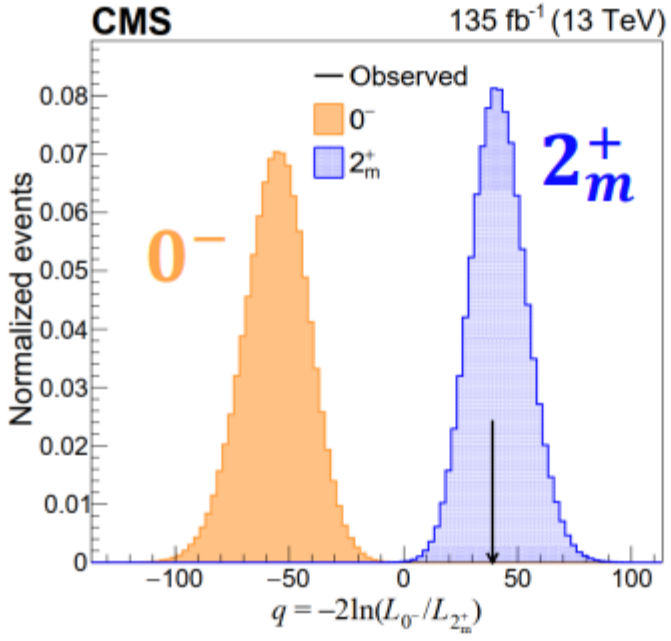
实验+理论+格点

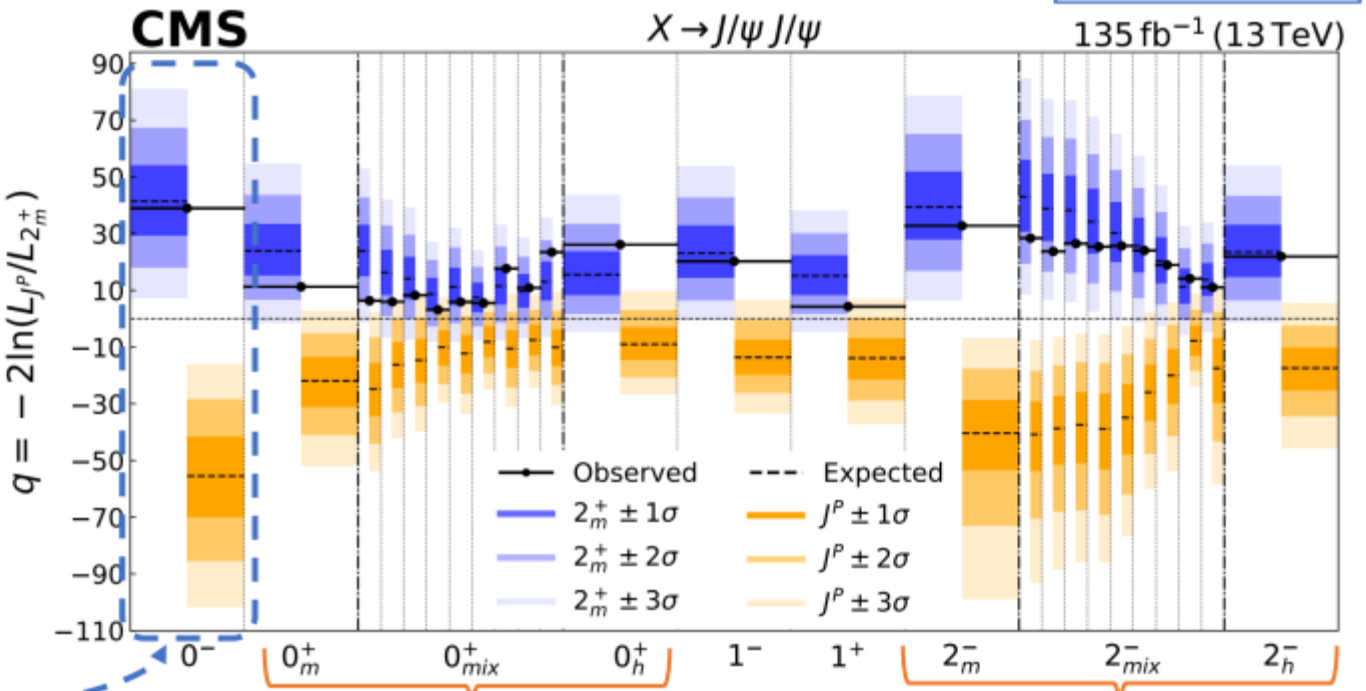


Summary of results

实验：张敬庆

arxiv:2506.07944





- Data consistent with 2^{++}, inconsistent with others
- JPC of the three tetraquark candidates X(6600), X(6900), X(7300)
  - $PC = + +$
  - $J \neq 1$ at > 99% CL; $J \neq 0$ at 95% CL
  - $J > 2$ possible, but highly unlikely, require $L \geq 2$
  - $\boldsymbol{J = 2}$ **consistent**, naively expected $J = 0$

Scan of two 2^{-+} (11 steps)

--No interference (different spin projections)

Scan mixture of two 0^{++} amp. (11 steps)

-- Constructive interf. most conservative

Outline

- Introduction
- $B \to D\bar{D}h(h')$ studies
- One charmonium(like) study
- Pentaquark-related studies
- Summary

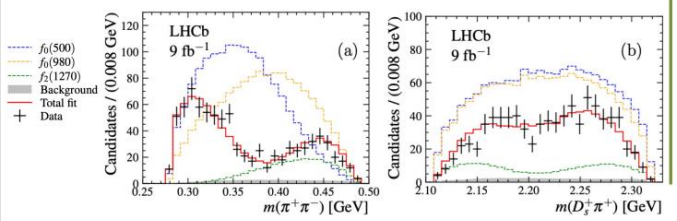
实验：张黎明

Two resonance models can fit the data well

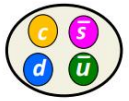
[Sci. Bull. 70 (2025) 1432–1444]

- $f_0(500) + f_0(980) + f_2(1270)$
  - Large contribution from $f_0(980)$ and $f_2(1270)$ above PHSP of $m(\pi\pi)$
  - This model cannot rejected, but implausible

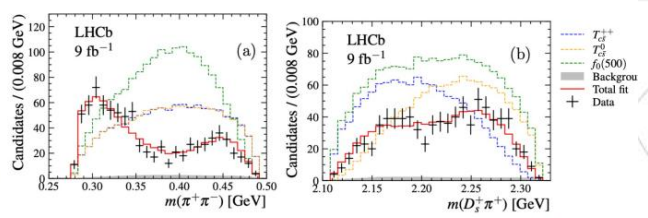
Resonance	Mass (MeV)	Width (MeV)	FF (%)
$f_0(500)$	$376 \pm 9 \pm 16$	$175 \pm 23 \pm 16$	$197 \pm 35 \pm 23$
$f_0(980)$	945.5	167	$187 \pm 38 \pm 43$
$f_2(1270)$	1275.4	186.6	$29 \pm 2 \pm 1$



- $f_0(500) + T_{c\bar{s}}^{++} + T_{c\bar{s}}^{0}$ (new exotics)



Resonance	Mass (MeV)	Width (MeV)	FF (%)
$f_0(500)$	$474 \pm 30 \pm 18$	$224 \pm 23 \pm 16$	$248^{+40}_{-54} \pm 39$
$T_{c\bar{s}}$	$2327 \pm 13 \pm 13$	$96 \pm 16 \pm 23$	$156^{+27}_{-38} \pm 25$



Disparity in Λ decay that reveals ΔI =1/2 rule

Test of CP violation

$$R(\cos\theta_p, \cos\theta_{\bar{p}}) = \frac{1+\alpha_{\Lambda-}\alpha_{\Xi}\cos\theta_p}{1+\alpha_{\Lambda+}\bar{\alpha}_{\Xi}\cos\theta_{\bar{p}}}$$

Test of $\Delta I = 1/2$ rule

$$R(\cos\theta_n, \cos\theta_p) = \frac{1+\alpha_{\Lambda 0}\alpha_{\Xi}\cos\theta_n}{1+\alpha_{\Lambda-}\alpha_{\Xi}\cos\theta_p}$$

The average of the ratio

$$\langle\alpha_{\Lambda 0}\rangle / \langle\alpha_{\Lambda-}\rangle = 0.870 \pm 0.012^{+0.011}_{-0.010}$$

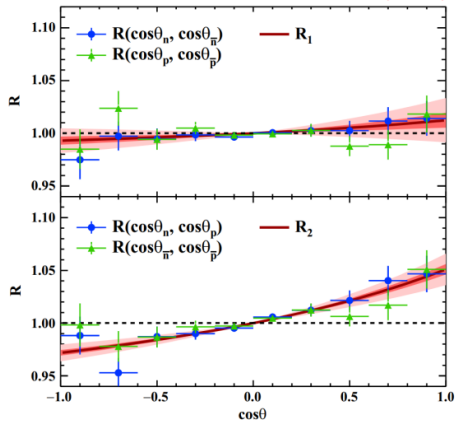
Consistent with kaon decay

$$S_1/S_3 = 28.4 \pm 1.3^{+1.1}_{-1.0} \pm 3.9$$

$$P_1/P_3 = -13.0 \pm 1.4^{+1.1}_{-1.2} \pm 0.7$$

Observed for the first time, different from S-wave

PRL 132, 101801(2024)



实验：
周小蓉
李春花—X(3872)
潘翔—粲介子半轻衰变

More BESIII results of HWRD are coming……

- Study of $\Xi^0 \to \gamma\Sigma^0$
- Study of $\Xi^- \to \gamma\Sigma^-$
- Study of $\Omega^- \to \gamma\Xi^-$
- Study of $\Sigma^0 \to \gamma n$
- Study of $\Sigma^+ \to pe^+e^-$
- Study of $\Sigma^0 \to \Lambda e^+e^-$
- …

Decay modes	Data [19–21, 32, 33]	NRCQM [12]	LFQM [13]	EOMS χPT [14]
$\Lambda \to n\gamma$	−0.16(10)(5)	−0.67(6)	−0.25	[−0.43, 0.15]
$\Sigma^+ \to p\gamma$	−0.652(56)(20)	−0.58(6)	−0.1	[−0.32, −0.27]
$\Sigma^0 \to n\gamma$	···	0.37(4)	−0.22	[−0.70, 0.70]
$\Xi^0 \to \Lambda\gamma$	−0.741(62)(19)	0.72(11)	0.23	[−0.83, −0.59]
$\Xi^0 \to \Sigma^0\gamma$	−0.69(6)	0.33(4)	−0.15	[−0.74, −0.63]
$\Xi^- \to \Sigma^-\gamma$	1.0(13)	···	···	[−0.18, 0.38]

Chin.Phys.Lett. 42, 032401 (2025)

Summary

- Introduce an new method to organize operator in lattice
- Long range force problem
- The pole of T_{cc} from lattice QCD calculation

Table VI. Fitting results of coupling constant c_S and the pole position.

isopsin	potential	$c_S^I[10^{-5}\mathrm{MeV}^2]$	χ^2/dof	$E^{\mathrm{Pole}} - E_{th}[\mathrm{MeV}]$
0	without OPE	-1.05(0.12)	2.75/5	-12.2(4.1)
0	with OPE	-1.55(0.15)	2.35/5	-10.2(2.4)±5.1(3.2)i
1	without OPE	3.37(0.61)	6.15/5	41.9(2.7)± 2.3(0.2)i
1	with OPE	4.42(0.90)	5.55/5	42.5(4.1)± 2.7(0.3)i

格点：
吴佳俊、吕炳楠
庞锦毅、曹雄辉、
牛忠旺

05 Conclusion and outlook

➢ **Build up modified Lüscher formula**

- Extract correct physical information near left-hand cut
- Fast convergency in partial-wave expansion
- Modified effective range expansion has much larger convergence radius

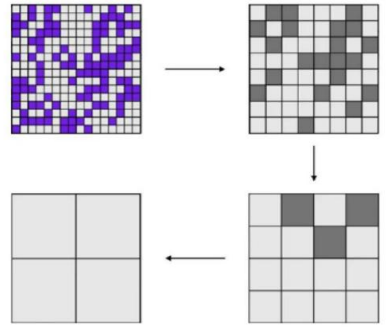
➢ **Give fast convergent method to calculate modified zeta function**

➢ **Apply to OPE potential**

➢ **Outlook: apply modified Lüscher formula to NN and $T_{cc}^{+}(3875)$**

Summary and reflections

- **Nuclear lattice EFT** can be built **without a lattice**
  (Though still solved with a lattice)
- Lattice discretization introduces more complications, e.g., symmetry breaking
  - Restore **translational** & **rotational** invariances using a smearing regulator
  - Restore **Galilean** invariance using counter terms (Similar to Symanzik program)
- Wilson's viewpoint:
  - All contact terms compatible with symmetries should be included to achieve RG invariance
    → **A stringent test for many-body methods**
- EFT principles are beliefs
  however, requiring verifications (done for $A \leq 4$)

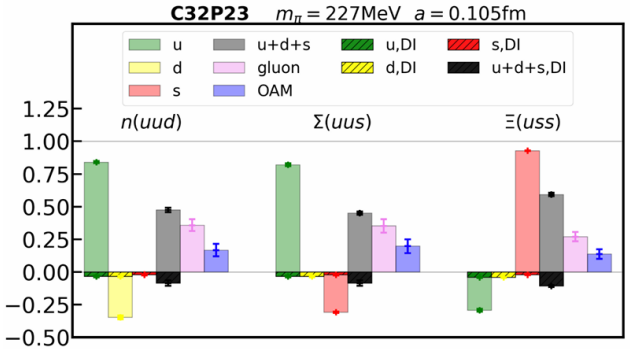


Thanks for your attention!

Summary

- CLQCD ensembles can now provide high precision hadron matrix elements through the blending method;

	Ensemble	L	T	a(fm)	m_π	n_{cfg}	g_A^{u-d}	Propagators	Propagators for 1% error
CLQCD	F64P13	64	128	0.078	134	40	1.24(01)	0.34M	0.11M
CalLAT	a12m130	48	64	0.121	131	1000	1.29(03)	0.03M	0.15M
ETMC	cB211.072.64	64	128	0.080	139	750	1.29(02)	1.71M	5.5M
RQCD	D452	64	128	0.076	156	1000	1.19(25)	0.01M	5.2M
PNDME	a09m130	64	96	0.090	138	1290	1.32(03)	1.69M	11.2M



- Update results on CLQCD ensembles suggest both quark and gluon contribute roughly half of the octet baryon spin;
- Control on the systematic uncertainties are in progress.

Summary & Outlook

➢ **Summary:** we present a first realistic study of low-energy N-V meson (N-J/ψ and N-ϕ) interaction based on lattice QCD calculations near the physical point

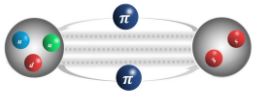
- The potential is found to be attractive at all distances
- Long-range potential→consistent w/ TPE
- Detailed analysis for near-threshold scattering properties

➢ **Outlook:**

- The physical point simulations
- The long-range potential for other hadron pairs

格点：杨一玻 吕岩

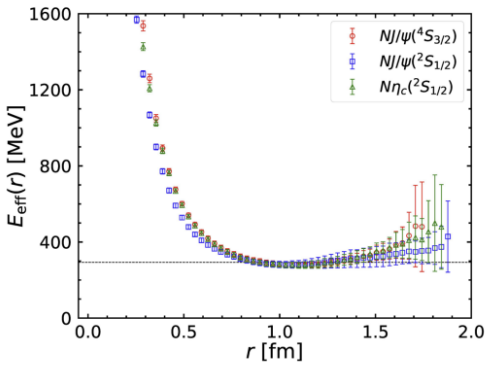
Two-pion-exchange tail



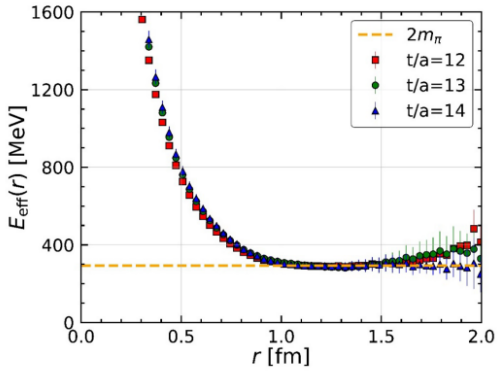
J. Castella and G. Krein, Phys. Rev. D **98**, 014029 (2018)
H. Fujii and D. Kharzeev, Phys. Rev. D **60**, 114039 (1999)
G. Bhanot and M. E. Peskin, Nucl. Phys. B **156**, 391(1979)

$$V(r) = -\alpha \frac{e^{-2m_\pi r}}{r^2} \Rightarrow E_{\text{eff}}(r) = -\frac{\ln\left[-V(r)r^2/\alpha\right]}{r}$$

➢ N-$c\bar{c}$



➢ N-ϕ



- long-range ($r > 1$ fm) potential is indeed dominated by the TPE
- nonperturbative gluon exchange manifests as TPE

Outline

Matching from quark to hadronic operators:

external source vs spurion methods

Gang Li

School of Physics and Astronomy, SYSU

GL, Chuan-Qiang Song, Jiang-Hao Yu, 2507.02538 (hep-ph)

第十届手征有效场论研讨会

October 19, 2025, Nanjing

新物理

尧江明、李刚、马小东、蒋军

General $\Delta B = 1$ nucleon decay operator structures

- Must involve an odd number of light quarks: qqq, $qqqG$, $qqqq\bar{q}$, $\cdots$
- Leading-order interactions: involve only three light quarks
- Only four general triple-quark (without derivative) structures

$$\mathcal{O}_a^{yzw} = (\overline{\Psi_a} q^{\alpha}_{\mathrm{L},y})(\overline{q^{\beta C}_{\mathrm{L},z}} q^{\gamma}_{\mathrm{L},w})\epsilon_{\alpha\beta\gamma}$$

$$\mathcal{O}_b^{yzw} = (\overline{\Psi_b} q^{\alpha}_{\mathrm{R},y})(\overline{q^{\beta C}_{\mathrm{L},z}} q^{\gamma}_{\mathrm{L},w})\epsilon_{\alpha\beta\gamma}$$

$$\mathcal{O}_c^{yzw} = (\overline{\Psi_{c,\mu}} q^{\alpha}_{\mathrm{L},\{y})}(\overline{q^{\beta C}_{\mathrm{L},z\}}} \gamma^{\mu} q^{\gamma}_{\mathrm{R},w})\epsilon_{\alpha\beta\gamma}$$

$$\mathcal{O}_d^{yzw} = (\overline{\Psi_{d,\mu\nu}} q^{\alpha}_{\mathrm{L},\{y})}(\overline{q^{\beta C}_{\mathrm{L},z}} \sigma^{\mu\nu} q^{\gamma}_{\mathrm{L},w\}})\epsilon_{\alpha\beta\gamma}$$

+ their chiral partners with $\mathrm{L} \leftrightarrow \mathrm{R}$

Newly identified structures

- $\overline{\Psi_a}, \overline{\Psi_b}, \overline{\Psi_{c,\mu}}, \overline{\Psi_{d,\mu\nu}}$: combinations of non-QCD fields
- $y, z, w = 1,2,3$: quark flavor indices with $q_{1,2,3} = u, d, s$
- $\{y, z\}$ and $\{y, z, w\}$: total symmetrization of flavor indices

- Form a basis for any triple-quark operators

Yi Liao, XDM, Hao-Lin Wang, arXiv: 2504.14855

奇特强子态：

杨智
肖褚文
陈山
刘雪杰
钟显辉
陈侃
胡欣月
刘明珠
刘志伟
孟璐
王俊璋
严茂俊

CONTENTS

$\bar{D}_s DK$

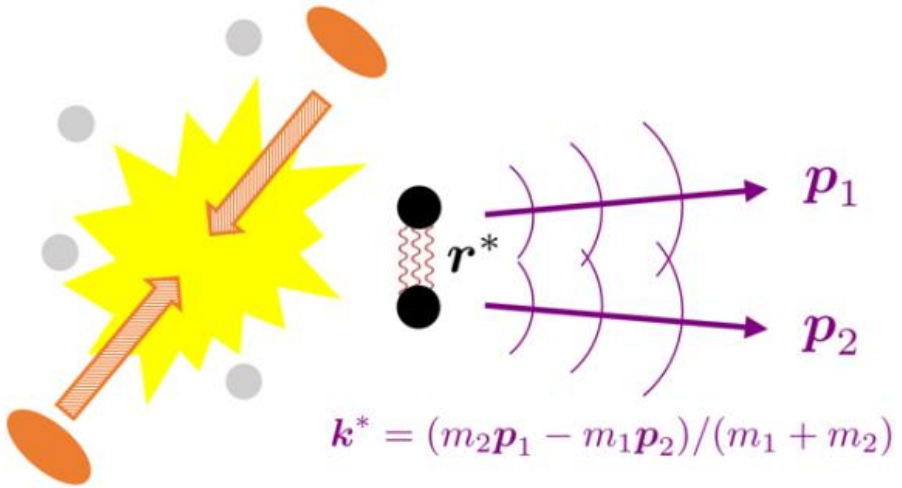
2πDAs

- Twist-2 and twist-3 contributions to the $D_s \to \pi\pi$ ($D_s \to f_0$) form factors at $q^2 = 0$

Form Factors	Twist-2	Twist-3	Total
$\sqrt{q^2}F_0^{(l=0)}(0) = \sqrt{q^2}F_t^{(l=0)}(0)$	$0.20^{+0.02}_{-0.02} - i0.24^{+0.02}_{-0.02}$	$-0.41^{+0.04}_{-0.05} + i0.51^{+0.02}_{-0.04}$	$-0.21^{+0.02}_{-0.01} + i0.27^{+0.03}_{-0.02}$
$\sqrt{q^2}F_0^{(l=2)}(0) = \sqrt{q^2}F_t^{(l=2)}(0)$	$0.27^{+0.03}_{-0.02} + i0.21^{+0.02}_{-0.01}$	$-0.55^{+0.02}_{-0.03} - i0.41^{+0.05}_{-0.04}$	$-0.28^{+0.02}_{-0.02} - i0.20^{+0.02}_{-0.01}$
$f_+(0) = f_0(0)$	$0.20^{+0.03}_{-0.05}$	$0.41^{+0.04}_{-0.06}$	$0.61^{+0.05}_{-0.07}$

- The widths (in unit of 10^{-4}) of $D_s \to [\pi\pi]_S\, e^+\nu$ obtained from $D_s \to [\pi\pi]$ and $D_s \to f_0$ transitions, under the $q\bar{q}$ component assumption.

$D_s \to [\pi\pi]_S\, e^+\nu_e$	$D_s \to [f_0 \to \pi\pi]\, e^+\nu_e$ [23]	Data [25]
$0.81^{+0.34}_{-0.14}$	$18.8^{+4.5}_{-3.8}$	17.2 ± 1.6



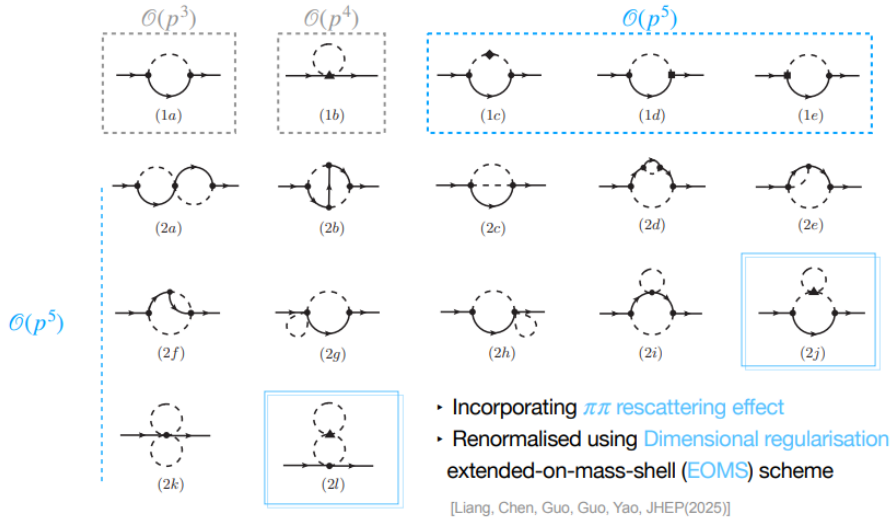
$k^* = (m_2 p_1 - m_1 p_2)/(m_1 + m_2)$

Emission source $S_{12}(r^*)$ Two-particle wavefunction $\psi(k^*, r^*)$

Chiral EFT

姚德良
梁泽锐
任修磊
申时行
彭锐
陆俊旭

The nucleon mass at two-loop order



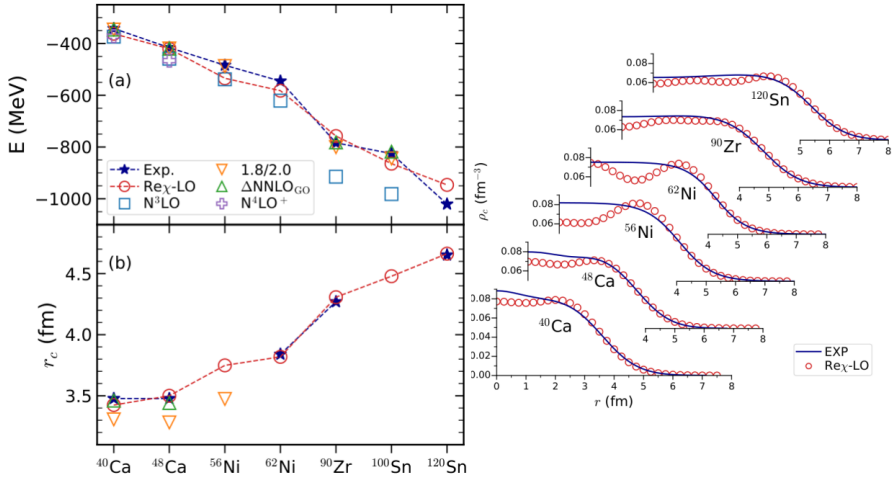
- Incorporating $\pi\pi$ rescattering effect
- Renormalised using Dimensional regularisation and extended-on-mass-shell (EOMS) scheme

[Liang, Chen, Guo, Guo, Yao, JHEP(2025)]

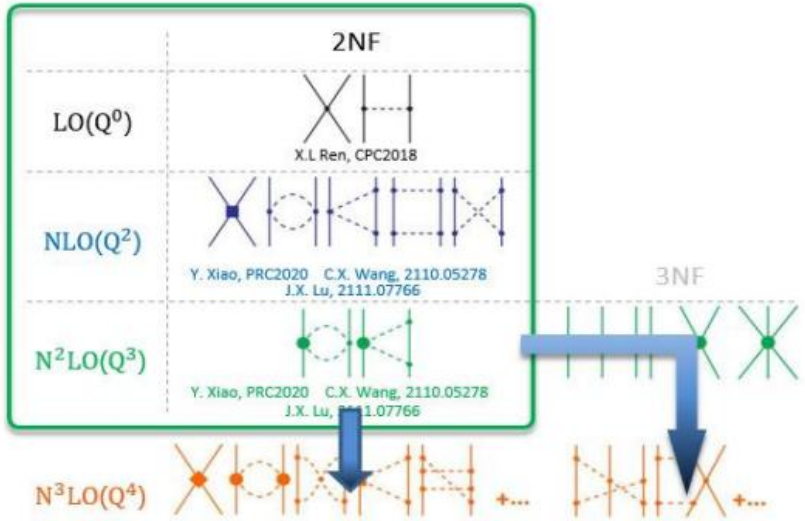
Medium-mass nuclei

- Energy, charge radius, and charge density calculated by RBHF using relativistic LO chiral interaction, in comparison with nonrelativistic ab initio studies.

SS, J.-X. Lu, L.-S. Geng, J. Meng, and W.-J. Zou, arXiv:2507.01257



R-ChNF-N^{3}LO ongoing !



- **N^{3}LO 两体核力基本构建完成**
  - J≥3 高分波相移与Nijmegen相移符合很好
  - NNLO/N3LO几乎重合
  - 非微扰地描述低分波相移
- **相对论三体框架基本搭建完成**
  - 实现LO相对论两体核力描述三体可观测量
  - NLO/NNLO/N3LO高阶核力
  - 三体力相关问题

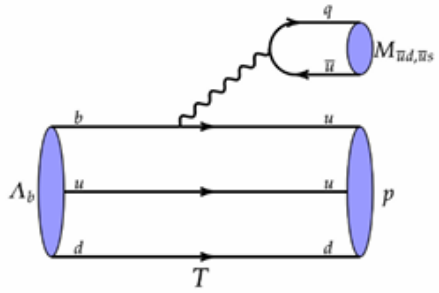
Others

熊佳颖
李衡智
余杰鑫
马垚
景豪杰
Craig Roberts
于福升

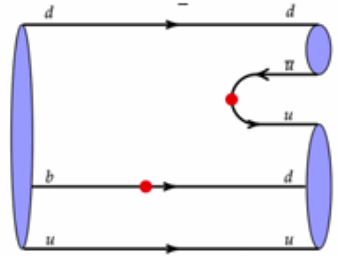
CPV cancelled between S- and P-waves

$$\mathscr{M} = \bar{u}_p \, (\, S \, + \, P \, \gamma_5 \,) \, u_{\Lambda_b}$$

tree:



penguin:



$$q^\mu \, \bar{u}_p \gamma_\mu (1-\gamma_5) u_{\Lambda_b} \to m_{\Lambda_b} \bar{u}_p (1+\gamma_5) u_{\Lambda_b}$$

$$\bar{u}_p (1+\gamma_5)(\gamma_5 \not{p}_\pi)(\not{p}_{\Lambda_b}\gamma_5)\not{p}_p (1-\gamma_5) u_{\Lambda_b} \to \bar{u}_p (1-\gamma_5) u_{\Lambda_b}$$

$$S_T \approx P_T$$

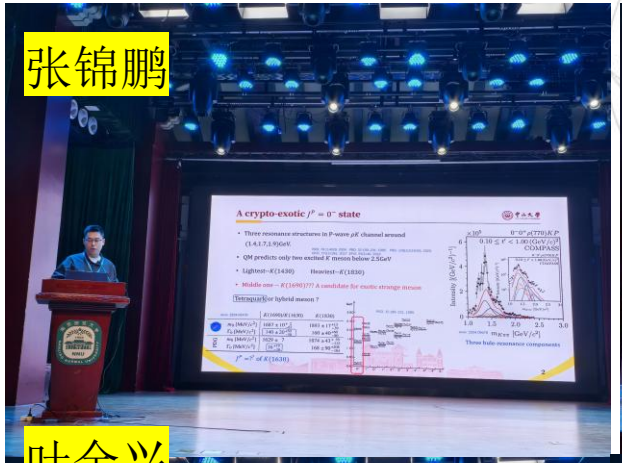
$$S_{PC_2} \approx -P_{PC_2}$$

- **CPVs of S- and P-waves might be as large as B mesons, but cancelled with each other.**
- **Baryons have spinors and Dirac structures, and thus partial waves.**

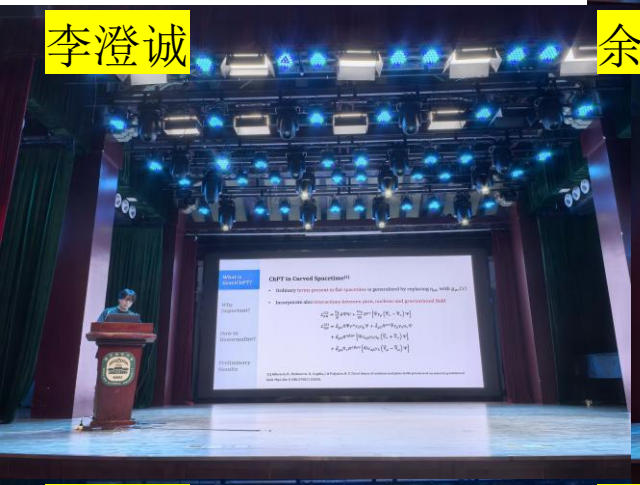
J.J.Han, J.X,Yu, Y.Li, H.n.Li, J.P.Wang, Z.J.Xiao, **FSY**, 2409.02821 (PRL)

青年学者成果展示


张书玮
The 10th Workshop on Chiral Effective Field Theory
QCD Sum Rule Study of Topped Mesons within Heavy Quark Effective Theory
Collaborators: Xuan Luo, Hui-Min Yang, Hua-Xing Chen
Speaker: Shu-Wei Zhang
Southeast University
，，，，，，，，


张锦鹏
A crypto-exotic $J^P = 0^-$ state


翟擎宇
第十届手征有效场论研讨会
Covariant three-body scattering equation
翟擎宇 @ 北京航空航天大学
2025·10 南京


李澄诚
ChPT in Curved Spacetime!?!


余康
Finite Volume Hamiltonian method : connecting EFT and lattice study
Kang Yu
Collaborators: Jin-Jun Wu, Guang-Juan Wang, Zhi Yang
based on JHEP04(2025)198


叶全兴
Resonance parameters of the vector charmonium-like state G(3900)
Quanxing Ye (叶全兴)
第十届手征有效场论研讨会
南京, 南京师范大学 2025.10.18
Phys. Rev. D 112 (2025), 014015


王金葆
Prominent Enhancement of Axion Thermalization Rate from axion-kaon Interaction
based on: J. B. Wang, Z. H. Guo and H. Q. Zhou, Phys. Rev. D 112, no.3, L031701 (2025).
Jin-Bao Wang, Zhi-Hui Guo, Hai-Qing Zhou


李志鑫
Evaluation of Muon g-2 from $\tau \to \pi\pi\nu$ Data
Report: Zhi-Xin Li(李志鑫)
Hebei Normal University (河北师范大学)
October 18, 2025


王积昊
Accurate nucleon iso-vector scalar and tensor charge at physical point
Speaker: Ji-Hao Wang
Institute of Theoretical Physics, Chinese Academy of Sciences
CLQCD


宋传强
Chiral Effective Field Theory for Coherent Neutrino-Nucleus Scattering
Chun-Qiang Song (IHAS)
10th ChEFT (Nan Jing)


卢多多
A Study of $X(6900)$ as a $[cc][\bar{c}\bar{c}]$ Tetraquark State Decaying into $2J/\psi$
卢多多

国际会议: Chiral Dynamics

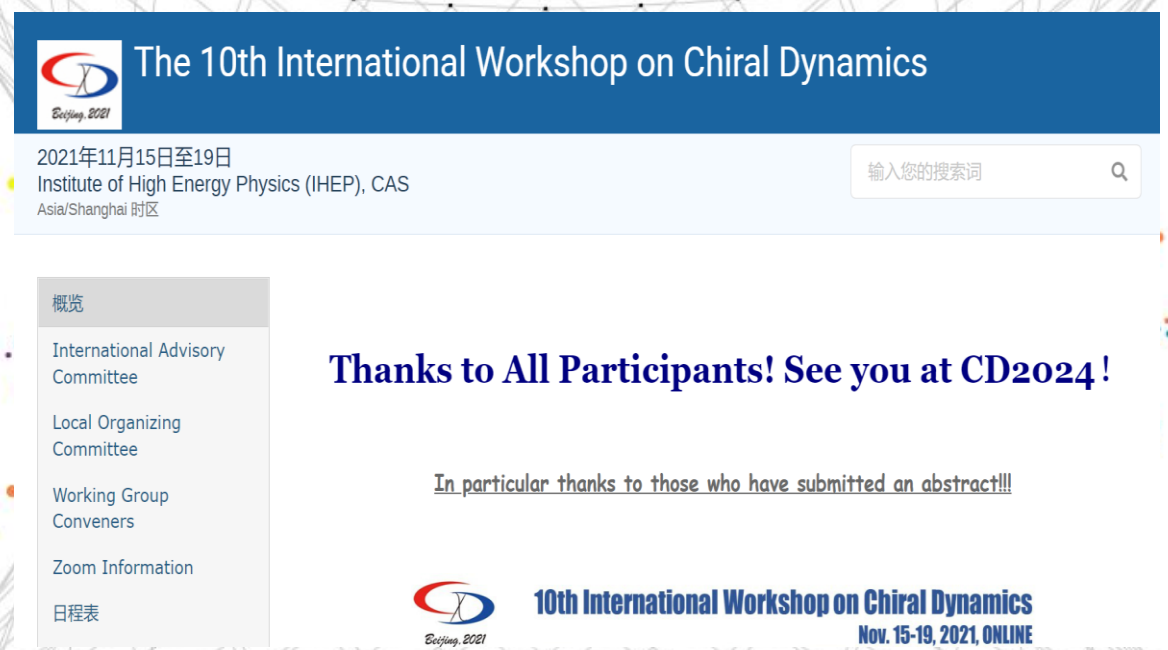
① MIT, 1994

② Mainz, 1997

③ Jefferson Lab, 2000

④ Jefferson Lab, 2012

⑤ Bonn, 2003



⑥ Duke, 2006

⑦ Bern, 2009

⑧ Jlab, 2012

⑨ Pisa, 2015

⑩ Duke, 2018

⑪ IHEP, 2021

⑫ Bochum 2024

国际会议：Chiral

① Chiral00: Possible Existence of the Sigma Meson and its Implications to Hadron Physics, YITP (Kyoto University), Japan

② Chiral01: Chiral Fluctuations on Hadronic Matter, Orsay, France

③ Chiral02: Chiral Restoration in Nuclear Medium, YITP (Kyoto University), Japan

④ Chiral05: Chiral Restoration in Nuclear Medium, RIKEN, Japan

⑤ Chiral07: Chiral Symmetry in Hadron and Nuclear Physics, Osaka, Japan

⑥ Chiral10: International Workshop on Chiral Symmetry in Hadrons and Nuclei, Valencia, Spain

⑦ **Chiral13: Chiral symmetry in hadrons and nuclei, Beijing, China**

国内会议：Chiral EFT

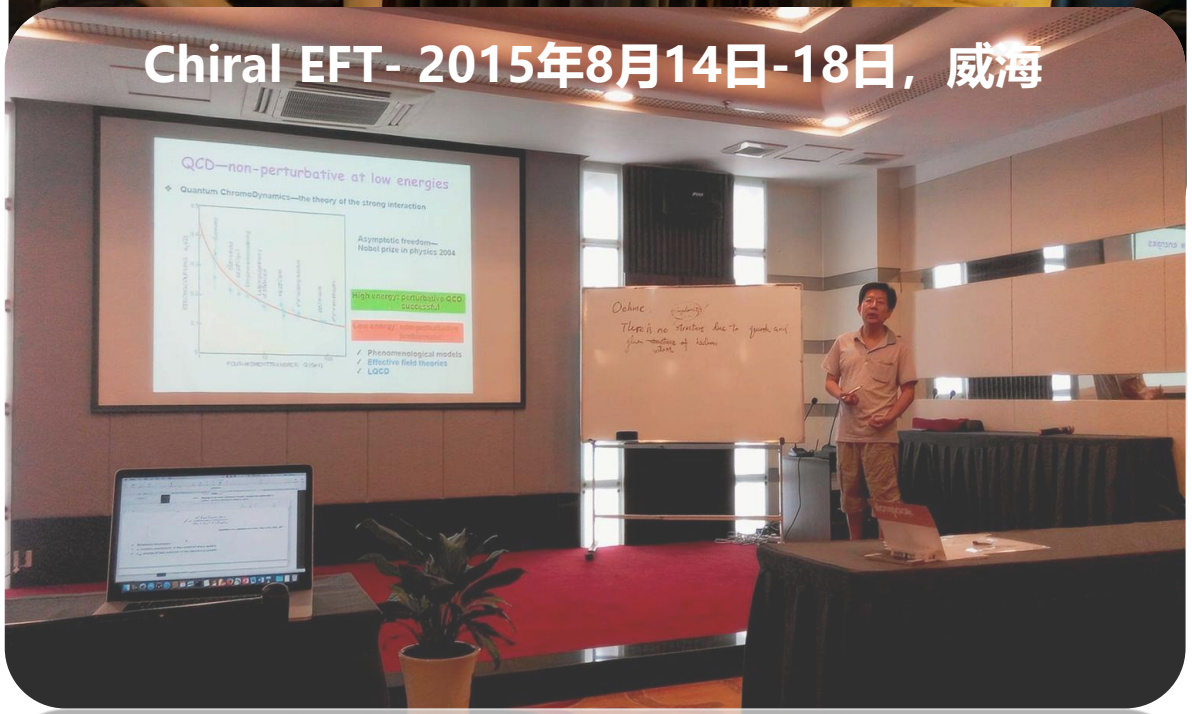
- **2014--2025**
- **会议顾问委员会**：

冯旭（北京大学）、贾宇（中国科学院高能物理研究所）、廖益（华南师范大学）、王青（清华大学）、赵强（中国科学院高能物理研究所）、郑汉青（四川大学）、邹冰松（清华大学）

会议组织委员会：

耿立升（北京航空航天大学）、郭奉坤（中国科学院理论物理研究所）、郭志辉（河北师范大学）、梁伟红（广西师范大学）、刘伯超（西安交通大学）、刘言锐（山东大学）、龙炳蔚（四川大学）、马永亮（南京大学）、毛鸿（杭州师范大学）、王恩（郑州大学）、姚德良（湖南大学）、周智勇（东南大学）

Chiral EFT-2014年8月14日-16日，成都



Chiral EFT- 2015年8月14日-18日，威海


2016手征有效场论研讨会合影 中国·桂林 2016.10
13
Chiral EFT- 2016年10月28日-11月2日，桂林

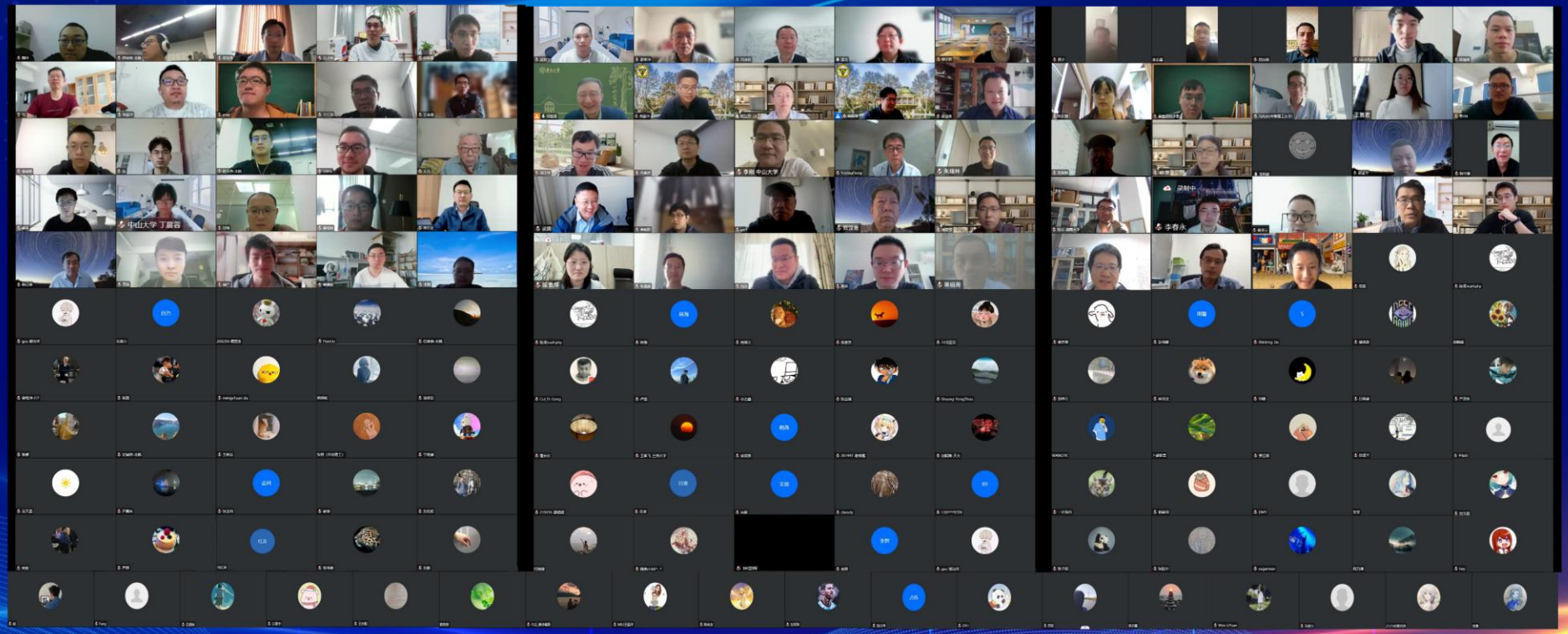
Chiral EFT-2017年10月13日-10月17日，西安


2018年手征有效场论研讨会
2018.08.28-2018.09.02
Chiral EFT- 2018年8月28日-9月3日，长春
长春维纳斯专业数码转机摄影 中国摄影家李维宪先生摄影 13331690312 82709763

Chiral EFT- 2019年11月1日-11月6日，杭州

第七届手征有效场论研讨会合影(南京)

2022年10月14日-10月17日



主办单位：北京大学、北京航空航天大学、广西师范大学、杭州师范大学、吉林大学、
南开大学、清华大学、四川大学、山东大学、西安交通大学、
中国科学院高能物理研究所、中国科学院理论物理研究所

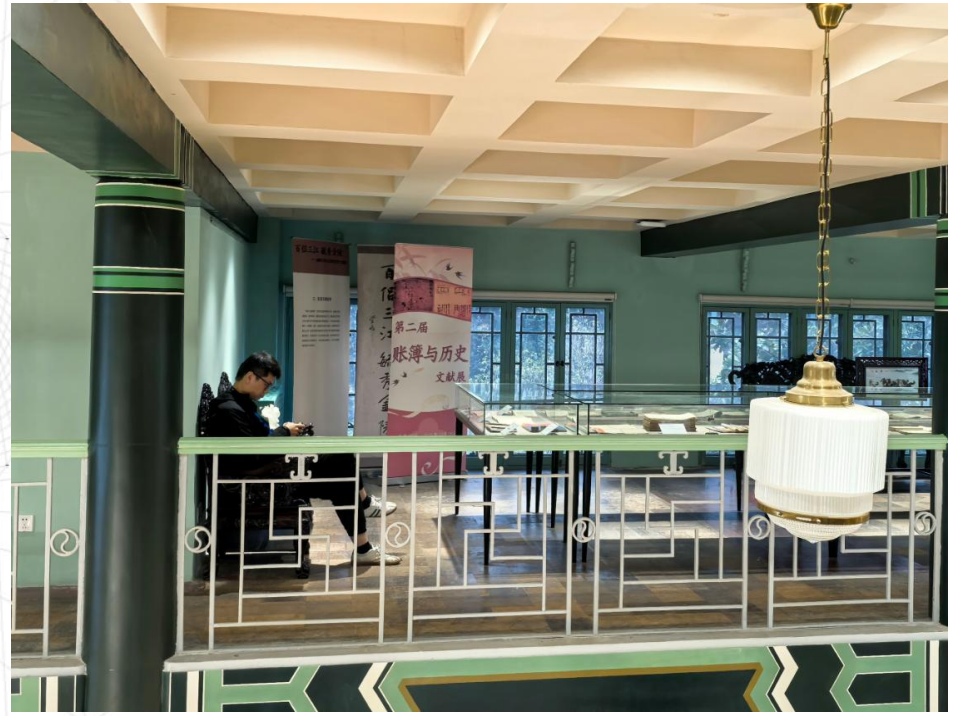
承办单位：东南大学

Chiral EFT- 2023年10月27日-10月31日，开封


第 九 届 手 征 有 效 场 论 研 讨 会
湖 南 · 长 沙
2024年10月19日
Chiral EFT- 2024年10月18日-10月22日，长沙

感谢地方组委会和志愿者的辛勤付出

地方组织委员会（按学校、姓氏拼音顺序排名）：
东南大学：陈殿勇、陈华星、孟璐、周海清、周智勇
南京大学：马永亮
南京师范大学：**何秉然**、何军、黄虹霞、黄琦、黄日俊、金立刚、李春花、刘宁、卢致廷、王徽、王琦、王烨凡、吴永成、武雷、邢志鹏、易凯、张敬庆、钟彬、朱瑞林



第十一届手征有效场论研讨会

2026 兰州