

粒子物理前沿卓越创新中心 青年骨干成员考评

新强子态相关理论研究

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2017年12月2日

● 教育经历

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- ◆ 2015. 09–
中国科学院理论物理研究所 副研究员

研究内容及发表文章统计

- 主要密切联系BESIII, Belle, LHCb等实验和格点QCD研究低能强相互作用：新强子态、强子相互作用、QCD的低能有效场论；并在QCD θ 项、Higgs有效场论等方面也有文章发表
- 已发表文章80余篇。其中，在Phys. Rev. Lett.发表6篇，在Phys. Rev. D (Rapid Communications)发表3篇，在Eur. Phys. J. A发表综述1篇，邀请综述Hadronic Molecules 即将在 Rev. Mod. Phys. 发表。

Citations summary

Generated on 2017-11-30

117 papers found, 115 of them citeable (published or arXiv)

Citation summary results	Citeable papers	Published only
Total number of papers analyzed:	115	84
Total number of citations:	2,696	2,608
Average citations per paper:	23.4	31.0
Breakdown of papers by citations:		
Renowned papers (500+)	0	0
Famous papers (250-499)	0	0
Very well-known papers (100-249)	4	4
Well-known papers (50-99)	12	12
Known papers (10-49)	50	48
Less known papers (1-9)	32	19
Unknown papers (0)	17	1
h_{HEP} index [2]	30	30

过去一年主要研究内容



文章列表 (2016. 09–2017. 08 期间共完成11篇)

一、新强子态:

1. *Hadronic molecules*, **FKG**, C. Hanhart, U.-G. Meißner, Q. Wang, Q. Zhao, B.-S. Zou, Rev. Mod. Phys., in print (2018) [arXiv:1705.00141]
2. *Effects of Z_b states and bottom meson loops on $\Upsilon(4S) \rightarrow \Upsilon(1S, 2S)\pi^+\pi^-$ transitions*, Y.-H. Chen, M. Cleven, J. T. Daub, **FKG**, C. Hanhart, B. Kubis, U.-G. Meißner, B.-S. Zou, Phys. Rev. D 95 (2017) 034022.
3. *Decay behaviors of the P_c hadronic molecules*, Y.-H. Lin, C.-W. Shen, **FKG**, B.-S. Zou, Phys. Rev. D 95 (2017) 114017.
4. *Disentangling the role of the $Y(4260)$ in $e^+e^- \rightarrow D^*\bar{D}^*$ and $D_s^*\bar{D}_s^*$ via line shape studies*, S.-R. Xue, H.-J. Jing, **FKG**, Q. Zhao, submitted to PLB [arXiv:1708.06961].

二、S 矩阵的解析性质与新强子态:

5. *Discussion on triangle singularities in the $\Lambda_b \rightarrow J/\psi K^- p$ reaction*, M. Bayar, F. Aceti, **FKG**, E. Oset, Phys. Rev. D 94 (2016) 074039.
6. *Role of a triangle singularity in the $\gamma p \rightarrow K^+ \Lambda(1405)$ reaction*, E. Wang, J.-J. Xie, W.-H. Liang, **FKG**, Phys. Rev. C 95 (2017) 015205.

三、系统研究重轻介子之间的相互作用与标量粲介子：

7. *Subtraction of power counting breaking terms in chiral perturbation theory: spinless matter fields*, M.-L. Du, **FKG**, U.-G. Meißner, JHEP 1610 (2016) 122.
8. *Aspects of the low-energy constants in the chiral Lagrangian for charmed mesons*, M.-L. Du, **FKG**, U.-G. Meißner, D.-L. Yao, Phys. Rev. D 94 (2016) 094037.
9. *Study of open-charm 0^+ states in unitarized chiral effective theory with one-loop potentials*, M.-L. Du, **FKG**, U.-G. Meißner, D.-L. Yao, Eur. Phys. J. C 77 (2017) 728.
10. *Two-pole structure of the $D_0^*(2400)$* , M. Albaladejo, P. Fernandez-Soler, **FKG**, J. Nieves, Phys. Lett. B 767 (2017) 465.

四、格点QCD相关的有效场论：

11. *Connected and disconnected contractions in pion–pion scattering*, N. R. Acharya, **FKG**, U.-G. Meißner, C.-Y. Seng, Nucl. Phys. B 922 (2017) 480.

会议邀请报告等

- 讲习班授课：
 - *Hadronic bound states and effective field theories*, the 55th International Winter School on Theoretical Physics, Admont, Austria
- 大会报告：
 - *Traps in hadron spectroscopy*, HADRON2017
 - *Hadronic molecules with heavy quarks*, 第17届全国中高能核物理会议
 - *Review on heavy meson spectroscopy*, 第7届亚太少体物理会议
- 其余邀请报告或 seminar 十余次
- 受邀参加第9届 Chiral Dynamics 国际会议的国际顾问委员会
- 参与会议组织：
 - 2017手征有效场论研讨会
 - 第7届亚太少体物理会议
- 参与 The Belle-II Physics Book “重夸克偶素” 部分撰写
- 为CPC, EPJA, EPJC, PLB, PRD等各杂志审稿20余篇



Feng-Kun Guo,^{1,5,*} Christoph Hanhart,^{2,†} Ulf-G. Meißner,^{3,2,‡} Qian Wang,^{3,§} Qiang Zhao,^{4,5,6,¶} and Bing-Song Zou^{1,5,**}

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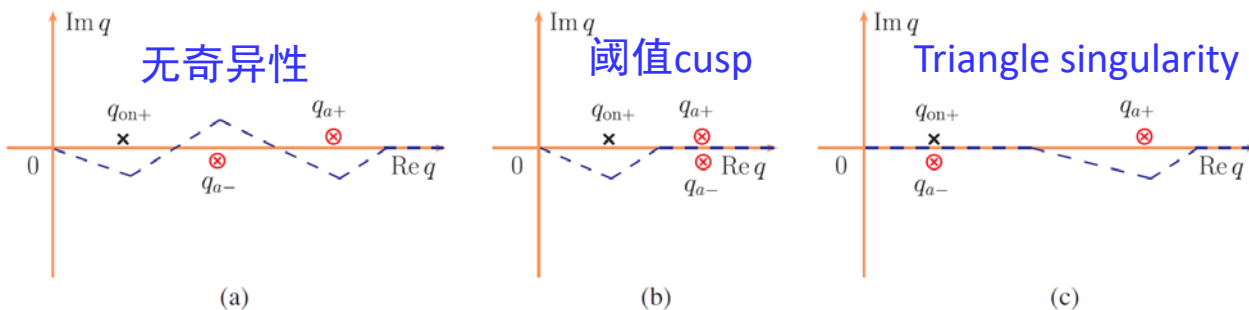
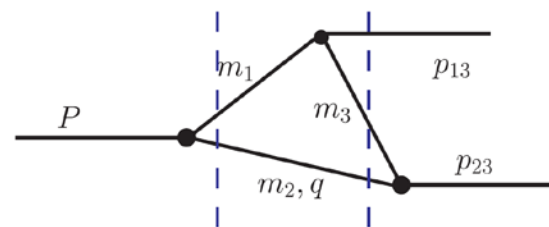
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代表工作二： triangle singularity 与 $P_c(4450)$

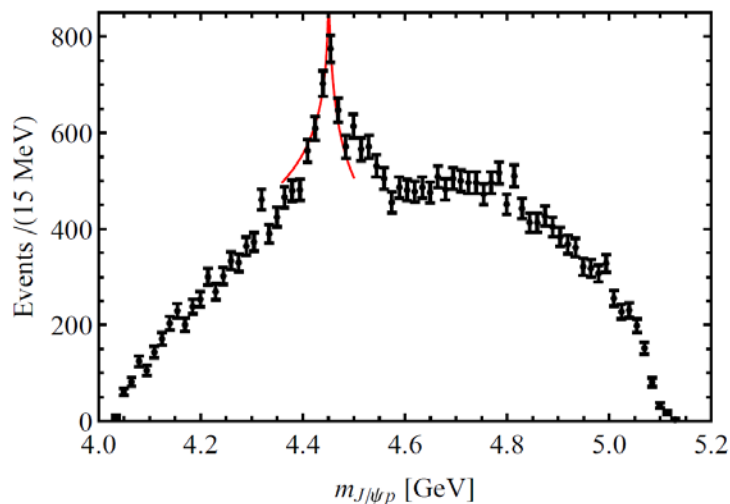
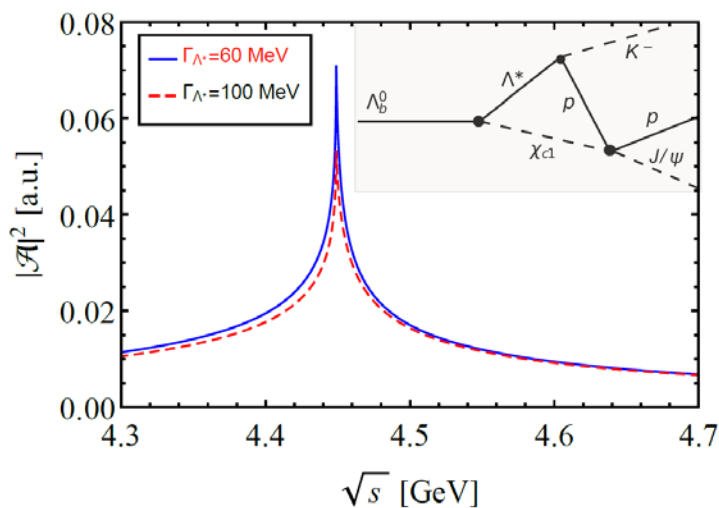
PHYSICAL REVIEW D **94**, 074039 (2016)

Discussion on triangle singularities in the $\Lambda_b \rightarrow J/\psi K^- p$ reaction

Melihat Bayar,^{1,2} Francesca Aceti,² Feng-Kun Guo,³ and Eulogio Oset²



- 推导了一个物理直观的 triangle singularity (TS) 公式
- 对于 $P_c(4450)$ ：只有量子数为 $3/2^+$ 或 $1/2^+$ 时，TS 才能表现为窄的尖峰



代表工作三： $D_0^*(2400)$ 其实是两个粒子

Two-pole structure of the $D_0^*(2400)$

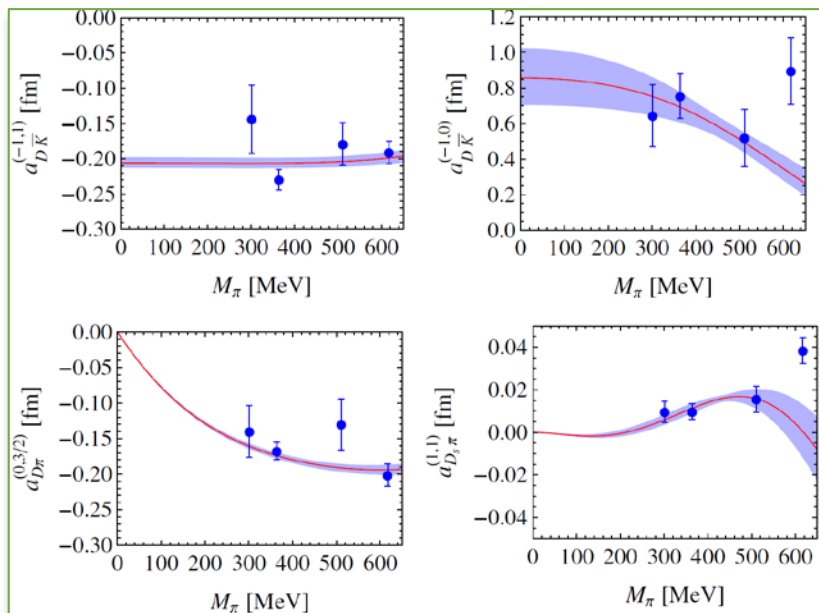
M. Albaladejo, P. Fernandez-Soler, **FKG**, J. Nieves, Phys. Lett. B 767 (2017) 465

$D_0^*(2400)^0$	$I(J^P) = 1/2(0^+)$
$J^P = 0^+$ assignment favored (ABE 2004D).	
PDG2016	
$D_0^*(2400)^0$ MASS	2318 ± 29 MeV (S = 1.7)
$D_0^*(2400)^0$ WIDTH	267 ± 40 MeV

红线：“马后炮”

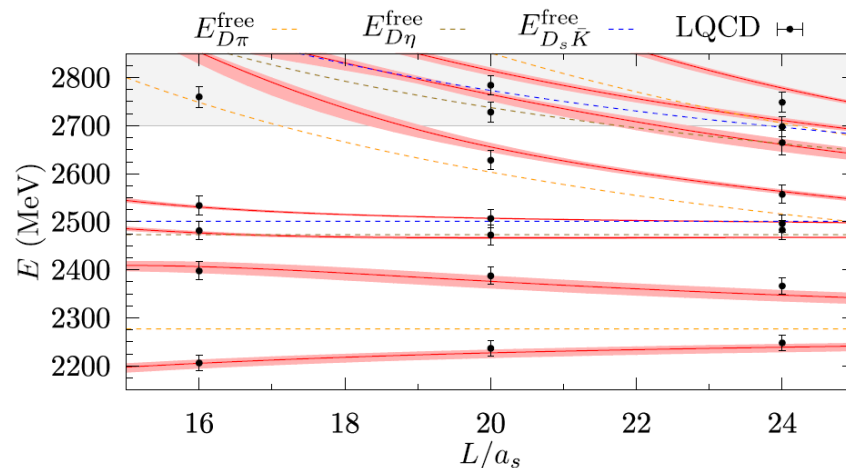
数据：G. Moir et al.,
JHEP1610(2016)011

- 我们在么正化手征微扰论中用以前确定的参数得到的“预言”与最新的格点计算完全相符



参数确定：

L.Liu,K.Orginos, FKG et al., PRD87(2013)014508



- 振幅有两个不同的极点，对应于两个共振态：

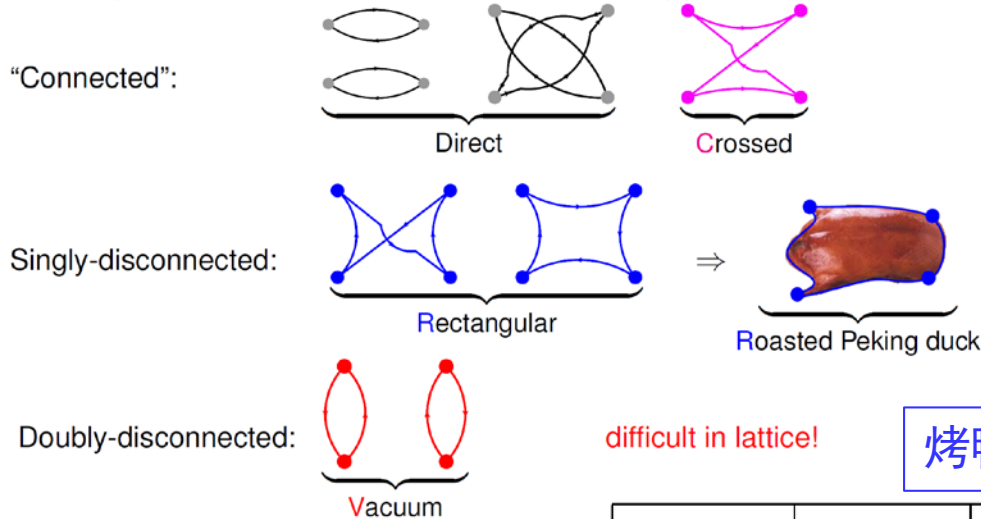
Masses	M (MeV)	$\Gamma/2$ (MeV)
lattice	2264^{+8}_{-14}	0
	2468^{+32}_{-25}	113^{+18}_{-16}
physical	2105^{+6}_{-8}	102^{+10}_{-12}
	2451^{+36}_{-26}	134^{+7}_{-8}

代表工作四： $\pi\pi$ 散射中的连通和非连通图的贡献

Connected and disconnected contractions in pion-pion scattering

N. R. Acharya, **FKG**, U.-G. Meißner, C.-Y. Seng, Nucl. Phys. B 922 (2017) 480.

Various possible Wick contractions for $\pi\pi$ scattering:



- 格点QCD中非连通图计算非常困难
- 我们在手征微扰论中分别计算了 $\pi\pi$ 散射中的各种Wick收缩的贡献

difficult in lattice!

烤鸭图 (R) 只要有贡献就总是最重要的!

	$10^2 a_X^{00}$	$10^2 a_X^{20}$	$10^2 M_\pi^2 a_X^{11}$	$10^4 M_\pi^4 a_X^{02}$	$10^4 M_\pi^4 a_X^{22}$
D	0.35(24)	0.35(24)	0.02(26)	3.5(2.0)	3.5(2.0)
C	2.41(12)	-4.81(23)	0	0.95(96)	-1.9(1.9)
R	14.8(7)	0	3.59(26)	6.7(7.8)	0
V	2.48(38)	0	0	0.8(7.3)	0
Total	20.0(2)	-4.46(7)	3.61(4)	11.9(8)	1.54(71)

与新强子态相关的工作计划

- 密切联系BESIII, Belle(-II), LHCb等实验研究
 - 强子分子态相关物理问题
 - 发展区分 triangle singularity 与共振态的方法
 - 重味介子性质
- 密切联系格点QCD, 进行相关有效场论研究

请 指 正, 谢 谢!