

# Baiyang Zhang

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Henan University  
School of Mathematics and Statistics  
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Henan Province, PRC

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Email: byzhang@henu.edu.cn  
Date of birth: Nov 18th, 1988

## Education

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### **Institute of Modern Physics, Chinese Academy of Sciences**

2012 – 2018

Ph.D. in Theoretical Physics

Advisor: Pengming Zhang

Dissertation title: Effects of Quark-gluon Interactions Induced by  
Nontrivial Topological Structures in the QCD Vacuum

### **Lanzhou University**

2007 – 2011

B.Sc in Physics

## Current Position

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September 2022 – current

Postdoctoral researcher in the group of Prof. Bjarke Gudnason, School of Mathematics and Statistics,  
Henan University.

## Previous Employment

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**September 2019 – September 2022**

Postdoctoral researcher in the group of Prof. Aleksey Cherman, School of Physics and Astronomy,  
University of Minnesota.

**January 2018 – August 2019**

Postdoctoral researcher in the group of Prof. Wolf György, Wigner Research Centre for Physics,  
Hungarian Academy of Sciences.

## Conferences/Talks

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**2025 National Symposium on Frontiers and Interdisciplinary Topics in Theoretical  
Physics**

April 2025

Talk: A Passive Perspective of Linearized Soliton Perturbation Theory

<b>Light-Cone 2024: Hadron Physics in the EIC era</b> Talk: Deconfinement in $SU(N)$ gauge theory with a massive adjoint fermion	Nov 2024
<b>The 4th Symposium on Quantum Field Theory and Its Applications</b> Talk: Linearized Solitonic Perturbation Theory	Nov 2024
<b>Southwest–Northwest China Joint Symposium on Theoretical Physics</b> Talk: Topological Sectors in 2-4D Scalar Model	Aug 2024
Invited Talk at Sun Yat-sen University Talk: A Stacky Perspective of Topological Sectors in 2D Scalar Model	June 2024
<b>Instantons, Holography, Strong Interactions and Nuclear Physics</b> Talk: A Categorical Survey of Linearized Kink Perturbation Method	June 2023
Invited Talk at Henan University Talk: Deconfining Phase Transition Cased by Topological Effects	August 2022
Nuclear Theory Group Seminar, University of Minnesota Talk: Cut-off Kinks, a Hamiltonian Based Approach	April 2022
Nuclear Theory Group Seminar, University of Minnesota Talk: Deconfinement in $SU(N)$ Gauge Theory with a Massive Adjoint Fermion	May 2021
<b>Balaton Workshop 2019</b> Talk: Spin Formalism and the Hadronic Density Matrix in Dilepton Production	September 2019
<b>9th Workshop on Hadron physics in China and Opportunities Worldwide</b> Talk: The Pauli Form Factor Induced by Instanton Effects in QCD	July 2017
<b>The Sixth Workshop on Hadron Physics in China and Opportunities in US</b> Talk: Spin-flavor Study With EIC@HIAF	July 2014
<b>The 21st International Symposium on Spin Physics</b> Poster: Flavor Separation for Polarized Parton Distribution Functions	October 2014

## Research Projects Led

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<b>National Natural Science Foundation of China, Youth Fund</b> Non-perturbative Study of the Confinement of Mass Deformed $SU(N)$ Super Yang-Mills Theory on $\mathbb{R}^3 \times S^1$ Manifold	Jan 2024 - Dec 2026
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## Other Grants

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### Mid-China Talent Initiative, Special Program for Overseas Postdoctoral Researchers

Feb 2025

## Publications

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The author marked with an asterisk (\*) is the corresponding author.

1. *On Emergent Directions in Weakly Coupled, Large  $N_c$   $\mathcal{N} = 1$  SYM*, Baiyang Zhang\*, Aditya Dhummuntara, JHEP 05 (2025) 012.
2. *Inhomogeneous and simultaneous Diophantine approximation in Cantor series expansions*, Zhipeng Shen, Baiyang Zhang\*, Journal of Mathematical Analysis and Applications, Volume 550, (2025), 129589.
3. *The Domain Wall Soliton's Tension*, J. Evslin\*, H. Liu and Baiyang Zhang, (2024), arXiv:2412.20814 [hep-th].
4. *Constructing A Finite Tension Domain Wall in  $\phi_4^4$* , J. Evslin, H. Guo, H. Liu, Baiyang Zhang, (2024), arXiv:2411.10099 [hep-th].
5. *A (2+1)-Dimensional Domain Wall at One-Loop*, Jarah Evslin, Kehinde Ogundipe, Baiyang Zhang\*, Hengyuan Guo, JHEP 05 (2024) 098.
6. *Meson production from kink-meson scattering*, Hui Liu, Jarah Evslin\*, Baiyang Zhang, Phys. Rev. D 107 (2023) 025012.
7. *Cut-Off Kinks*, Jarah Evslin, Andrew B. Royston, Baiyang Zhang\*, JHEP 01 (2023) 073.
8. *Flavor-dependent EMC effect from a nucleon swelling model*, Rong Wang\*, Raphaël Dupre, Yin Huang, Baiyang Zhang, Silvia Niccolai, Phys. Rev. C 99 (2019) 035205.
9. *The Compactified Principal Chiral Model's Mass Gap*, Jarah Evslin\*, Baiyang Zhang, Phys. Rev. D 98 (2018) 085016.
10. *Gluonic Distribution in the Constituent Quark and Nucleon Induced by the Instantons*, Baiyang Zhang\*, Nikolai Kochelev, Hee-Jung Lee, Pengming Zhang, Phys. Part. Nuclei Lett. (2018) 15:371.
11. *The Pauli Form Factor of Quark and Nontrivial Topological Structure of the QCD*, Baiyang Zhang\*, Andrey Radzhabov, Nikolai Kochelev, Pengming Zhang, Phys. Rev. D 96 (2017) 054030.
12. *Generalized Skyrme Model with the Loosely Bound Potential*, S. B. Gudnason\*, Baiyang Zhang, N. Ma, Phys. Rev. D 94 (2016) 125004 .
13. *Gluonic Structure of the Constituent Quark*, N. Kochelev\*, Hee-Jung Lee, Baiyang Zhang, Pengming Zhang, Phys. Lett. B 757 (2016) 420-425.
14. *Nonperturbative Collisional Energy Loss of Heavy Quarks in Quark-gluon Plasma*, N. Kochelev\*, Hee-Jung Lee, Y. Oh, Baiyang Zhang, Pengming Zhang, Phys. Rev. C 93 (2016) 021901.
15. *Anomalous Pion Production Induced by Nontrivial Topological Structure of QCD Vacuum*, Kochelev\*, Hee-Jung Lee, Baiyang Zhang, Pengming Zhang, Phys. Rev. D 92 (2015) 034025.

## Professional Service

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Co-organizer	Fall 2023
The 8th Workshop on Chiral Effective Field Theory	
Co-organizer	Fall 2023
Instantons, Holography, Strong Interactions and Nuclear Physics	
Co-organizer	Fall 2020
Nuclear Theory Seminar: University of Minnesota	
Organizer	Spring 2021 – Fall 2021
Nuclear Theory Seminar: University of Minnesota	
Organizer	Fall 2016 - Fall 2018
Graduate Student Quantum Field Theory Seminar	
Institute of Modern Physics, Chinese Academy of Sciences	

## Teaching Experience

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Mathematical Economics (English)	Fall 2023
Henan University, School of Economics	

## References

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### **Prof. Pengming Zhang**

**School of Physics and Astronomy**

**Sun Yat-sen University**

Zhuhai Campus of Sun Yat-Sen University

Tangjiawan, Zhuhai, Guangdong, China 519082

email: zhangpm5@mail.sysu.edu.cn

### **Prof. Jarah Evslin**

**Institute of Modern Physics, Chinese Academy of Sciences**

509 Nanchang Road, Lanzhou, Gansu,

China 730000

email: jarah@impcas.ac.cn

**Prof. Aleksey Cherman**

**School of Physics and Astronomy**

**University of Minnesota, The Twin Cities**

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Minneapolis, MN 55455

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# 张柏阳

## 个人信息

性别	男	出生年月	1988年11月
籍贯	甘肃省兰州市	婚姻状况	未婚
电话号码	15194622750	电子邮件	<a href="mailto:byzhang@henu.edu.cn">byzhang@henu.edu.cn</a>
技术职称	副高级	个人主页	<a href="https://www.mathlimbo.net">https://www.mathlimbo.net</a>
政治面貌	群众		

## 工作经历

博士后	2022.9至今
河南大学，数学与统计学院	
博士后	2019.9 – 2022.9
明尼苏达大学，物理与天文学院	
博士后	2017.12 – 2019.9
匈牙利科学院，魏格纳理论物理中心	

## 教育背景

博士（硕博连读）	2012.8 – 2017.12
中国科学院，近代物理研究所	
研究方向：理论物理	
本科	2007.9 – 2011.8
兰州大学，物理科学学院	
研究方向：理论物理	

## 研究兴趣

本人研究兴趣为高能理论物理和数学物理，主要包括如下方向：

- （拓扑）非微扰解的量子化问题。我们致力于发展一套适用于孤子背景的微扰理论，即线性孤子微扰论（Linearized Soliton Perturbation Theory, LSPT），以系统地研究扭折区（kink sector）物理量的高阶量子修正
- 复现理论（Resurgence Theory）在拓扑孤子区的应用。复现理论将渐进展开与非微扰效应解析地联系起来，与微扰孤子围绕方法相结合，提供了计算孤子区非微扰贡献的新思路
- SU(N)超对称Yang-Mills理论在不同流形（例如 $\mathbb{R}^3 \times \mathbb{S}^1$ ）中的拓扑结构，特别是复合孤子（如双孤子解）及其对系统非微扰性质（如色禁闭）的贡献
- 非广延Tsallis熵在物理唯象理论及一般统计方法中的应用

## 主持基金项目

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### 国家自然科学基金青年科学基金项目：

项目名称：对质量形变SU(N)超对称Yang-Mills理论在 $\mathbb{R}^3 \times \mathbb{S}^1$ 流形上禁闭性质的非微扰研究

资助金额：30.00万元/三年

资助时间：2024年1月 – 2026年12月

### 其它基金：

项目名称：河南省中原英才计划（博士后海外引才专项）

资助金额：60.00万元/三年

获得时间：2025年2月

## 文章发表情况

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备注：（1）星号（\*）标明通讯作者；（2）遵循研究方向惯例，国际合作文章中署名按照姓氏字母排列

1. *On Emergent Directions in Weakly Coupled, Large  $N_c$   $\mathcal{N} = 1$  SYM*, Baiyang Zhang\*, Aditya Dhumuntarao, JHEP 05 (2025) 012.
2. *Inhomogeneous and simultaneous Diophantine approximation in Cantor series expansions*, Zhipeng Shen, Baiyang Zhang\*, Journal of Mathematical Analysis and Applications, Volume 550, (2025), 129589.
3. *The Domain Wall Soliton's Tension*, J. Evslin\*, H. Liu and Baiyang Zhang, (2024), arXiv:2412.20814 [hep-th].
4. *Constructing A Finite Tension Domain Wall in  $\phi_4^4$* , J. Evslin, H. Guo, H. Liu, Baiyang Zhang, (2024), arXiv:2411.10099 [hep-th].
5. *A (2+1)-Dimensional Domain Wall at One-Loop*, Jarah Evslin, Kehinde Ogundipe, Baiyang Zhang\*, Hengyuan Guo, JHEP 05 (2024) 098.
6. *Meson production from kink-meson scattering*, Hui Liu, Jarah Evslin\*, Baiyang Zhang, Phys. Rev. D 107 (2023) 025012.
7. *Cut-Off Kinks*, Jarah Evslin, Andrew B. Royston, Baiyang Zhang\*, JHEP 01 (2023) 073.
8. *Flavor-dependent EMC effect from a nucleon swelling model*, Rong Wang\*, Raphaël Dupre, Yin Huang, Baiyang Zhang, Silvia Niccolai, Phys. Rev. C 99 (2019) 035205.
9. *The Compactified Principal Chiral Model's Mass Gap*, Jarah Evslin\*, Baiyang Zhang, Phys. Rev. D 98 (2018) 085016.
10. *Gluonic Distribution in the Constituent Quark and Nucleon Induced by the Instantons*, Baiyang Zhang\*, Nikolai Kochelev, Hee-Jung Lee, Pengming Zhang, Phys. Part. Nuclei Lett. (2018) 15:371.
11. *The Pauli Form Factor of Quark and Nontrivial Topological Structure of the QCD*, Baiyang Zhang\*, Andrey Radzhabov, Nikolai Kochelev, Pengming Zhang, Phys. Rev. D 96 (2017) 054030.

12. *Generalized Skyrme Model with the Loosely Bound Potential*, S. B. Gudnason\*, Baiyang Zhang, N. Ma, Phys. Rev. D 94 **(2016)** 125004 .
13. *Gluonic Structure of the Constituent Quark*, N. Kochelev\*, Hee-Jung Lee, Baiyang Zhang, Pengming Zhang, Phys. Lett. B 757 **(2016)** 420-425.
14. *Nonperturbative Collisional Energy Loss of Heavy Quarks in Quark-gluon Plasma*, N. Kochelev\*, Hee-Jung Lee, Y. Oh, Baiyang Zhang, Pengming Zhang, Phys. Rev. C 93 **(2016)** 021901.
15. *Anomalous Pion Production Induced by Nontrivial Topological Structure of QCD Vacuum*, Kochelev\*, Hee-Jung Lee, Baiyang Zhang, Pengming Zhang, Phys. Rev. D 92 **(2015)** 034025.

### 参加学术会议及交流访问

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#### 学术会议报告:

<b>2025年全国理论物理前沿与交叉科学研讨会（长沙）</b> 报告题目: A Passive Perspective of Linearized Soliton Perturbation Theory	2025.4
<b>Light-Cone 2024: Hadron Physics in the EIC era（惠州）</b> 报告题目: Deconfinement in SU(N) gauge theory with a massive adjoint fermion	2024.11
<b>第四届量子场论及应用研讨会（广州）</b> 报告题目: Introduction to Linearized Solitonic Perturbation Theory	2024.11
<b>西南西北理论物理联合研讨会（昆明）</b> 报告题目: A Stacky Perspective of Topological Sectors in $\phi^4$ Scalar Model	2024.6
<b>Instantons, Holography, Strong Interactions and Nuclear Physics（开封）</b> 报告题目: A Categorical Survey of Linearized Kink Perturbation Method	2023.6
<b>Balaton Workshop 2019（蒂豪尼,匈牙利）</b> 报告题目: Spin Formalism and the Hadronic Density Matrix in Dilepton Production	2019.9
<b>9th Workshop on Hadron physics in China and Opportunities Worldwide（南京）</b> 报告题目: The Pauli Form Factor Induced by Instanton Effects in QCD	2017.7
<b>The 21st International Symposium on Spin Physics（北京）</b> 海报展示: Flavor Separation for Polarized Parton Distribution Functions	2014.10
<b>The Sixth Workshop on Hadron Physics in China and Opportunities in US（兰州）</b> 报告题目: Spin-flavor Study With EIC@HIAF	2014.7

#### 其它邀请报告:

郑州大学，邀请报告 报告题目: Introduction to Linearized Soliton Perturbation Theory	2025.1
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西安交通大学，邀请报告 报告题目: Perturbation Theory in Non-perturbative Sectors	2024.10
西南交通大学，邀请报告 报告题目: Quantization of One-kink Sector	2024.10
烟台大学，邀请报告 报告题目: Quantization of One-kink Sector	2024.9
中山大学，邀请报告 报告题目: A Stacky Perspective of Topological Sectors in 2D Scalar Model	2024.6
河南大学，邀请报告 报告题目: Deconfining Phase Transition Cased by Topological Effects	2022.8
明尼苏达大学，学术报告 报告题目: Cut-off Kinks, a Hamiltonian Based Approach	2022.4
明尼苏达大学，学术报告 报告题目: Deconfinement in $SU(N)$ Gauge Theory with a Massive Adjoint Fermion	2021.5

## 学术活动

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### (参与) 组织会议:

1. 参与组织学术会议: 第七届强子谱和强子结构研讨会  
地点: 河南大学  
时间: 2023年10月27日 – 10月31日
2. 参与组织学术会议: 瞬子、全息、强相互作用与核物理  
地点: 河南大学  
时间: 2023年6月9日 – 6月11日
3. 组织明尼苏达大学理论核物理组学术报告  
地点: 明尼苏达大学双城校区  
时间: 2020年秋季学期、2021年春季学期, 每周一次报告 + 讨论

## 教学经历

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- **Mathematical Economics(数学经济学)** 2023年秋季  
授课对象: 国际交流生 (本科)  
主要职责: 课程主讲人  
授课语言: 英文  
授课内容: 经济学中的数学方法, 包括数学分析、线性代数及概率论等

## 推荐人

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**张鹏鸣 教授**

物理与天文学院，中山大学

通讯地址：广东省珠海市香洲区唐家湾

中山大学珠海校区

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**Prof. Aleksey Cherman**

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