

Yi Yin

Center for Theoretical Physics
Massachusetts Institute of Technology
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Curriculum Vitae

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Education

- **U. Illinois, Chicago** Chicago, IL, USA
Ph.D. in Physics May. 2014
– Advisor: Prof. Misha Stephanov
– Thesis: “QCD in Extreme Environments and Heavy-ion Collisions”
- **U. Illinois, Chicago** Chicago, IL, USA
M.Sc in Physics May. 2010

Professional Experience

- **Postdoctoral Associate**
Center for Theoretical Physics, Massachusetts Institute of Technology, Sep. 2016 - Present
– Supervisor: Prof. Krishna Rajagopal
- **Postdoctoral Associate**
Nuclear Theory Group, Brookhaven National Laboratory, Aug. 2014 - Aug. 2016
– Supervisor: Prof. Dimitri Kharzeev/Dr. Raju Venugopalan
- **Research Assistant**
Physics Department, U. Illinois, Chicago, Jan. 2010 - May. 2014
– Supervisor: Prof. Misha Stephanov
- **Visiting Research Assistant**
Nuclear Theory Group, Stony Brook University, Oct. 2013 - Nov. 2013
– Supervisor: Prof. Dimitri Kharzeev

Research Interests

- QCD phase diagram and critical point, critical fluctuations and their observable consequences in heavy ion collisions.
- Chiral anomaly and its macroscopic manifestations, anomalous transport and topological fluctuations of non-Abelian gauge theories.
- Field theory in extreme background fields and non-equilibrium dynamics.

GRANTS

- **Provost & Deiss Awards for Graduate Research**
Graduate College, University of Illinois at Chicago, Amount: \$3000; Dates: Fall. 2013
– For proposal “Chiral Magnetic Effect in Quark Gluon Plasma”

Awards and Honors

Young Research Fellowship, Quark Matter 17 Committee,	2016
Dean’s scholar Fellowship, U. Illinois, Chicago,	2012 – 2013
James Kouvel Fellowship, U. Illinois, Chicago,	2012
Outstanding TA Awards, U. Illinois, Chicago,	2009
Paul M. Racciah Awards, U. Illinois, Chicago,	2007
Fellowship for Excellent Academic Performance, Wuhan University,	2003 – 2005

Synergistic activities

- Referee (since 2013) for: Physical Review Letters, Physics Letter B, Physics Review C, Physics Review D, Nuclear Physics B, Journal of High Energy Physics and Annals of Physics.
- Co-organizer:
 - Nuclear Theory Seminar at Brookhaven National Laboratory (Fall, 2015 - Fall, 2016).
- Working with following graduate students while a postdoc:
 - Andrey Sadofyey (MIT, co-authored one paper in *JHEP* and one paper in *Phys. Rev. D* respectively)
 - Jasmine Brewer (MIT)

- Shuzhe Shi (U. Indiana at Bloomington)
- Dennis Bazow (Ohio State University)

Presentations

Overview

As of Nov. 2016, I was invited to give 15 seminars and 16 talks at conferences, workshops and summer schools.

Presentations in 2017

1. Oral presentation in the parallel session, “Quark Matter 2017”, Chicago, IL, Feb. 5th - Feb. 11rd.

Presentations in 2016

2. Nuclear Theory Seminar, Stony Brook University, Stony Brook, NY, Nov. 9th.
3. Nuclear and Particle Theory Seminar, Center for Theoretical Physics, MIT, Cambridge, MA, Oct. 24th.
4. Workshop on “Exploring the QCD Phase Diagram through Energy Scans”, Institute of Nuclear Theory, University of Washington, Seattle, WA, Oct. 5th.
5. “Beam Energy Scan Physics”, RHIC/AGS user’s meeting, Brookhaven National Laboratory, Upton, NY, June. 8th.
6. Topical Workshop on Beam Energy Scan, Indiana University, Bloomington, IN, May, 9th.
7. Nuclear Theory Seminar, Ohio State University, Columbus, OH, Mar. 28th.
8. Astronomy, Particle and Nuclear Theory Seminar, University of Connecticut, Storrs, CT, Mar. 21st.
9. Nuclear Theory Seminar, Institute of Nuclear Theory, University of Washington, Seattle, WA, Feb. 29th.
10. “QCD Chirality Workshop”, University of California, Los Angeles, CA, Feb. 23rd
11. “Opportunities for Exploring Longitudinal Dynamics in Heavy Ion Collisions at RHIC”, Brookhaven National Laboratory, Upton, Jan. 20-22nd.

Presentations in 2015

12. Nuclear Theory Seminar, University of Maryland, College Park, MD, Dec. 3rd.
13. Oral presentation in the parallel session, “Young Researcher Symposium”, Brookhaven National Laboratory, Upton, Nov. 17th.

14. Oral presentation in the parallel session, “Quark Matter 2015”, Kobe Fashion Mart, Kobe, Japan, Sep. 27th - Oct. 3rd. (travel cancelled due to unexpected emergency).
(**Comment:** Quark Matter is the largest meeting in the field. In 2015, less than 30% of submitted theoretical abstracts are selected for oral presentations.)
15. Nuclear theory seminar, Columbia University, New York, NY, Sep. 21st .
16. Lunch seminar, RIKEN-RBRC center, Upton, NY, June. 18th.
17. “Beam Energy Scan and Associated Theory”, Brookhaven National Laboratory, Upton, NY, June. 10th.
18. Nuclear Theory Seminar, Stony Brook University, Stony Brook, NY, Apr. 23th.
19. “Theory and Modeling for the Beam Energy Scan”, Brookhaven National Laboratory, Upton, NY, Feb. 26-27th.
20. “Frontiers of Hadronic Physics: Brains Circulate workshop”, Brookhaven National Laboratory, Upton, NY, Feb. 25th.
21. “The Workshop on Chirality, Vorticity and Magnetic Field in Heavy Ion Collisions”, University of California, Los Angeles, CA, Jan. 21st-23rd.

Presentations in 2014

22. “Thermal Photons and Dileptons in Heavy-Ion Collisions” Workshop, RIKEN/BNL Research Center, Upton, NY, Aug. 20th.
23. “School of Collective Dynamics in High Energy Collisions ”, Lawrence Berkeley National Laboratory , Berkeley, CA, Jun. 11th.
24. Nuclear Theory Seminar, Brookhaven National Laboratory, Upton, NY, Feb. 28th.
25. “Quantum Anomalies and hydrodynamics” Workshop, Simons center for Geometry and Physics, Stony Brook, NY, Feb. 17th.
26. Nuclear Theory Seminar, Center of Exploring Energy and Matter, Bloomington, IN, Feb. 7th.

Presentations in 2013

27. Nuclear Theory Seminar, Stony Brook University, Stony Brook, NY, Nov. 21st.
28. “Midwest Theory Get-Together” Conference, Argonne National Laboratory, Dupage County, IL, Sep. 6th.
29. Nuclear Physics and RIKEN Theory Seminar, Brookhaven National Laboratory, Upton, NY, Aug. 9th.
30. Nuclear Theory Seminar, Stony Brook University, Stony Brook, NY, Aug. 8th.

Presentations in 2011

31. “INT Summer School on the Applications of String Theory”, Institute for Nuclear Theory, Seattle, WA, Jul. .
32. “Physics Festival”, University of Illinois, Chicago, IL, Feb. .

Participation in Workshops, Conferences and Summer Schools

2016

1. “Recent RHIC and LHC results and their implications for heavy ion physics in the 2020’s”, Massachusetts Institute of Technology, Cambridge, MA, Oct. 28-29.
2. “Exploring the QCD Phase Diagram through Energy Scans”, Institute of Nuclear Theory, University of Washington, Seattle, WA, Oct. 3-7th
3. “Beam Energy Scan Physics”, RHIC/AGS user’s meeting, Brookhaven National Laboratory, Upton, NY, June. 7-10 th.
4. “Topical Workshop on Beam Energy Scan”, Indiana University, Bloomington, IN, May, 9-11th.
5. “High pT Physics in the RHIC-LHC Era”, Brookhaven National Laboratory, Upton, Apr. 12-15.
6. “QCD Chirality Workshop”, University of California, Los Angeles, CA, Feb. 23-26th.
7. “Opportunities for Exploring Longitudinal Dynamics in Heavy Ion Collisions at RHIC”, Brookhaven National Laboratory, Upton, Jan. 20-22nd.

2015

8. “Young Researcher Symposium”, Brookhaven National Laboratory, Upton, Nov. 17th.
9. “Gauge Field Topology: From Lattice Simulations and Solvable Models to Experiment”, Simons Center for Geometry and Physics, Stony Brook, NY, Aug. 17-21.
10. “RHIC & AGS Annual Users’ Meeting”, Brookhaven National Laboratory, Upton, NY, Jun. 9-12.
11. “Collectivity in Small Colliding Systems with High Multiplicity” Workshop, RIKEN/BNL center, Upton, NY, Mar. 4-6.
12. “Theory and Modeling for the Beam Energy Scan” Workshop, RIKEN/BNL center, Upton, NY, Feb. 26-27.
13. “Frontiers of Hadronic Physics: Brains Circulate workshop ”, Brookhaven National Laboratory, Upton, NY, Feb. 25.
14. “The Workshop on Chirality, Vorticity and Magnetic Field in Heavy Ion Collisions ”, University of California, Los Angeles, CA, Jan. 21-23.

2014

15. “Workshop on Beam Energy Scan Phase II ”, Lawrence Berkeley National Laboratory, Berkeley, CA, Sep. 27-29.
16. “Thermal Photons and Dileptons in Heavy-Ion Collisions” , RIKEN/BNL center, Upton, NY.
17. “School of Collective Dynamics in High Energy Collisions ”, Lawrence Berkeley National Laboratory, Berkeley, CA, June. 9-12.
18. “The Approach to Equilibrium in Strongly Interacting Matter”, Brookhaven National Laboratory, Upton, NY Apr. 2-4.
19. “Joint Condensed Matter Theory Symposium”, Institute for Condensed Matter Theory, UIUC, Urbana, IL, March. 15.
20. “Strongly coupled systems away from equilibrium”, Simons Center for Geometry and Physics, Stony Brook, NY, Feb. 24-28.
21. “Quantum anomalies and hydrodynamics”, Simons Center for Geometry and Physics, Stony Brook, NY, Feb. 17-21.

2013

22. “45 Year Of Nuclear Theory at Stony Brook”, Simons Center for Geometry and Physics, Stony Brook, NY Nov. 24-26.
23. “Midwest Theory Get-Together”, Argonne National Laboratory, Dupage County, IL Sep. 5-7.

2012

24. “P- and CP-odd Effects in Hot and Dense Matter”, Brookhaven National Laboratory, Upton, NY, Jun. 25-27.

2011

25. “INT Summer School on the Applications of String Theory” , Institute for Nuclear Theory, Seattle, WA Jul. 17-29.

2010

26. “Midwest Theory Get-Together”, Argonne National Laboratory, Dupage County, IL Sep. 10-11.
27. “Theoretical Advanced Study Institute in Elementary Particle Physics”, Topic: String Theory and Its Applications, Boulder, CO, Jun. 01-26.

Teaching experience

- Teaching Assistant for graduate courses (at University of Illinois at Chicago) :

- Statistical mechanics, (Fall 2011).
- Particle physics, (Fall 2010).
- Electrodynamics, (2010 – 2012).
- Teaching Assistant for undergraduate courses (at University of Illinois at Chicago) ::
 - Introductory Physics (2009).
 - Labs for Modern Physics (2008-2010).
 - Modern Experimental Physics (Fall 2009).

References

- **Misha Stephanov**,
Physics Department,
University of Illinois, Chicago, IL, 60607, USA,
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- **Dmitri Kharzeev**,
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- **Raju Venugopalan**,
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- **Krishna Rajagopal**,
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(Available at <http://inspirehep.net/author/profile/Yi.Yin.1>)

Publication Overview

- Since Nov. 2011, I have written **21 scientific research papers** and **3 conference proceedings** in the broad area of theoretical high energy nuclear physics :
 - Physical Review Letters: 6 papers with 2 selected as *editor's suggestion*
 - Physics Letter B: 1 paper
 - Physics Review C: 3 papers
 - Physics Review D: 5 papers
 - Journal of High Energy Physics: 3 papers
 - Posted in arXiv and submitted to journals : 3 papers

These papers have accumulated (as of Nov 2016) a total citation of about 340 and an H-index of 9 (according to inSPIRE).

- I have been working effectively with people at all levels of seniority and of different nationalities. My expanding list of collaborators now includes faculties, postdocs and graduate students from 12 institutions (Brookhaven National Laboratory, Columbia U., Fudan. U, Indiana U., MIT, Ohio State U., Riken Brookhaven Research Center, Stony Brook U., Texas A&M, U. Chicago, U. Illinois Chicago, U. Tokyo) worldwide.

Publications in 2016

1. Shuzhe Shi, Yin Jiang, Jinfeng Liao and **Yi Yin** , *Quantifying Chiral Magnetic Effect from Anomalous Viscous Fluid Dynamics*, [[arXiv:1611.04586](#)] .
2. K. Hattori, **Yi Yin** , *Charge redistribution from anomalous magneto-vorticity coupling*, *Phys. Rev. Lett.* **117** (2016) 152002, [[arXiv:1607.01513](#)] .
3. Y. Hirono, D. Kharzeev and **Yi Yin** , *Quantized chiral magnetic current from reconnections of magnetic flux*, *Phys. Rev. Lett.* **117** (2016) 172301, [[arXiv:1606.09611](#)]
4. A. Monnai, S. Mukherjee, **Yi Yin** , *Phenomenological Consequences of Enhanced Bulk Viscosity Near the QCD Critical Point*, [[arXiv:1606.00771](#)] .

Comments: the first attempt to study the phenomenological consequences of enhanced bulk viscosity near the QCD critical point.

5. S. Mukherjee, R. Venugopalan, **Yi Yin** , *Phys. Rev. Lett.* **117** (2016) 222301, (selected as editor's suggestion) , *Universal off-equilibrium scaling of critical cumulants in the QCD phase diagram*, [[arXiv:1605.09341](#)] .

Comments: The first application of Kibble-Zurek framework of non-equilibrium phase transitions for the search for the QCD critical point.

In final preparation

- M. Stephanov and **Yi Yin** , *Hydrodynamics with critical slowing down*.
- Koichi Hattori, Yuji Hirono, Ho-Ung Yee and **Yi Yin** , *Instability in anomalous magneto-hydrodynamics*

Publications in 2015

6. K. Fukushima, K. Hattori, Ho-Ung. Yee, and **Yi Yin** , *Heavy quark diffusion in strong magnetic fields at weak coupling and implications to elliptic flow*, *Phys. Rev. D* **7** 2016, 074028 [[arXiv:1512.03689](#)].

7. A. Sadofyev and **Yi Yin** , *Drag suppression in anomalous chiral media*, *Phys. Rev. D* **12** (2016), 125026 [[arXiv:1511.08794](#)].

Comments: Connecting Landau's criterion for superfluidity with non-dissipative nature of transport associated with anomaly.

8. A. Sadofyev and **Yi Yin** , *The charmonium dissociation in an "anomalous wind"*, *JHEP* **1601** (2016), 052 [[arXiv:1510.06760](#)].

Comments: First study of effects from chiral anomaly on charmonium dissociation .

9. Y. Hirono, D. Kharzeev and **Yi Yin** , *Self-similar inverse cascade of magnetic helicity driven by the chiral anomaly*, *Phys. Rev. D* **92** (2015), 125031 [[arXiv:1509.07790](#)]

Comments: Dynamical evolution of electromagnetic field and chiral fermions coupled by anomaly. One of the figures has been selected as part of "Kaleidoscope" in *Phys. Rev. D* of the same issue .

10. I. Iatrakis, Shu Lin, **Yi Yin** , *The anomalous transport of axial charge: topological vs non-topological fluctuations* , *JHEP* **1509** (2015), 030, [[arXiv:1506.01384](#)] .

11. S. Mukherjee, R. Venugopalan, **Yi Yin** , *Phys. Rev. C* **92** (2015) 3, 034912 , *Real time evolution of non-Gaussian cumulants in the QCD critical regime*, [[arXiv:1506.00645](#)] .

Comments: a set of novel equations that describe the non-equilibrium evolution of the critical fluctuations near the QCD critical point.

12. **Yi Yin** and Jinfeng. Liao, *Hydrodynamics with chiral anomaly and charge separation in relativistic heavy ion collisions* , *Phys. Lett. B* **756** (2016) 42-46, [[arXiv:1504.06906](#)] .

Comments: quantification of the contributions to charge correlations from both chiral anomaly and background effects in one and same framework for the first time in literature.

13. M. Stephanov, Ho-Ung. Yee and **Yi Yin** , *Collective modes of chiral kinetic theory in a magnetic field* , *Phys. Rev. D* **12** (2015) 125014, [[arXiv:1501.06906](#)] .

Comments: a new diffusive mode due to the interplay between the chirality transition and Chiral magnetic effects.

Publications in 2014

14. I. Iatrakis, Shu Lin and **Yi Yin** , *Axial current generation by P-odd domains in QCD matter*, *Phys. Rev. Lett.* **114** (2015) 252301, [[arXiv:1411.2863](#)].

Comments: a novel mechanism for generation of axial current originated from in-homogeneities of topological fluctuations of a non-Abelian plasma.

15. J.Y. Chen, D. Son, M. Stephanov, Ho-Ung. Yee and **Yi Yin** , *Lorentz Invariance in Chiral Kinetic Theory*, *Phys. Rev. Lett.* **113** (2014) 182302, (*selected as editor's suggestion*) [[arXiv:1404.5963](#)].

Comments: “A kinetic theory, with explicit Lorentz invariance, is derived for chiral fermions in an external electromagnetic field. This theory provides the correct form for the chiral vortical effect – the appearance of a current in a system undergoing rotation”, quoted from Editors’ suggestion of *Phys. Rev. Lett.*.

16. M. Stephanov, **Yi Yin** , *Reversing a heavy-ion collision*, [[arXiv:1404.5910](#)].

Comments: The application of the maximum entropy method to decipher temperature and flow profile of a heavy-ion collisions from experiment data.

Publications in 2013

17. **Yi Yin** , *Electrical conductivity of the quark-gluon plasma and soft photon spectrum in heavy-ion collisions*, *Phys. Rev. C* **99** (2014) 044903, [[arXiv:1312.4434](#)] .

Comments: can we extract electrical conductivity of the quark-gluon plasma from soft photo spectrum in heavy-ion collisions?

18. Ho-Ung. Yee and **Yi Yin** , *Realistic Implementation of Chiral Magnetic Wave in Heavy Ion Collisions*, *Phys. Rev. C* **4** (2014) 044909, [[arXiv:1311.2574](#)].

Comments: By incorporating anomalous transport in data-validated hydrodynamic background, anomalous contribution to charge dependent elliptic flow is quantified.

19. P. Hohler and **Yi Yin** , *Charmonium Moving through a Strongly Coupled QCD Plasma: a Holographic Perspective*, *Phys. Rev. D* **88** (2013) 162001,086001, [[arXiv:1305.1923](#)].

Publications in 2012

20. M. Stephanov and **Yi Yin** , *Chiral Kinetic Theory*, *Phys. Rev. Lett.* **109** (2012) 162001, [[arXiv:1207.0747](#)].

Comments: a theoretical framework that can be applied to study chiral transport effects in the non-equilibrium environments such as those arising at the early stages of heavy-ion collisions. Its far-reaching application also includes early universe, neutron star and other chiral (parity-violating) medium such as newly discovered Weyl semi-metal.

Publications in 2011

21. M. Stephanov and **Yi Yin** , *Conductivity and Quasinormal Modes in Holographic Theories*, *JHEP* **1202** (2012), 017, [[arXiv:1111.5303](#)].

Conference Proceedings

1. K. Fukushima, K. Hattori, Ho-Ung. Yee, and **Yi Yin** , In *Proceedings of the Hard Probes 2016, Sep. 23-27 , Wuhan, China*, Title: *Heavy-Quark Diffusion Dynamics in Quark-Gluon Plasma under Strong Magnetic Fields*, [[arXiv:1611.00500](#)] .
2. S. Mukherjee, R. Venugopalan, **Yi Yin** , In *Proceedings of the Quark Matter 2015, Sep. 27-Oct. 3, Kobe, Japan*, Title: *Remembrance of things past: non-equilibrium effects and the evolution of critical fluctuations near the QCD critical point*, [[arXiv:1512.08022](#)] .
3. X. Huang, **Yi Yin** , J. Liao, In *Proceedings of the Quark Matter 2015, Sep. 27-Oct. 3, Kobe, Japan*, Title: *In search of chiral magnetic effect: separating flow-driven background effects and quantifying anomaly-induced charge separations*, [[arXiv:1512.06602](#)] .