Christopher J. Plumberg *Curriculum Vitae*

CONTACT INFORMATION

Department of Physics, Loomis Laboratory
University of Illinois, Urbana-Champaign
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Urbana, IL 61801 USA

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RESEARCH INTERESTS

Heavy-ion physics, event generators, QCD at finite temperature and density, Hanbury Brown-Twiss interferometry, relativistic hydrodynamics, fluctuating hydrodynamics and thermal noise, gauge/gravity duality

ACADEMIC APPOINTMENTS

Postdoctoral Researcher September 2020 - present
– University of Illinois, Urbana-Champaign - Urbana, IL

Postdoctoral Researcher September 2018 - September 2020
– Lund University - Lund, SE
– Department of Astronomy and Theoretical Physics - Theoretical Particle Physics
– Activities:
- Conduct and publish both independent and collaborative research

Postdoctoral Researcher August 2016 - August 2018
– University of Minnesota - Twin Cities
– School of Physics and Astronomy - Nuclear theory group
– Activities:
- Conduct and publish both independent and collaborative research
- Supervise and collaborate with graduate students studying nuclear physics
- Organize weekly nuclear seminar

EDUCATION

The Ohio State University, Columbus, Ohio USA

Ph.D., Physics, July 2016

- Thesis Topic: *Azimuthally sensitive and event-by-event Hanbury Brown-Twiss analyses*
- Adviser: Professor Ulrich W. Heinz
- Area of Study: Relativistic heavy-ion collisions

M.S., Physics, August 2012

- Candidacy Topic: *Constraints on Supersymmetry from* $B_s \to \mu^+\mu^-$
- Adviser: Professor Stuart A. Raby
- Area of Study: Model building and collider phenomenology

Eastern University, St. Davids, Pennsylvania USA

B.A., Astronomy and Astrophysics, June 2009

- *Magna cum Laude*
- In conjunction with Villanova University, B.S. program
- Templeton Honors College graduate
- Thesis topic: *Light Curves and Analyses of the Eclipsing Overcontact Binaries V1033 Her and V1044 Her*
- Adviser: Prof. David H. Bradstreet

PUBLICATIONS

C. Plumberg, *The Multiplicity Dependence of Pion Interferometry in Hydrodynamics*, arXiv:2010.11957 [nucl-th].

C. Plumberg, *Hanbury Brown–Twiss Interferometry and Collectivity in Small Systems* Phys. Rev. C **102**, 054908 (2020).

J. Adolfsson, *et al.*, *QCD Challenges from pp to A-A Collisions* Eur. Phys. J. A **56**, 288 (2020).

A. De, C. Plumberg and J. I. Kapusta, *Calculating Fluctuations and Self-Correlations Numerically for Causal Charge Diffusion in Relativistic Heavy-Ion Collisions*, Phys. Rev. C **102**, 024905 (2020).

M. Bluhm, *et al.*, *Dynamics of critical fluctuations: Theory – phenomenology – heavy-ion collisions*, Nucl. Phys. A **1003**, 122016 (2020).

A. Dhumuntarao, J. I. Kapusta and C. Plumberg, *Randall-Sundrum Model with a Dilaton Field at Finite Temperature*, Phys. Rev. D **101**, 066023 (2020).

J. Cimerman, B. Tomášik and C. Plumberg, *The Shape of the Correlation Function*, arXiv:1909.00278 [nucl-th].

B. Tomášik, J. Cimerman and C. Plumberg, *Averaging and the Shape of the Correlation Function*, Universe 2019, 5(6), 148 [doi:10.3390/universe5060148].

S. Pratt and C. Plumberg, *Determining the Diffusivity for Light Quarks from Experiment*, Phys. Rev. C 102, 044909 (2020).

S. Pratt and C. Plumberg, *Evolving Charge Correlations in a Hybrid Model with both Hydrodynamics and Hadronic Boltzmann Descriptions*, Phys. Rev. C **99**, 044916 (2019) [**Editor's Suggestion**].

C. Plumberg and U. Heinz, *Hanbury-Brown–Twiss correlation functions and radii from event-by-event hydrodynamics*, Phys. Rev. C **98**, 034910 (2018).

S. Pratt, J. Kim and C. Plumberg, *Evolution of Charge Fluctuations and Correlations in the Hydrodynamic Stage of Heavy Ion Collisions*, Phys. Rev. C **98**, 014904 (2018).

J. I. Kapusta and C. Plumberg, *Causal Electric Charge Diffusion and Balance Functions in Relativistic Heavy Ion Collisions*, Phys. Rev. C **97**, 014906 (2018).

C. Plumberg and J. I. Kapusta, *Hydrodynamic fluctuations near a critical endpoint and Hanbury-Brown–Twiss interferometry*, Phys. Rev. C **95**, 044910 (2017).

C. Plumberg and U. Heinz, *Probing the properties of event-by-event distributions in Hanbury-Brown–Twiss radii*, Phys. Rev. C **92**, 044906 (2015).

C. Plumberg and U. Heinz, *Interferometric signatures of the temperature dependence of the specific shear viscosity in heavy-ion collisions*, Phys. Rev. C **91**, 054905 (2015) [**Editor's Suggestion**].

C. J. Plumberg, C. Shen and U. W. Heinz, *Hanbury-Brown-âĂŞTwiss interferometry relative to the triangular flow plane in heavy-ion collisions*, Phys. Rev. C **88**, 044914 (2013) [Erratum-ibid. C **88**, 069901 (2013)].

S. D. Mathur and C. J. Plumberg, *Correlations in Hawking radiation and the infall problem*, JHEP **1109**, 093 (2011).

T. Mizusawa, J. Merritt, R. L. Ballouz, M. Bonaro, S. Foran, C. Plumberg, H. Stewart and T. Wiley *et al.*, *Far Ultraviolet Spectroscopy of Seven Nova-Like Variables*, Publ. Astron. Soc. Pac. **122**, 299 (2010).

Conference Publications

J. Cimermaň, B. Tomášik and C. Plumberg, *The Shape of the Correlation Function* Phys. Part. Nucl. **51**, 282-287 (2020)

C. J. Plumberg, T. Welle and J. I. Kapusta, *QCD matter with a crossover and a first-order phase transition*, PoS **CORFU2018**, 157 (2018)

C. Plumberg and U. Heinz, *Observable consequences of event-by-event fluctuations of HBT radii*, Nucl. Phys. A 956 (2016) 381-384.

Mentoring/Supervision

- Nicoline Krogh Hemme **Spring 2020**

  Degree: Bachelor's thesis
  Title: *Principal Component Analyses of Final States in Relativistic Nuclear Collisions using Pythia/Angantyr*
  Institution: Lund University

Teaching Experience

Lund University, Lund, Sweden

Lecturer **Spring 2020**
Classical Mechanics and Special Relativity
(Undergraduate, FYTB14)

University of Minnesota, Minneapolis, Minnesota USA

Guest Lecturer **October 2016**
Graduate Statistical Physics course (PHYS 5201)

The Ohio State University, Columbus, Ohio USA

Teaching Assistant **Autumn 2009 to Spring 2012**

- Supertutor for Physics majors, Physics 2300 and 2301
  - Autumn 2011 and Spring 2012
  - Sample student evaluations available upon request
  - Responsible for regularity availability to assist physics majors with challenging problems sets in Intermediate Mechanics
- Instructor for Freshman Engineering Honors, PHY 131
  - Autumn 2010 and Spring 2011
- Instructor for PHY 111: Forces and Kinematics
  - Autumn 2009, Winter 2010, and Spring 2010 (2 sections)
  - Responsible for two 1 hour sessions and supervision of 3 hour laboratory where undergraduate students design explore various elementary concepts in Newtonian kinematics and dynamics

Invited Lectures

From Micro to Macro QCD Phenomena: Origins of Collectivity in Nuclear Collisions (COST Workshop Mini-school), February 2019, Lund University, (Lund, Sweden)

Invited Talks

Interferometric Signatures of Hydrodynamics in Small Systems (11th MPI at LHC), November 20, 2019 (Prague, Czech Republic)

Event-By-Event Particle Interferometry: Developments and Applications (Subatech), April 17, 2019 (Nantes, France)

Effects of Time Correlations on Net-Baryon Number Fluctuations (GSI EMMI RRTF; "Dynamics of critical fluctuations: theory - phenomenology - HIC"), April 12, 2019 (Darmstadt, Germany)

Switching It Up: Parametrizing the QCD Equation of State, Critical Point and Onset of Deconfinement (CPOD) 2018, September 2018 (Corfu, Greece)

Evolution of Charge Fluctuations and Correlations in Hydrodynamics, RHIC/AGS Users' Meeting 2018 (Brookhaven National Lab), June 2018 (Upton, NY)

Hanbury-Brown Twiss interferometry with respect to the triangular flow plane, WPCF2013, November 2013 (Catania, Italy)

Organized Conferences and Workshops

3rd International Þing on QCD Challenges from *pp* to *AA*
Dates: August 19-23, 2019
Location: Lund University, Lund, Sweden

Contributed Talks

Contributed talk (COST Workshop Mini-school), Lund University, *Particle Interferometry for Hydrodynamics and Event Generators* February 2019 (Lund, Sweden)

Seminar talk, CERN, *Event-By-Event Particle Interferometry: Developments and Applications*, October 2018 (Geneva, Switzerland)

Seminar talk, CLASH meeting, Lund University, *Fluctuations and Correlations in Heavy-Ion Collisions*, October 2018 (Lund, Sweden)

Poster, Christopher Plumberg and Joseph I. Kapusta, *Causal Charge Diffusion and Fluctuations in Heavy-Ion Collisions*, Quark Matter 2018, May 2018 (Venice, Italy), ID#314.

Colloquium, Minnesota State University - Mankato (Correlation and Fluctuations in Relativistic Heavy-Ion Collisions), February 2018 (Mankato, Minnesota)

Nuclear Seminar, University of Minnesota (Causal Charge Diffusion in Relativistic Heavy-ion Collisions), October 2017 (Minneapolis, Minnesota)

Contributed talk, Light, Color, and Dense Matter Symposium, *Event-by-event fluctuations of interferometric radii near the QCD critical point*, June 2017 (Minneapolis, Minnesota)

Poster, Christopher Plumberg and Joseph I. Kapusta, *Hydrodynamic fluctuations and Hanbury Brown-Twiss Interferometry*, Quark Matter 2017, February 2017 (Chicago, Illinois), ID#175.

Nuclear Seminar, University of Minnesota (Event-by-event fluctuations and their consequences for Hanbury Brown-Twiss interferometry), October 2016 (Minneapolis, Minnesota)

Nuclear Seminar, University of Minnesota (Observable consequences of event-by-event fluctuations of HBT radii), April 2016 (Minneapolis, Minnesota)

Nuclear Seminar, Brookhaven National Laboratory (Observable consequences of event-by-event fluctuations of HBT radii), October 2015 (Long Island, New York)

Selected talk, *Observable consequences of event-by-event fluctuations of HBT radii*, Quark Matter 2015, September 2015 (Kobe, Japan)

Contributed talk, CAM (Canadian-American-Mexican) Graduate student conference (Event-by-event fluctuations of HBT radii and the QGP shear viscosity), September 2015 (Oaxaca, Oaxaca, Mexico)

Contributed talk, APS - Ohio Section (Event-by-event fluctuations of HBT radii and the QGP shear viscosity), March 2015, Kent State University (Kent, Ohio)

Contributed talk, 2014 Midwestern Theory Get-together, Argonne National Laboratory (How to measure a distribution of HBT radii, and why you might want to), September 2014, Lemont, Illinois

Student presentation, JET Summer School (Hanbury-Brown–Twiss interferometry with respect to the triangular flow plane), June 2014, Davis, California

Contributed talk, MADAI 2014 (How to measure a distribution of HBT radii), July 2014, East Lansing, Michigan

Contributed talk, Midwest Critical Mass 2014 (Hanbury-Brown–Twiss interferometry and event-by-event fluctuations), March 2014, Toledo, Ohio

Contributed talk, 2013 Midwestern Theory Get-together, Argonne National Laboratory (Hanbury-Brown–Twiss interferometry with respect to the triangular flow plane), September 2013, Lemont, Illinois

Contributed talk, OSAPS (Hanbury-Brown–Twiss interferometry with respect to the triangular flow plane), March 2013, Athens, Ohio

Contributed talk, SPOCK (Correlations in Hawking Radiation and the Infall Problem), April 2011, Cincinnati, Ohio

Poster, Plumberg, C., & Kankelborg, C. C., *Coronal Tomography With STEREO and TRACE* (poster), American Astronomical Society Meeting Abstracts, #407.22. Presented at 216th Meeting of the AAS in Miami, Florida, May 2010.

Poster, Bradstreet, D. H., Sanders, S. J., Wiley, T. B., Plumberg, C. J., Grau, D. M., *Light Curves and Analyses of the Eclipsing Overcontact Binaries V1033 Her and V1044 Her*, Bulletin of the American Astronomical Society, 41, #410.12.

Referee for Journals

- *Physics Review C*
- *European Physical Journal A*

Scholarships, Honors, and Awards

The Ohio State University

- Three-Minute Thesis (3MT) competition (Ohio State) semi-finalist
- APS membership (2014 - present)
- OSU Physics department teaching award (2011)

Eastern University

- Society of Physics Students membership (2008-present)
- Sigma Pi Sigma membership (2008-2009)
- Templeton Honors College Student at Eastern University (2005-2009)
- Dean's List for 7 out of 8 semesters at Eastern University (GPA, 3.75 or higher; 2005-2009)
- Jerry Goff Scholarship Recipient (2006)

High School

- National Merits Scholar (2005)

Technical Skills

Programming: Bash (shell scripting), C/C++, Fortran, HDF5, HTML, Interactive Data Language (IDL), GNU make, Mathematica, MPI, OpenMP, Perl Data Language (PDL), Python

Scientific Visualization: gnuplot, Matlab, Matplotlib, Mathematica

Other Computer Applications: LaTeX, Vim, Awk

Operating Systems: Microsoft Windows family, Linux, Solaris, and other UNIX variants

Professional Experience

Montana State University - Bozeman
Research Experience for Undergraduates (REU) in Solar Physics

REU/NSF Summer Program **June 2008 through August 2008**

- Fluxon modeling of magnetohydrodynamic phenomena on solar corona and photosphere
- Mentor: Prof. Charles Kankelborg

REU/NSF Summer Program **June 2009 through August 2009**

- Developed tomographic software for analyzing STEREO and TRACE data of solar corona
- Mentor: Prof. Charles Kankelborg

Service

Guest blogger

- "A day in the life..." (OSU Women In Physics)
- Title: *Atom-smashing and femtoscopy*

References

Available upon request