Yasuki Tachibana

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Position & Affiliation

Assistant Professor

Basic Education (Mathematics and Natural Science), Faculty of International Liberal Arts,
Akita International University

Research Interests

The dynamics of the QGP created in relativistic heavy-ion collisions.
In particular, the interplay between the QGP fluid and jets.

Experience

Apr. 2020–	Assistant Professor Akita International University
Oct. 2017–Mar. 2020	Post-doctoral Researcher Department of Physics and Astronomy, College of Liberal Arts and Sciences, Wayne State University
Mar. 2016–Sep. 2017	Post-doctoral Researcher Institute of Particle Physics and Key Laboratory of Quark and Lepton Physics (MOE), Central China Normal University
Sep. 2015–Feb. 2016	Short-term Lecturer Nishinippon Institute of Technology
Apr. 2015–Sep. 2015	Post-doctoral Researcher Theoretical Research Division, Nishina Center for Accelerator-Based Science, RIKEN
Apr. 2013–Mar. 2015	Research Fellow Japan Society for the Promotion of Science (JSPS) for Young Scientists (DC2)
Mar. 2012–Mar. 2015	Course Student (*Secondary Supervisor: Prof. Takao Someya*) Advanced Leading Graduate Course for Photon Science (ALPS), The University of Tokyo
Apr. 2012–Present	Co-researcher Partnership (*Host Professor: Prof. Tetsufumi Hirano*) Faculty of Science and Technology, Sophia University
Apr. 2012–Mar. 2015	Student Trainee (*Host Scientist: Prof. Tetsuo Hatsuda*) Theoretical Research Division, Nishina Center for Accelerator-Based Science, RIKEN

Education

Apr. 2012–Mar. 2015	Doctor of Philosophy (*Ph.D.*) Department of Physics, Graduate School of Science, The University of Tokyo Supervisor: *Prof. Tetsuo Hatsuda* Thesis title: *"Hydrodynamic response to jet propagation in quark-gluon plasma"*
Apr. 2010–Mar. 2012	Master of Science (*M.Sc.*) Department of Physics, Graduate School of Science, The University of Tokyo Supervisor: *Prof. Tetsuo Hatsuda* Thesis title: *"A Relativistic Hydrodynamic Model with Source Terms and its Application to Heavy Ion Collisions"*
Apr. 2006–Mar. 2010	Bachelor of Science (*B.S.*) Department of Physics, Faculty of Science, The University of Tokyo

Honors & Awards

Mar. 2019 Young Scientist Award of the Physical Society of Japan (Theoretical Nuclear Physics)
Aug. 2012 Invitation to a Poster Flash Talk in Plenary Session (*Quark Matter 2012*, Washington D.C.)

Fellowships/Scholarships

Apr. 2013–Mar. 2015 Research Fellowships of Japan Society for the Promotion of Science (JSPS) for Young Scientists (DC2)

Mar. 2012–Mar. 2015 Advanced Leading Graduate Course for Photon Science (ALPS) course, The University of Tokyo

Apr. 2010–Mar. 2012 First Category Scholarship Loan Program by Japan Student Services Organization

Grants

FY2013 JPY 1100,000 Grant-in-Aid for Fellows of Japan Society for the Promotion of Science (JSPS)
FY2014 JPY 1100,000 Grant-in-Aid for Fellows of Japan Society for the Promotion of Science (JSPS)

Research Collaboration

Oct. 2017– JETSCAPE Collaboration [National Science Foundation (NSF) funded]

Community Services

Referee for: Nuclear Physics A

Organizer for:

Teaching Experiences

● Lectures (in English)

–At Akita International University–

Apr. 2020–Aug. 2020 Lecture for Undergraduate Class *"College Algebra"* (2 classes)

● Lectures (in Japanese)

–At Nishinippon Institute of Technology–

Sep. 2015–Mar. 2016 Lecture for Undergraduate Class *"Fundamental Physics"* (2 classes)
- Taught compulsory course on basics of physics for first-year undergraduate students.
- Took charge of 2 classes (14 students on average in each class).
- Total number of school hours is 15* including midterm and term-end examinations.
*Equivalent to 22.5 hours (90 min/class).

Sep. 2015–Mar. 2016 Lecture for Undergraduate Class *"Fundamental Physics (S)"*
- Taught advanced course on basics of physics for first-year undergraduate students.
- Took charge of 1 class with 24 students.
- Total number of school hours is 15* including midterm and term-end examinations.
*Equivalent to 22.5 hours (90 min/class).

–At Department of Physics, the University of Tokyo–

Apr. 2010–Mar. 2011 Teaching Assistant for Undergraduate Class *"Computational Experiments"*
- Responded to questions and marked test in course.
- Course was on basics of computer operation and numerical calculation for third-year undergraduate students.
- Managed computer room of Department of Physics.

Visits

May 2017	Institute for Nuclear Theory	(INT Program INT-17-1b)
Feb. 2017	Lawrence Berkeley National Laboratory	(Host: *Prof. Xin-Nian Wang*)
Mar. 2015	Central China Normal University	(Hosts: *Prof. Xin-Nian Wang and Prof. Guang-You Qin*)
Mar. 2014	Institut de physique théorique de Saclay	(Host: *Prof. Jean-Yves Ollitrault*)
Mar. 2014	Universidad de Santiago de Compostela	(Host: *Prof. Carlos A. Salgado*)

Computer Skills

Operating Systems	Macintosh, Linux, Microsoft Windows
Programming Languages	C/C++, Python, Perl
Softwares	Root

Languages Skill

Japanese	Native
English	Fluent

Publications

- Papers

[1] Y. Tachibana, C. Shen and A. Majumder,
"Bulk medium evolution has considerable effects on jet observables!,"
[arXiv:2001.08321 [nucl-th]].

[2] Y. Kanakubo, Y. Tachibana and T. Hirano,
"Unified description of hadron yield ratios from dynamical core-corona initialization,"
Phys. Rev. C **101**, no.2, 024912 (2020) [arXiv:1910.10556 [nucl-th]].

[3] A. Kumar, Y. Tachibana, D. Pablos, C. Sirimanna, R. J. Fries *et al.* [JETSCAPE Collaboration],
"The JETSCAPE framework: p+p results," [arXiv:1910.05481 [nucl-th]].

[4] N.-B. Chang, Y. Tachibana and G.-Y. Qin,
"Nuclear modification of jet shape for inclusive jets and γ-jets at the LHC energies,"
Phys. Lett. B **801**, 10 (2020) [arXiv:1906.09562 [nucl-th]].

[5] J. H. Putschke, K. Kauder, E. Khalaj *et al.* [JETSCAPE Collaboration],
"The JETSCAPE framework," [arXiv:1903.07706 [nucl-th]].

[6] Y. Kanakubo, M. Okai, Y. Tachibana and T. Hirano,
"Enhancement of strange baryons in high-multiplicity proton-proton and proton-nucleus collisions,"
PTEP **2018**, no. 12, 121D01 (2018) [arXiv:1806.10329 [nucl-th]].

[7] M. Okai, K. Kawaguchi, Y. Tachibana and T. Hirano,
"A new approach to initialize hydrodynamic fields and mini-jet propagation in quark-gluon fluids,"
Phys. Rev. C **95**, 054914 (2017) [arXiv:1702.07541 [nucl-th]].

[8] Y. Tachibana, N.-B. Chang and G.-Y. Qin,
"Full jet in quark-gluon plasma with hydrodynamic medium response,"
Phys. Rev. C **95**, 044909 (2017) (**Editors' Suggestion**) [arXiv:1701.07951 [nucl-th]].

[9] Y. Tachibana and T. Hirano,
"Interplay between Mach cone and radial expansion and its signal in gamma-jet events,"
Phys. Rev. C **93**, 054907 (2016) [arXiv:1510.06966 [nucl-th]].

[10] Y. Tachibana and T. Hirano,
"Momentum transport away from a jet in an expanding nuclear medium,"
Phys. Rev. C **90**, 021902(R) (2014) [arXiv:1402.6469 [nucl-th]].

● Proceedings*

[1] Y. Tachibana *et al.* [JETSCAPE Collaboration],
"Hydrodynamic response to jets with a source based on causal diffusion,"
arXiv:2002.12250 [proceedings of Quark Matter 2019].

[2] Y. Tachibana *et al.* [JETSCAPE Collaboration],
"Jet substructure modification in a QGP from a multi-scale description of jet evolution with JETSCAPE,"
PoS HardProbes **2018**, 099 (2018) [proceedings of Hard Probes 2018].

[3] Y. Tachibana
"Medium response to jet-induced excitation: theory overview,"
Nucl. Phys. A **982**, 156 (2019) [proceedings of Quark Matter 2018, *refereed*].

[4] Y. Tachibana
"Medium response to jets in heavy ion collisions,"
EPJ Web Conf. **172**, 05009 (2018) [proceedings of ISMD 2017].

[5] Y. Tachibana, N.-B. Chang and G.-Y. Qin,
"Effect of hydrodynamic response in QGP on full jet,"
Nucl. Phys. A **967**, 568 (2017) [proceedings of Quark Matter 2017, *refereed*].

[6] Y. Tachibana, N.-B. Chang and G.-Y. Qin,
"Flow excited by full jet shower in QGP fluid and its effect on jet shape,"
Nucl. Part. Phys. Proc. **289-290**, 141 (2017) [proceedings of Hard Probes 2016].

[7] Y. Tachibana and T. Hirano,
"Interplay between Mach cone and radial expansion in jet events,"
Nucl. Phys. A **956**, 577 (2016) [proceedings of Quark Matter 2015, *refereed*].

[8] Y. Tachibana and T. Hirano,
"Hydrodynamic excitation by jets in the expanding QGP,"
Nucl. Part. Phys. Proc. **276-278**, 173 (2016) [proceedings of Hard Probes 2015, *refereed*].

[9] Y. Tachibana and T. Hirano,
"Di-jet asymmetric momentum transported by QGP fluid,"
Nucl. Phys. A **932**, 387 (2014) [proceedings of Hard Probes 2013, *refereed*].

[10] Y. Tachibana and T. Hirano,
"Emission of Low Momentum Particles at Large Angles from Jet,"
Nucl. Phys. A **904-905**, 1023C (2013) [proceedings of Quark Matter 2012, *refereed*].

*Extract of contributions as a speaker.

Presentations

● Invited Talks

–International Conferences and Workshops–

[1] *"Jet back reaction on the medium,"*
Hard Probes 2020, The University of Texas at Austin, 1-5 June 2020.

[2] *"Interaction with jet and its medium response in quark-gluon plasma,"*
Thermal quantum field theory and its application,
Yukawa Institute for Theoretical Physics, Kyoto University, 4 September 2019.

[3] *"Status of JETSCAPE,"*
2019 RHIC & AGS Annual Users' Meeting, Brookhaven National Laboratory, New York, 4 June 2019
(for the JETSCAPE Collaboration).

[4] *"Jets in QGP and medium response theory,"*
Fifth Joint Meeting of the Nuclear Physics Divisions of the APS and the Physical Society of Japan,
Waikoloa, Hawaii, 23 October 2018.

[5] *"Jets with medium response,"*
The Definition of Jets in a Large Background, RIKEN BNL Research Center, New York, 26 June 2018.

[6] *"Medium response to jet-induced excitation: theory overview,"*
Quark Matter 2018, Venice, 18 May 2018.

[7] *"Medium response to jets in heavy ion collisions,"*
ISMD 2017, Tlaxcala City, Mexico, 15 September 2017.

[8] *"Jet medium interactions,"*
ATHIC 2016, New Delhi, India, 19 February 2016.

[9] *"Momentum Transport in Dijet+QGP-fluid,"*
Quadrangle 2014, High Energy Strong Interactions: A School for Young Asian Scientists,
Central China Normal University, 23 September 2014.

[10] *"Emission of Low Momentum Particles at Large Angles from Jet,"*
Quark Matter 2012, Washington D.C., 18 August 2012.

–Domestic Conferences and Workshops (talks given in Japanese)–

[1] *"Broadening of full jet in quark-gluon plasma with hydrodynamic medium response,"*
Spring meeting of Physics Society of Japan 2019, Kyushu University, 15 March 2019.

● Lecture Talks

–International Conferences and Workshops–

[1] *"JETSCAPE Physics (Hard Probes and Bulk),"*
3rd JETSCAPE Winter School and Workshop 2020, University of Tennessee Knoxville, 17 March 2020.

● Contributed Talks

–International Conferences and Workshops–

[1] *"Medium response and bulk fluid velocity effect in jet quenching,"*
3rd JETSCAPE Winter School and Workshop 2020, University of Tennessee Knoxville, 19 March 2020.

[2] *"Hydrodynamic response to jets with a source based on causal diffusion,"*
Quark Matter 2019, Wuhan, China, 5 November 2019 (for the JETSCAPE Collaboration).

[3] *"Jet substructure modification in multi-stage jet evolution with JETSCAPE,"*
2nd JETSCAPE Winter School and Workshop 2019, Texas A&M University, 12 January 2019
(for the JETSCAPE Collaboration).

[4] *"Jet substructure modifications in a QGP from multi-scale description of jet evolution with JETSCAPE,"*
Hard Probes 2018, Aix-Les-Bains, France, 30 October 2018 (for the JETSCAPE Collaboration).

[5] *"Jet modification with hydro medium response,"*
Precision Spectroscopy of QGP Properties with Jets and Heavy Quarks (INT Program INT-17-1b),
Institute for Nuclear Theory, University of Washington, 10 May 2017.

[6] *"Jet modification in QGP and hydrodynamic medium response,"*
Santa Fe Jets and Heavy Flavor Workshop, Santa Fe, 14 February 2017

[7] *"Effect of hydrodynamic response in QGP on full jet,"*
Quark Matter 2017, Chicago, 8 February 2017.

[8] *"Full jet including hydrodynamic response in heavy ion collisions,"*
The 32nd Heavy Ion Cafe, RIKEN, 21 January 2017.

[9] *"Flow excited by full jet shower in quark-gluon plasma fluid and its effect on jet shape,"*
Flow, Jet Quenching and Strong Coupling Physics, Huzhou University, China, 17 December 2016.

[10] *"Flow excited by full jet shower in QGP fluid and its effect on jet shape,"*
Hard Probes 2016, Wuhan, China, 25 September 2016.

[11] *"Interplay between Mach cone and radial expansion in jet events,"*
Quark Matter 2015, Kobe, Japan, 28 September 2015.

[12] *"Hydrodynamic excitation by jets in the expanding QGP,"*
Hard Probes 2015, McGill University, Montréal, 30 June 2015.

[13] *"Collective dynamics in dijet+QGP-fluid system,"*
Forth Joint Meeting of the Nuclear Physics Divisions of the APS and the Physical Society of Japan,
Waikoloa, Hawaii, 9 October 2014.

[14] *"Momentum flow in dijet+QGP-fluid system,"*
ATHIC 2014, Osaka University, 6 August 2014.

[15] *"Collective flow induced by energetic partons in heavy-ion collisions,"*
The 26th Heavy Ion Cafe, The University of Tokyo, 19 July 2014.

[16] *"Di-jet asymmetric momentum transported by QGP fluid,"*
Hard Probes 2013, Stellenbosch Institute for Advanced Study, 7 November 2013.

[17] *"Collective Flow in the QGP Induced by Jets,"*
Phenomenology and Experiments at RHIC and LHC, KMI, Nagoya University, 25 September 2012.

[18] *"Emission of Low Momentum Particles at Large Angles from Jet,"*
Jet Modification in the RHIC and LHC Era (QM12 Satellite Workshop), Wayne State University, 21 August 2012.

–Domestic Conferences and Workshops (talks given in Japanese)–

[1] *"Hydrodynamic response to jet quenching in QGP,"*
HadNucl2015, KEK, 26 November 2015.

[2] *"Transport of momenta from a jet in an expanding QGP fluid,"*
Autumn Meeting of Physical Society of Japan 2013, Kochi University, 21 September 2013.

[3] *"Flows in the QGP Fluid Induced by Jets,"*
Autumn Meeting of Physical Society of Japan 2012, Kyoto Sangyo University, 12 September 2012.

[4] *"Relativistic Hydrodynamic Model with a Source Term Induced by Jets,"*
Spring meeting of Physics Society of Japan 2012, Kwansei Gakuin University, 24 March 2012.

● Poster Presentations

–International Conferences and Workshops–

[1] *"Interference effect between jet-induced flows in dijet events,"*
Quark Matter 2018, Venice, 15 May 2018.

[2] *"Medium response in asymmetric di-jet events from full 3-D hydro,"*
Quark Matter 2014, Darmstadt, 20 May 2014.

[3] *"Emission of Low Momentum Particles at Large Angles from Jet,"*
Quark Matter 2012, Washington D.C., 16 August 2012.

● Seminars & Other Talks

[1] *"Jet flowing in the quark-gluon plasma fluid,"*
PAN Physics Seminar, Wayne State University, 28 February 2020.

[2] *"Medium response to jets in heavy ion collisions,"*
PAN Physics Seminar, Wayne State University, 10 November 2017.

[3] *"Full jet with hydrodynamic medium response in relativistic heavy-ion collisions,"*
Theory Seminar, Nuclear Theory Group at Lawrence Berkeley National Laboratory, 24 February 2017.

[4] *"Full jet with hydrodynamic response in QGP,"*
Seminar at Particle Theory Group, Chuo University, 20 January 2017.

[5] *"Full jet with hydrodynamic response in QGP,"*
QHP seminar, RIKEN, 18 January 2017.

[6] *"Jet induced flow in quark-gluon plasma,"*
Nuclear theory seminar, Central China Normal University, 21 March 2016.

[7] *"Hydrodynamic response to jet energy loss,"*
Colloquium, Nuclear Theory Group, Kyoto University, 14 October 2015.

[8] *"Hydrodynamic response to jet propagation in quark-gluon plasma ,"*
Nuclear theory seminar, Central China Normal University, 11 March 2015.

[9] *"Flow induced by jets in QGP fluid,"*
Seminar, Nuclear Theory Group, Osaka University, 22 July 2014.

[10] *"Medium response in asymmetric di-jet events from full 3-D hydro,"*
QCD journal clubs, Institut de physique théorique de Saclay, 25 March 2014.

[11] *"Medium response in asymmetric di-jet events from full 3-D hydro,"*
Seminar, IGFAE, Universidad de Santiago de Compostela, 20 March 2014.