

# Naruo Ohga

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First-year Ph.D. student at Department of Physics, Graduate School of Science, the University of Tokyo, studying the theoretical aspects of nonequilibrium thermodynamics.

## CONTACT & LINKS

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## KEYWORDS

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Nonequilibrium thermodynamics, Stochastic thermodynamics, Stochastic processes, Information theory

## EDUCATION

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**The University of Tokyo** (Tokyo, Japan), Apr. 2023–present

Doctoral Program, Department of Physics, Graduate School of Science

**The University of Tokyo** (Tokyo, Japan), Apr. 2021–Mar. 2023

Master's Program, Department of Physics, Graduate School of Science

Degree Title: **Master of Science** (Mar. 23, 2023)

Thesis: “Global structure in information geometry for nonequilibrium thermodynamics and its applications”

**The University of Tokyo** (Tokyo, Japan), Apr. 2017–Mar. 2021

Bachelor's Program, Physics, Faculty of Science

Degree Title: **Bachelor of Science** (Mar. 18, 2021)

[The School of Science Encouragement Award for the Undergraduate Program]

## RESEARCH ARTICLES

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### PUBLICATIONS

**“Thermodynamic Bound on the Asymmetry of Cross-Correlations”**

[Naruo Ohga](#), [Sosuke Ito](#), [Artemy Kolchinsky](#)

[Phys. Rev. Lett.](#) **131**, 077101 (2023). [[arXiv:2303.13116](#)]

[Editors' Suggestion] [Highlighted in [Physics Magazine Viewpoint](#)] [Press Release ([EN/JP](#))]

**“Information-geometric structure for chemical thermodynamics: An explicit construction of dual affine coordinates”**

[Naruo Ohga](#), [Sosuke Ito](#)

[Phys. Rev. E](#) **106**, 044131 (2022). [[arXiv:2112.13813](#)]

### PREPRINTS

**“Thermodynamic bound on spectral perturbations”**

[Artemy Kolchinsky](#), [Naruo Ohga](#), [Sosuke Ito](#)

[arXiv:2304.01714](#) (2023).

**“Inferring nonequilibrium thermodynamics from tilted equilibrium using information-geometric Legendre transform”**

[Naruo Ohga](#), [Sosuke Ito](#)

[arXiv:2112.11008](#) (2021).

## PRESENTATIONS

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### INVITED TALKS

“Universal thermodynamic bounds on two-time correlations” (Seminar)

Saito group seminar, Jun. 20, 2023, Kyoto University, Kyoto, Japan.

“Information-geometric duality between nonequilibrium states and tilted equilibrium states” (Seminar)

Joint-group meeting between U. Washington (Qian group) and UNC-Chapel Hill (Lu group), Jul. 14th, 2022, University of Washington and UNC-Chapel Hill, US (Online).

### INTERNATIONAL CONFERENCES

“Legendre duality between nonstationary and equilibrium entropy and its application to thermodynamic inference” (Oral)

STATPHYS28, Aug. 7–11, 2023, Hongo campus, The University of Tokyo, Tokyo, Japan.

“Thermodynamic bound on the asymmetry of cross-correlations” (Oral)

YITP-YSF Symposium “Perspectives on Non-Equilibrium Statistical Mechanics: The 45th Anniversary Symposium of Yamada Science Foundation,” Aug. 3–5, 2023, Panasonic Auditorium, Yukawa Hall, Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto, Japan.

“Universal relations on nonequilibrium entropy in classical fluctuating systems” (Poster)

FoPM International Symposium, Feb. 6–8, 2023, Ito Hall, The University of Tokyo.

“Legendre duality in stochastic thermodynamics: A construction based on information geometry” (Oral)

Workshop on Stochastic Thermodynamics III, May 26–Jun. 3, 2022, Japan (Online).

### OTHERS

“Thermodynamic costs behind two-time correlations” (Oral)

7th Conference, Grant-in-Aid for Scientific Research on Innovative Areas: “Information physics of living matters,” Sep. 21–22, 2023, Toki Messe Niigata Convention Center, Niigata, Japan.

“Thermodynamic bounds on correlation functions and their applicability to biological energetic costs” (Poster)

7th Conference, Grant-in-Aid for Scientific Research on Innovative Areas: “Information physics of living matters,” Sep. 21–22, 2023, Toki Messe Niigata Convention Center, Niigata, Japan.

“Thermodynamic inference of nonstationary processes from tilted equilibrium measurements” (Oral)

78th Annual Meeting, The Physical Society of Japan, Sep. 16–19, 2023, Tohoku University (Aobayama Campus, Kawauchi Campus), Miyagi, Japan.

“Thermodynamic bound on the eigenvalues of the time evolution generator” (Oral)

The 68th Condensed Matter Physics Summer School, Aug. 12–15, 2023, Makino Parkhotel & Seminarhouse, Shiga, Japan.

“Thermodynamic bound on the cross-correlations and its application to oscillatory eigenvalues” (Oral)

2023 Spring Meeting, The Physical Society of Japan, Mar. 22–25, 2023, Japan (Online).

“Thermodynamic bound on the time-reversal symmetry breaking in cross-correlations” (Poster)

6th Conference, Grant-in-Aid for Scientific Research on Innovative Areas: “Information physics of living matters,” Mar. 6–7, 2023, ACROS Fukuoka International Conference Hall, Fukuoka, Japan.

“Thermodynamic duality between nonequilibrium states and tilted equilibrium states in stochastic systems” (Oral)

The 67th Condensed Matter Physics Summer School, Aug. 2–5, 2022, Japan (Online).

“Thermodynamic duality between nonequilibrium relaxation processes and tilted quasi-static processes in stochastic systems” (Poster)

5th Conference, Grant-in-Aid for Scientific Research on Innovative Areas: “Information physics of living matters,” Jun. 20–21, 2022, Awaji Yumebutai International Conference Center, Hyogo, Japan.

“Legendre duality in stochastic thermodynamics based on information geometry” (Oral)

77th Annual Meeting, The Physical Society of Japan, Mar. 15–19, 2022, Japan (Online).

“Information-geometric dual affine coordinates in non-equilibrium chemical thermodynamics” (Oral)

2021 Autumn Meeting, The Physical Society of Japan, Sep. 20–23, 2021, Japan (Online).

“A global structure of stochastic thermodynamics based on dually flat geometry” (Oral)  
The 66th Condensed Matter Physics Summer School, Aug. 2–5, 2021, Japan (Online).

#### AWARDS & FELLOWSHIPS

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Sep. 22, 2023 — Presentation award, 7th Conference, Grant-in-Aid for Scientific Research on Innovative Areas: “Information physics of living matters”

Aug. 16, 2023 — [Editors’ Suggestion](#), Physical Review Letters

Apr. 2023–Mar. 2026 — [Research Fellowship for Young Scientists \(DC1\)](#), Japan Society for the Promotion of Science (JSPS).

Apr. 2021–Mar. 2026 — [Forefront Physics and Mathematics Program to Drive Transformation \(FoPM\)](#), a World-leading Innovative Graduate Study (WINGS) Program, The University of Tokyo.

Mar. 18, 2021 — [The School of Science Encouragement Award for the Undergraduate Program](#), School of Science, The University of Tokyo