

INTERNATIONAL SYMPOSIUM on QUANTUM ELECTRONICS


February 13 - 16, 2024



PROGRAM BOOK

<https://tsqs2024.org/>





WELCOME to the INTERNATIONAL SYMPOSIUM on QUANTUM ELECTRONICS 2024

Dear Colleagues,

Welcome to the Symposium on Quantum Electronics 2024 at the University of Tokyo, Japan. We hope this event will be a rewarding and unforgettable experience for all.

This symposium belongs to the international workshop series hosted by the Trans-scale Quantum Science Institute (TSQS) at the University of Tokyo. The institute's primary mission is to foster innovation by bridging intellectual contributions from a broad spectrum of quantum science disciplines, from cosmology and particle physics to quantum materials and quantum information.

Quantum electronics is a fast-growing frontier that links various facets of quantum science. Here, you will be exposed to a wide range of topics in quantum electronics, including foundational concepts of quantum magnets, cutting-edge spintronics devices, interdisciplinary intersections of quantum technologies with particle physics, cosmology, and quantum many-body physics, and recent advances in technological applications. With more than 200 participants from diverse backgrounds, we believe this event will provide a unique venue for illuminating overviews and to exchange information on the latest developments for field experts and emerging talents.

Organizing Committee of Symposium on Quantum Electronics

Ryotaro Arita

Research Center for Advanced Science and Technology, the University of Tokyo

Collin Broholm

Department of Physics and Astronomy, Johns Hopkins University

Kenji Fukushima

Department of Physics, the University of Tokyo

Kouta Kondou

Center for Emergent Matter Science (CEMS), RIKEN

Shinji Miwa

The Institute for Solid State Physics (ISSP), the University of Tokyo

Satoru Nakatsuji

Department of Physics, the University of Tokyo

Yoshichika Otani

The Institute for Solid State Physics (ISSP), the University of Tokyo

SYMPOSIUM HIGHLIGHTS

- **9** Keynote Talks, **6** Special Session Talks, **26** Contributed Orals, and **118** Posters.
- **Scientific Publishing and Communications Session** featuring talks by editors of Nature journals and free-form discussion.
- **Sponsor Speech** by JSR Corp. highlighting innovations achieved through collaboration with UTokyo research teams
- **Best Poster Award** open to students and postdoctoral presenters
- **Tea Tasting & Ceremony** during session breaks and poster sessions
- **Banquet** for enjoying authentic traditional Japanese cuisine and networking

Keynotes

Stefan Blügel

Peter Grünberg Institute (PGI) and
Institute for Advanced Simulation,
Forschungszentrum Jülich GmbH

Shunsuke Fukami

Research Institute of Electrical
Communication, Tohoku University

Tomas Jungwirth

The Department of Spintronics and
Nanoelectronics, Institute of Physics,
Academy of Sciences of the Czech
Republic (ASCR)

Kyung-Jin Lee

Department of Physics, Korea Advanced
Institute of Science and Technology
(KAIST)

Prineha Narang

Physical Sciences, the University of
California, Los Angeles (UCLA)

Stuart Parkin

The Max Planck Institute of
Microstructure Physics

Cheng Song

School of Materials Science and
Engineering, Tsinghua University,

Evgeny Tsymbal

University of Nebraska-Lincoln (UNL)

Daniel Worledge

IBM Research

Special Sessions

Gordon Baym

The University of Illinois at
Urbana-Champaign (UIUC)

Takashi Oka

The Institute for Solid State Physics (ISSP),
The University of Tokyo

Surjeet Rajendran

The Department of Physics and Astronomy,
Johns Hopkins University

Shinsei Ryu

Department of Physics, Princeton University

Maria Vozmediano

Instituto de Ciencia de Materiales de
Madrid (ICMM - CSIC)

Naoki Yamamoto

Department of Physics, Keio University

General Guidelines

Registration Desk

Day 1 (February 13)	9: 00 - 18: 00
Day 2 (February 14)	8: 30 - 18: 30
Day 3 (February 15)	9: 00 - 18: 30
Day 4 (February 16)	9: 00 - 12: 00

On-site Registration

Day 1 (February 13)	9: 00 - 18: 00
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Banquet Registration and Fee

Banquet registration will be open until **9: 00 AM on Day 1 (February 13)** or upon reaching maximum capacity.

The banquet fee is **JPY 1000** for students and **JPY 3000** for non-students. Cash payments will be collected at the registration desk starting from Day 1 at 9: 00 AM and will continue until noon on Day 2.

Video Shooting

External media will be present on Day 1 (February 13) for video shooting, capturing moments for event advertisement. We appreciate your cooperation on this. Please inform administrative staff if you wish to avoid being in the video, and we will ensure we meet your request.

Presenter Guidelines

Oral Sessions

• Presentation Time

Keynote and Special Session:
35 minutes presentation + **5** minutes Q&A

Contributed Oral:
15 minutes presentation + **5** minutes Q&A

Please come to the front stage **at least 10 minutes before the session starts** to test your laptop. HDMI and VGA cables are available for connections, while we recommend HDMI for better color effects.

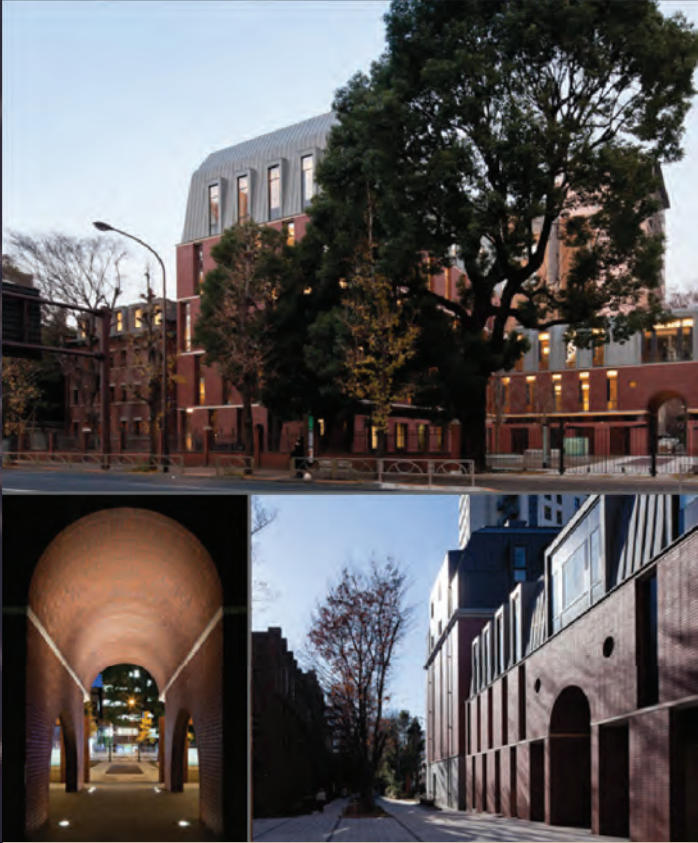
Poster Session

Posters for both sessions will be displayed from Day 2 (February 14) until the end of Day 4 (February 16). The schedule below applies to **ALL** presenters:

Setup: Day 2 10: 00 - 14: 00
Removal: Day 4 before 14: 00

Please make sure to mount your poster on the board with your **Registration No.**

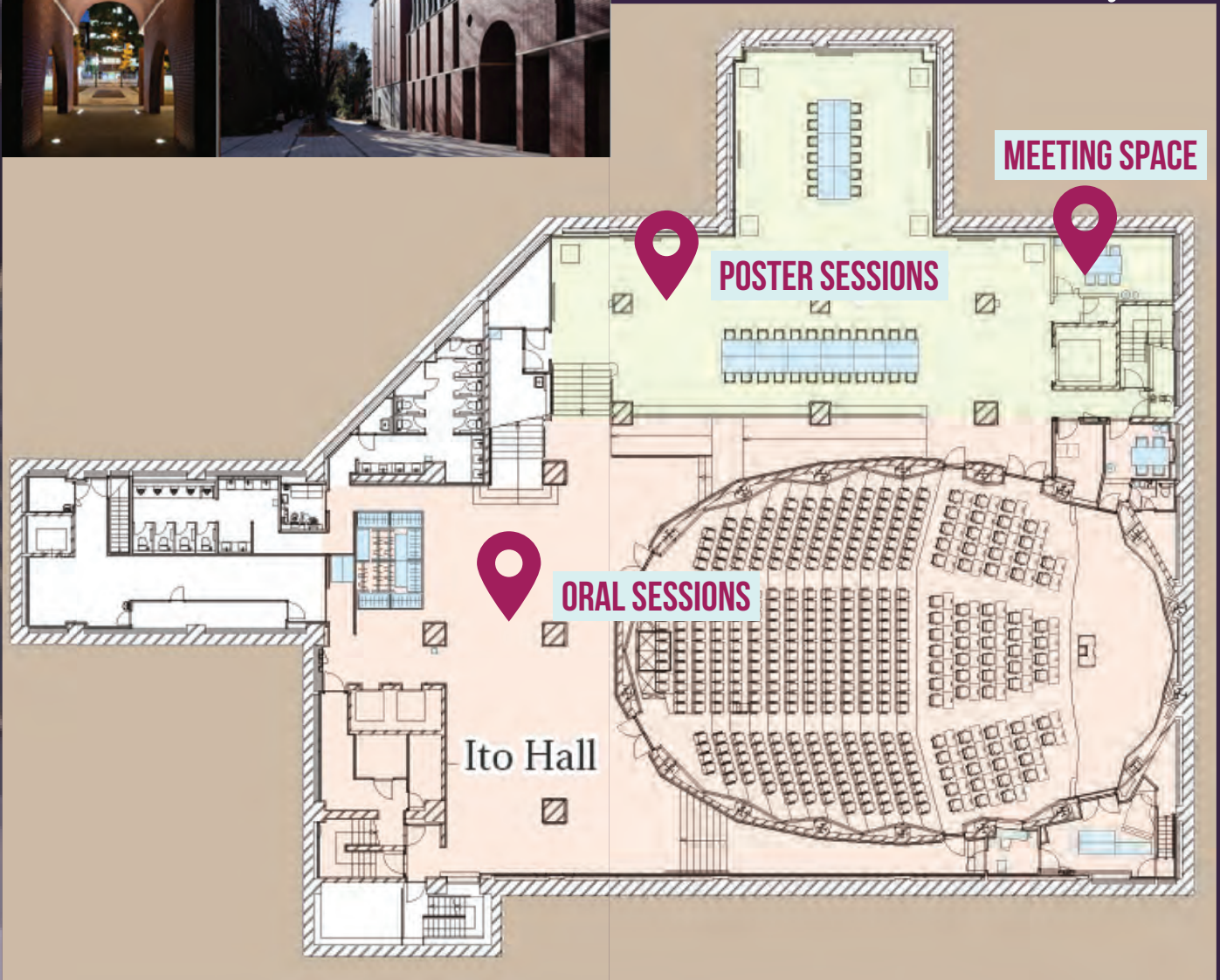
Venue Information



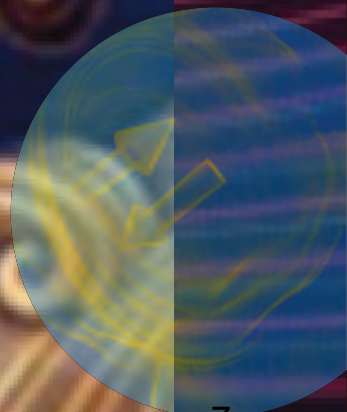
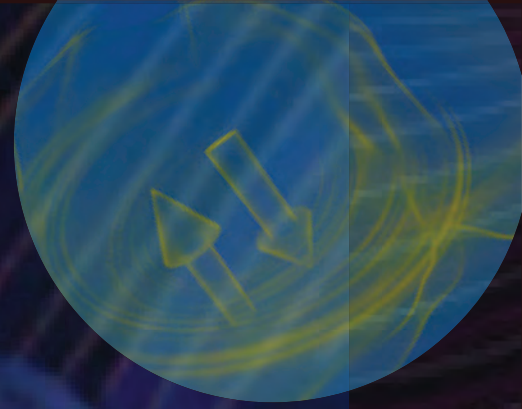
Ito International Research Center, The University of Tokyo

Location:
7-3-1 Hongo, Bunkyo-ku,
Tokyo 113-0033, JAPAN

B2 Level Layout



OVERALL PROGRAM



Day 1 February 13, 2024 (Ito Hall)

9:00 -10:00	Registration
10:00 - 10:15	Opening Remark Satoru Nakatsuji Director, Trans-Scale Quantum Science Institute, The University of Tokyo
10:15 -12:15	Oral Session A1 Chair: Satoru Nakatsuji, The University of Tokyo
	Keynote Talk (10:15 - 10:55) Orbital torque and orbital pumping Kyung-Jin Lee Korea Advanced Institute of Science and Technology (KAIST)
	Contributed Oral (10:55 - 11:15) Observation of current-driven fast magnetic domain-wall motion in noncollinear antiferromagnets Kouta Kondou Center for Emergent Matter Science, RIKEN
	Contributed Oral (11:15 - 11:35) Stroboscopic magneto-optical imaging of current-induced domain wall dynamics in ferrimagnet GdFeCo Kazuma Ogawa Department of Physics, The University of Tokyo
	Keynote Talk (11:35 - 12:15) Electrical 180° switching of Néel vector in altermagnets Cheng Song School of Materials Science and Engineering, Tsinghua University
12:15 -14:00	Lunch Break
14:00 – 15:40	Oral Session A2 Chair: Stefan Blügel Peter Grünberg Institute and Institute for Advanced Simulation, Forschungszentrum Jülich GmbH
	Keynote Talk (14:00 - 14:40) TBD Prineha Narang Physical Sciences, the University of California, Los Angeles (UCLA)
	Contributed Oral (14:40 – 15:00) Hyperuniform electron distribution in quasicrystals Shiro Sakai Center for Emergent Matter Science, RIKEN
	Contributed Oral (15:00 – 15:20) Four-index coulomb interaction beyond Hund's coupling Steffen Backes RIKEN iTHEMS
	Contributed Oral (15:20 – 15:40) Exact quantum spin Hamiltonian for magnetic interactions Hiroshi Katsumoto Peter Grünberg Institut and Institute for Advanced Simulation, Forschungszentrum Jülich and JARA
15:40 – 16:00	Coffee and Tea Break
16:00 – 18:00	Oral Session A3 Chair: Surjeet Rajendran, Johns Hopkins University
	Special Session Talk (16:00 – 16:40) Quantum field theory aspects of Dirac semimetals Maria A. H. Vozmediano Instituto de Ciencia de Materiales de Madrid (ICMM - CSIC)
	Special Session Talk (16:40 – 17:20) Chiral transport in the universe Naoki Yamamoto Department of Physics, Keio University, Japan
	Contributed Oral (17:20-17:40) Chiral anomalies through laser-induced chiral gauge fields in disordered 3D Dirac semimetals Hung-Hsuan Teh The Institute for Solid State Physics (ISSP), The University of Tokyo
	Contributed Oral (17:40-18:00) Emergent spin-momentum locking and triplet-mixed cooper pairs in a chiral organic superconductor Takuro Sato Research Center of Integrative Molecular Systems (CIMoS), Institute for Molecular Science
18:00 – 18:30	Free Discussion with Coffee and Tea

Day 2 February 14, 2024 (Ito Hall)

9:00 -10:40	Oral Session B1 Chair: Kyung-Jin Lee, KAIST
	Keynote Talk (9:00 – 9:40) Electrical control of noncollinear antiferromagnetic Mn₃Sn Shunsuke Fukami Research Institute of Electrical Communication, Tohoku University
	Contributed Oral (9:40 - 10:00) Electrical manipulation and detection of topological antiferromagnetic state in Mn₃Sn-based epitaxial heterostructures Tomoya Higo Department of Physics, the University of Tokyo
	Keynote Talk (10:00 - 10:40) The Josephson diode effect Stuart Parkin The Max Planck Institute of Microstructure Physics
10:40 -11:00	Coffee and Tea Break
11:00 – 12:40	Oral Session B2 Chair: Shinsei Ryu, Princeton University
	Contributed Oral (11:00-11:20) Ferroc multipole order in the quadrupole Kondo lattice PrV₂Al₂₀ studied by magnetostriction and thermal expansion Akito Sakai Department of Physics, The University of Tokyo
	Contributed Oral (11:20-11:40) Versatile magnetic hedgehog lattice phases induced by anisotropic interactions in centrosymmetric systems Shun Okumura Department of Applied Physics, The University of Tokyo
	Contributed Oral (11:40-12:00) Emergent inductance from spin fluctuations in strongly correlated magnets Taekoo Oh Center for Emergent Matter Science, RIKEN
	Contributed Oral (12:00-12:20) Majorana-mediated spin transport in the Kitaev model at finite temperatures Akihisa Koga Department of Physics, Tokyo Institute of Technology
	Contributed Oral (12:20-12:40) Field control of quasiparticle decay in a quantum antiferromagnet Takatsugu Masuda The Institute for Solid State Physics (ISSP), The University of Tokyo
12:40 – 14:00	Lunch Break
14:00 – 15:40	Oral Session B3 Chair: Maria A. H. Vozmediano, Instituto de Ciencia de Materiales de Madrid (ICMM - CSIC)
	Special Session Talk (14:00 – 14:40) Topological phenomena out of equilibrium and time-reversal symmetry Shinsei Ryu Department of Physics, Princeton University
	Special Session Talk (14:40 – 15:20) Heterodyne Hall effect in oscillating magnetic fields Takashi Oka The Institute for Solid State Physics (ISSP), The University of Tokyo
	Contributed Oral (15:20-15:40) Nonlinear optical responses in α-type organic salt Keisuke Kitayama Department of Physics, University of Tokyo
15:40 – 16:30	Scientific Publishing and Communications Session
	Debarchan Das, Associated Editor at Nature Physics Giulia Pacchioni, Chief Editor at Nature Review Materials
16:30 – 18: 30	Poster Session 1
18:30 – 21: 00	Banquet

Day 3 February 15, 2024 (Ito Hall)

9:00 – 10:20	Oral Session C1 Chair: Shunsuke Fukami, Tohoku University
	Keynote Talk (9:00 – 9:40) Spin-transfer-torque MRAM: the next revolution in memory Daniel C. Worledge IBM Research
	Keynote Talk (9:40 – 10:20) Antiferromagnetic tunnel junctions for spintronics Evgeny Y. Tsybal University of Nebraska-Lincoln (UNL)
10:20 – 10:35	Sponsor Speech
	R&D initiatives of JSR Corporation Kouichi Hasegawa JSR Corporation
10:35 – 10:55	Coffee and Tea Break
10:55 – 11:55	Oral Session C2 Chair: Cheng Song, Tsinghua University
	Contributed Oral (10:55 – 11:15) Anisotropic spin polarized current and magnetoresistance in an antiferromagnetic tunnel junction Shinji Miwa The Institute for Solid State Physics (ISSP), The University of Tokyo
	Contributed Oral (11:15 – 11:35) First-principles study on tunnel magnetoresistance effect with antiferromagnets Katsuhiro Tanaka Department of Physics, The University of Tokyo
	Contributed Oral (11:35 – 11:55) Magnetic tunnel junction-based readout for spin Hall nano-oscillators Akash Kumar Department of Physics, University of Gothenburg and Research Institute of Electrical Communication, Tohoku University
11:55 – 13:30	Lunch Break
13:30 – 15:50	Oral Session C3 Chair: Naoki Yamamoto, Keio University
	Special Session Talk (13:30 – 14:10) Matter under extreme conditions in neutron stars Gordon Baym The University of Illinois at Urbana-Champaign (UIUC)
	Contributed Oral (14:10-14:30) Nonrelativistic trace anomaly and its impact on equation of state in dense fermionic matter: Toward understanding hadron-quark crossover via analogue quantum simulation Hiroyuki Tajima Department of Physics, The University of Tokyo
	Special Session Talk (14:30 – 15:10) Fundamental physics with quantum sensors Surjeet Rajendran The Department of Physics and Astronomy, Johns Hopkins University
	Contributed Oral (15:10-15:30) Braiding and fusion of Majorana fermions in minimal Kitaev spin liquid on a single hexagon with 5 qubits Motohiko Ezawa Department of Applied Physics, The University of Tokyo
	Contributed Oral (15:30-15:50) Integrating ultrafast switches into a single molecule Hirofumi Yanagisawa Shizuoka University
15:50 – 16:00	Coffee and Tea Break
16:00 – 18:00	Poster Session 2

Day 4 February 16, 2024 (Ito Hall)

9:00 -10:40	Oral Session D1 Chair: Tomas Jungwirth Academy of Sciences of the Czech Republic (ASCR)
	Keynote Talk (9:00 – 9:40) From the Fermi surface to topological magnetization textures Stefan Blügel Peter Grünberg Institute (PGI) and Institute for Advanced Simulation, Forschungszentrum Jülich GmbH
	Contributed Oral (9:40 - 10:00) Observation of cluster magnetic octupole domains in the antiferromagnetic Weyl semimetal Mn₃Sn Nanowire using an atomic force microscope Hironari Isshiki Department of Physics, University of Tokyo
	Contributed Oral (10:00 - 10:20) Topological magneto-optical effect from skyrmion lattice Yoshihiro Okamura Department of Applied Physics and Quantum Phase Electronics Center, University of Tokyo
	Contributed Oral (10:20 – 10:40) First principles calculation of topological Hall conductance in the skyrmion lattice Hsiao-Yi Chen Center for Emergent Matter Science, RIKEN
10:40 -11:00	Coffee and Tea Break
11:00 – 12:40	Oral Session D2 Chair: Evgeny Y. Tsymbal , University of Nebraska-Lincoln (UNL)
	Keynote Talk (11:00 – 11:40) Altermagnets: An unconventional magnetic class Tomas Jungwirth The Department of Spintronics and Nanoelectronics, Institute of Physics, Academy of Sciences of the Czech Republic (ASCR)
	Contributed Oral (11:40 – 12:00) Symmetry of emergent physical phenomena free from relativistic spin-orbit coupling Hikaru Watanabe Research Center for Advanced Science and Technology, The University of Tokyo
	Contributed Oral (12:00 – 12:20) Acoustically driven magnon-phonon coupling in a layered antiferromagnet Jorge Puebla Center for Emergent Matter Science, RIKEN
	Contributed Oral (12:20 – 12:40) Emergent isotropic spin fluctuations from a diluted 2D anisotropic antiferromagnet Hidemaro Suwa Department of Physics, The University of Tokyo
12:40 – 13:00	Reception of Poster Award & Closing Remark

UNLEASH CREATIVITY with TEA

Tea Menu

Yuzu Sencha

(柚子煎茶)

Shizuoka, Japan

Kaga-Boucha

(加賀棒茶)

Ishikawa, Japan

Alishan Golden

Lily Oolong

(阿里山金萱烏
龍茶)

Chiayi, Taiwan, Taiwan

Rubby Black

(紅玉紅茶)

Nantou, Taiwan

Imperial Pu'er

(宮廷老散茶)

Yunnan, Mainland China

Tea Serving Hours:

Session Breaks on Day 2 - Day 4
Kung-Fu Tea Ceremony: Poster Sessions 1 & 2

Banquet

Wednesday, February 14th at 6:45 p.m.

Traditional Japanese cuisine restaurant
四季郷土料理かどや 山上亭
(Kadoya-Sanjotei)

Location:
Sanjo Conference Hall, B1 Level, 7 Chome-3-1
Hongo, Bunkyo City, Tokyo
(About 10-minute walk from the venue)

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