

## OCAMI Joint Usage/Research

### Helicity and space-time symmetry — a new perspective of classical and quantum systems

Co-organized by NITEP: Nambu Yoichiro Institute of Theoretical and Experimental Physics, Osaka City University

Date: October 5 (Tue) - 8 (Fri), 2021

Venue: Media Center, Osaka City University (Sugimoto Campus)

<https://indico.nitep.osaka-cu.ac.jp/event/86/>

Remote attendance via Zoom is accepted

#### October 5 (Tue)

※ [Z]: talk via Zoom

Chairperson: T. Oota (Osaka City U.)

13:50 ~ 14:00 Opening address

14:00 ~ 14:45 Y. Matsuo (U. Tokyo), A. Sugamoto (Ochanomizu U.) [Z]

A description of perfect fluid by Kalb-Ramond field and the duality with Gross-Pitaevskii

Chairperson: C. Matsuoka (Osaka City U.)

14:45 ~ 15:30 Z. Yoshida (Natl. Inst. Fusion Sci.), P. J. Morrison (U. Texas, Austin) [Z]

The kinetic origin of the fluid helicity — a symmetry in the kinetic phase space

15:30 ~ 16:00 Tea break

16:00 ~ 16:45 H. K. Moffatt (Trinity College, Cambridge) [Z]

Invariance of helicity and some topological implications

16:45 ~ 17:30 C. F. Barenghi (Newcastle U.) [Z]

Helicity and topology of a tangle of vortices

#### October 6 (Wed)

Chairperson: H. Ishihara (Osaka City U.)

9:30 ~ 10:15 N. Yamamoto (Keio U.), D.-L. Yang (Academia Sinica) [Z]

Chiral radiation transport theory of neutrinos

10:15 ~ 11:00 S. Hanai, N. Yamamoto (Keio U.) [Z]

Gravitational waves caused by chiral transport phenomena in neutron stars and supernova

11:00 ~ 11:15 Tea break

11:15 ~ 12:00 Y. Masada (Aichi U. Edu.), T. Takiwaki (Natl. Astron. Obs. Japan), K. Kotake (Fukuoka U.) [Z]

- Convection and dynamo in newly-born neutron stars
- 12:00 ~ 14:00 Lunch break  
Chairperson: T. Oota (Osaka City U.)
- 14:00 ~ 14:45 K. Shimokawa (Saitama U.) [Z]  
Untying pathways of vortex knots  
Chairperson: C. Matsuoka (Osaka City U.)
- 14:45 ~ 15:30 R. Morita (Hokkaido U.) [Z]  
Physics of optical vortex and its application
- 15:30 ~ 16:00 Tea break  
Chairperson: M. Tsubota (Osaka City U.)
- 16:00 ~ 16:45 X. Liu (Beijing U. Tech.), R. L. Ricca (U. Milano-Bicocca) [Z]  
Detecting topology of fluid vortex knots in terms of polynomial invariants constructed from helicity
- 16:45 ~ 17:30 R. L. Ricca (U. Milano-Bicocca), X. Liu (Beijing U. Tech.),  
X.-F. Li (Guangxi U. Sci. Tech.) [Z]  
Minimal unlinking pathways as geodesics in knot polynomial space

### October 7 (Thu)

- Chairperson: T. Oota (Osaka City U.)
- 9:30 ~ 10:15 K. Kohkichi (Natl. Inst. Tech. Tomakomai College) [Z]  
Review of Chern-Simons modified gravity: its effects on compact objects
- 10:15 ~ 11:00 T. Igata (KEK) [Z]  
Energy extraction from a rotating black hole
- 11:00 ~ 11:15 Tea break
- 11:15 ~ 12:00 K. Maruyoshi (Seikei U.) [Z]  
Surface defects, vortices and integrable systems
- 12:00 ~ 14:00 Lunch break  
Chairperson: C. Matsuoka (Osaka City U.)
- 14:00 ~ 14:45 K. Nishihara (Osaka U.), C. Matsuoka (Osaka City U.), T. Sano (Osaka U.),  
F. Cobos-Campos (U. Castilla-La Mancha)  
Richtmyer-Meshkov instability and vortices
- 14:45 ~ 15:30 T. Sano (Osaka U.)  
Laser-driven interfacial instabilities in magnetized plasmas
- 15:30 ~ 16:00 Tea break
- 16:00 ~ 16:45 K. Abe (Osaka City U.)  
Rigidity of Beltrami fields with a non-constant proportionality factor

16:45 ~ 17:30 C. Matsuoka (Osaka City U.), K. Hiraide (Ehime U.)  
Exact solutions in non-integrable systems

### October 8 (Fri)

Chairperson: T. Oota (Osaka City U.)

9:30 ~ 10:15 H. Yoshimura (Waseda U.) [Z]

Dirac geometry and variational structures in nonequilibrium thermodynamics

Chairperson: C. Matsuoka (Osaka City U.)

10:15 ~ 11:00 L. Peng (Keio U.) [Z]

Continuous symmetries of semi-discrete equations and conserved quantities

11:00 ~ 11:15 Tea break

Chairperson: H. Itoyama (Osaka City U.)

11:15 ~ 12:00 Y. Fukumoto (Kyushu U.), R. Zou (U. Hawai'i)

Particle relabeling symmetry and Noether's first and second theorems for  
fluid and MHD equations

12:00 ~ 12:10 Closing remarks

※ If you attend this conference, please visit the HP and make registration

<https://indico.nitep.osaka-cu.ac.jp/event/86/>

by clicking the button 'Registration' on the left

### Organizers

Yasuhide Fukumoto (Kyushu U., PI), Hiroshi Itoyama (Osaka City U.)

Chihiro Matsuoka (Osaka City U.)