

# WG4

## THE BIGGER PICTURE – EDI & OUTREACH ACROSS THE COMMUNITY

Group report

Melissa Mendes & Andrea Richaard

- WG4 mission
- Completed activities
- Ongoing activities
- Future activities



Get involved!

WG4 membership: <https://e-services.cost.eu/action/CA24139/working-groups/apply>

WG4 mailing list: <https://groups.google.com/g/scales-wg4>

contact: [melissa.mendes@tu-darmstadt.de](mailto:melissa.mendes@tu-darmstadt.de), [andrea.richaud@upc.edu](mailto:andrea.richaud@upc.edu)

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# WG4 mission

- Equity, diversity, and inclusion
  - Build a visible, inclusive, and connected community across Europe
- Outreach and public engagement
  - Integrate the cold atoms, helium and neutron star groups with a shared language
- Support for early career researchers



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# Completed activities

- Code of conduct drafting and implementation
- Point of contact training
- Support in website creation (<https://camk.pl/SCALES/index.html>)
- Hiring graphic designer for logo development
- Practical support for EDI and outreach presence in events



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# SCALES Code of Conduct



<https://camk.pl/SCALES/code-of-conduct.html>

- **Respect & inclusivity:** foster a safe, welcoming, and inclusive environment across all identities and career stages.
- **Constructive communication:** critique ideas, not people; encourage open dialogue, active listening, and equal participation.
- **Scientific integrity:** ensure proper credit, avoid plagiarism or data falsification, and use shared resources responsibly.
- **Responsibility & professionalism:** act ethically, respect confidentiality, and handle conflicts with civility.
- **Zero tolerance for misconduct:** no harassment, discrimination, abuse of resources, or scientific malpractice.
- **Points of Contact available:** designated WG representatives and the EDI Coordinator handle concerns confidentially and fairly.
- **Point of Contacts** present at this event: **Marco Antonelli, Bryn Haskell, Gary Liu, Melissa Mendes, Armin Vahdat**

# EDI and outreach in events



CONFERENCE PROGRAM

## Scientific Timetable

● Break / Lunch ● 45-min slot ● 30-min slot ● Online speaker

For example in WG1

|             | MONDAY   | TUESDAY  | WEDNESDAY   | THURSDAY   | FRIDAY  |
|-------------|--|--|---|--|---|
| 09:00–09:45 | <p><b>Opening Session</b></p> <p>08:45–09:15 <b>Registration</b></p> <p>09:15–09:30 <b>Opening Remarks</b><br/>Brynmor Haskell</p> <p>09:30–10:30 <b>Scientific Introduction</b><br/>N. Chamel, V. Eltsov, P. Magierski, K. Wilson</p> | <p><i>Vortex dynamics in rotating superfluid <math>^4\text{He}</math></i><br/><b>Vladimir Eltsov</b></p>                     | <p><i>Synthetic magnetic field for ultracold atoms using vortex light beams</i><br/><b>Gediminas Juzeliūnas</b></p>     | <p><i>Superfluid fraction in the inner crust of neutron stars</i><br/><b>Giorgio Almirante (online)</b></p>                                    | <p><i>The Physics Governing Magnetic Field Evolution in Magnetars</i><br/><b>Clara Dehman</b></p>                   |
| 09:45–10:30 |  | <p><i>Quantum vortices on camera: visualisation of vortex structures in superfluid helium</i><br/><b>Patrik Švančara</b></p> | <p><i>Exploring Vortex Dynamics in Binary Superfluids</i><br/><b>Kali Wilson</b></p>                                    | <p><b>EDI Event</b></p>  | <p><i>Novel state-space techniques to infer neutron star internal physics</i><br/><b>Andres Vargas (online)</b></p> |
| 10:30–11:00 | ☕ COFFEE   | ☕ COFFEE   | ☕ COFFEE  | ☕ COFFEE   | ☕ COFFEE  |
| 11:00–11:45 | <p><i>Vortex Dynamics in Neutron Stars</i><br/><b>Bennett Link</b></p>   | <p><i>Inertial effects in superfluid vortex dynamics</i><br/><b>Andrea Richaud</b></p>                                       | <p><i>Motion of quantized vortices on rough surfaces</i><br/><b>Emil Varga</b></p>                                      | <p><i>Quantum simulation of neutron star</i><br/><b>Andrea Tononi</b></p>  | <p><i>Full control of a single vortex in a superconducting nanodevice</i><br/><b>Maciej Zgirski</b></p>             |
| 11:45–12:15 | <p><i>Pairing in neutron matter: testing many-body methods with ultracold atoms</i><br/><b>Michael Urban</b></p>   | <p><i>Vortex and soliton dynamics in a quantum fluid of light</i><br/><b>Myrann Baker-Rasooli</b></p>                        | <p><i>Rotating counterflow in Helium II: from waves to quantum turbulence</i><br/><b>Florian Lorin</b></p>              | <p><i>Simulating superfluid <math>^4\text{He}</math> aerogel experiments as a laboratory neutron star analogue</i><br/><b>Samuli Autti</b></p> | <p><i>On chip strongly confined pinned vortices under rotation</i><br/><b>Marek Talić</b></p>                       |
| 12:15–12:45 | <p><i>The Meissner effect in neutron stars</i><br/><b>Sam Lander</b></p>   | <p><i>Microscopic Analysis of Vortex Structure in the Outer Core of the Neutron Stars</i><br/><b>Tatsuhiko Hattori</b></p>   | <p><i>Quantum vortex driven Kelvin wave in the thermal background of superfluid helium</i><br/><b>Simone Scollo</b></p> | <p><i>Curved spacetimes and accelerated observers in superfluid helium</i><br/><b>Marion Cromb (online)</b></p>                                | <p><i>Interaction of NEMS with a Quantum Vortex in Superfluid-4</i><br/><b>Viktor Tsepelin (online)</b></p>         |



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# For example WG1 meeting



Work in small groups to create one single slide to explain a topic to a general audience.

Your slide should include:

- One clear idea
- Very little text
- At least one visual (sketch, diagram, etc)

| Group number | Topic  |
|--------------|--|
| 1            | What is superfluidity?                             |
| 2            | Why can superfluids flow without friction?         |
| 3            | What is a quantum vortex?                          |
| 4            | Difference between classical and turbulence?       |
| 5            | What is a Bose-Einstein condensate (BEC)?          |
| 6            | What are neutron stars?                            |
| 7            | What is a pulsar glitch?                           |
| 8            | Difference between classical and quantum fluids?   |
| 9            | What is coherence in quantum systems?              |
| 10           | What are the possible applications of superfluids? |
| 11           | How do vortices interact with their environment?   |
| 12           | How can lab experiments mimic neutron stars?       |
| 13           | Why is superfluidity important in astrophysics?    |



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# Ongoing activities

- Building a database of EDI/outreach speakers for future events
- Building a database of facilitators and workshop moderators (outreach/support early career researchers)
- Support material for organizers regarding code of conduct violations and reports



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# Ongoing activities

- Yearly meeting of point of contact volunteers
- Support to a shared cloud, members-only, area within the website
- Development and dissemination of educational material



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## Pulsar Magnetosphere v5

Yee FDTD · Boris Pusher · MC Photons · Kerr Geodesics · Landau-Lifshitz · QED Cascade · Hot Spots

### Default Configuration

Standard pulsar with moderate pair production, radiation reaction, and Kerr corrections. Select a preset below or adjust parameters manually.

$R_{LC}$  5.0 |  $R_+$  |  $\Omega$  0.20 |  $\langle R_+ \rangle$  |  $N_{p0}$  0 |  $N_{r0}$  0

$L_{sd}$  0.00 |  $L_{syn}$  0.00 | FPS: 60

$\alpha$ : 10 |  $\kappa$ : 0 |  $\tau$ : 0.00 | P

$E_{inj}$  0.00 |  $\gamma_{max}$  1.0 |  $\sigma$ : 0

$T_{max}$  0 | keV |  $N_{ph0}$  0 |  $T_{opt}$  0.00

Pause | Reset

B-lines | Particles | Sheet |  $R_{LC}$  | Auto-Rot

p Map | E | Synchro | Hot Spots | MC Photons | Kerr

Vacuum | Force-free | Oblique 45° | Pair-Starved | Reconnection

Hot Spot | Millisecond | Magnetar | Aligned FF | Orthogonal

#### PULSAR PARAMETERS

$\Omega$  (spin)  0.200

Obliquity  $\alpha$   0

$B_+$  (dipole)  2.0

$R_+/R_{LC}$   0.20

#### KERR METRIC & GR

$a/M$  (spin)  0.15

Compactness  0.15

#### PLASMA & QED PAIR PRODUCTION

$\kappa$  (multiplic.)  10

$x$  threshold  0.10

Inject Rate  4

Max Particles  6000

#### MONTE CARLO PHOTONS

#### SYNCHROTRON & RADIATION

#### HOT SPOTS

#### GRID & NUMERICS

#### VISUALIZATION

SETUP

?

Physics & Methods

Charts | Table | Export

Waiting for data.

Waiting for data.

Waiting for data.

Waiting for data.

Waiting for data.

Waiting for data.

# Future activities

- Expand the database of speakers and facilitators for future events
- Development and dissemination of educational material
  - Expand the website with links and external resources
- Organize volunteers and share responsibilities
- Creation and management of social media channels



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Andrea Richaud - [andrea.richaud@upc.edu](mailto:andrea.richaud@upc.edu)