



D5.9 | Dissemination Activities

Author(s): Sanna Rauhamäki

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Author(s):	Sanna Rauhamäki, University of Jyväskylä
Contributor(s):	Tero Heikkilä, University of Jyväskylä
External contributor(s):	

Abstract

This is a draft report of the dissemination activities by the 54th month of the project.



1. Introduction

According to European Commission guidelines¹, the H2020 principles direct participants to take part in both dissemination and exploitation activities. In SUPERTED D4.4 Dissemination and exploitation plan, the dissemination activities are defined as follows:

- Dissemination is **about results only**, it transfers knowledge “to the ones that can best make use of it” and “maximizes the impact of research, enabling the value of results to be potentially wider than the original focus”. Some examples are peer-reviewed publications, presentations on scientific conferences and social events.

Each of the project partners are responsible for implementing the dissemination activities on their own areas of expertise. Since the dissemination and exploitation plan (DEP, D4.4) is dynamic and reviewed periodically, this draft report will discuss the current state of the dissemination activities, as the project is concluded.



2. Dissemination activities

2.1 Press releases on high impact factor articles

Based on the D4.4 DEP, more than 30 research papers have been expected to emerge as a result of the project. This landmark was reached during summer 2020 which means the publication activities exceeded expectation by the half point of the project. At the end of the third reporting period, as the project is concluded, there are nearly 90 peer-reviewed articles that acknowledge the project listed on the SUPERTED website (<https://superted-project.eu/publications>). In addition, publishing in high-impact (>7) journals has been encouraged. Accompanying high-impact publications with a press release for international media and the AlphaGalileo service has been an important goal for reaching the general public.

Overall, there have been 18 publications in high-impact journals (IF>7). Eight of those publications have one or more press releases linked to them. The press releases have been published on the institution websites of the project members and listed on the SUPERTED website <https://superted-project.eu/news>.

Table 1: Press releases on publications with high impact factor.

Publication	Press release
" <i>Superconducting spintronic tunnel diode</i> " E. Strambini, M. Spies, N. Ligato, S. Ilić, M. Rouco, Carmen González-Orellana, Maxim Ilyn, Celia Rogero, F. S. Bergeret, J. S. Moodera, P. Virtanen, T. T. Heikkilä, and F. Giazotto, <i>Nat Commun</i> 13, 2431, 2022, DOI: https://doi.org/10.1038/s41467-022-29990-2 (arXiv publication)	https://www.nano.cnr.it/the-first-superconducting-spintronic-tunnel-diode/ https://www.jyu.fi/en/current/archive/2022/05/researchers-found-how-to-make-diodes-from-superconductors
" <i>Dynamics of Two Ferromagnetic Insulators Coupled by Superconducting Spin Current</i> " R. Ojajärvi, F. S. Bergeret, M. A. Silaev, and T. T. Heikkilä, <i>Phys. Rev. Lett.</i> 128, 167701, 2022, DOI: https://doi.org/10.1103/PhysRevLett.128.167701 (arXiv publicatio)	https://www.jyu.fi/en/current/archive/2022/05/superconductors
" <i>Gate-controlled suspended titanium nanobridge supercurrent transistor</i> " M. Rocci, G. De Simoni, C. Puglia, D. Degli Esposti, E. Strambini, V. Zannier, L. Sorba, and F. Giazotto, <i>ACS Nano</i> , 14, 10, 12621–12628, 2020, DOI: https://doi.org/10.1021/acsnano.0c05355 (arXiv	http://web.nano.cnr.it/sqel/2020/09/16/gate-controlled-suspended-titanium-nanobridge-supercurrent-transistor-published-on-acsnano/



publication)	
" <i>A Josephson phase battery</i> " E. Strambini, A. Iorio, O. Durante, R. Citro, C. Sanz-Fernández, C. Guarcello, I. V. Tokatly, A. Braggio, M. Rocci, N. Ligato, V. Zannier, L. Sorba, F. S. Bergeret and F. Giazotto, <i>Nat. Nanotechnol.</i> 15, 656–660, 2020 , DOI: https://doi.org/10.1038/s41565-020-0712-7 (arXiv publication)	http://web.nano.cnr.it/sqel/2020/06/17/a-josephson-phase-battery-has-been-published-on-nature-nanotechnology/ https://cfm.ehu.es/cfm_news/a-phase-battery-for-quantum-technologies/ http://web.nano.cnr.it/sqel/2020/07/25/press-review-of-a-josephson-phase-battery/
" <i>Nonlinear thermoelectricity with electron-hole symmetric systems</i> " G. Marchegiani, A. Braggio, and F. Giazotto <i>Phys. Rev. Lett.</i> 124, 106801, 2020 , DOI: https://doi.org/10.1103/PhysRevLett.124.106801 (arXiv publication)	http://web.nano.cnr.it/sqel/2020/03/26/nonlinear-thermoelectricity-with-electron-hole-symmetric-systems-published-on-physical-review-letters/
" <i>Thermal, electric and spin transport in superconductor/ferromagnetic-insulator structures</i> ", T. T. Heikkilä, M. Silaev, P. Virtanen, S. F. Bergeret, <i>Progress in Surface Science</i> , 94 (3), 100540, 2019 , DOI: doi.org/10.1016/j.progsurf.2019.100540 (arXiv publication)	https://www.jyu.fi/science/en/nanoscience-center/research/research-highlights/research-highlights-of-year-2019
" <i>Field-Effect Controllable Metallic Josephson Interferometer</i> " F. Paolucci, F. Vischi, G. De Simoni, C. Guarcello, P. Salinas, and F. Giazotto, <i>Nano Letters</i> , 19, 6263–6269, 2019 , DOI: doi.org/10.1021/acs.nanolett.9b02369 (arXiv publication)	http://web.nano.cnr.it/sqel/2019/09/17/field-effect-controllable-metallic-josephson-interferometer-published-on-nano-letters/
" <i>Josephson Field-Effect Transistors Based on All-Metallic Al/Cu/Al Proximity Nanojunctions</i> " G. De Simoni, F. Paolucci, C. Puglia, and F. Giazotto, <i>ACS Nano</i> , 13 (7), 7871–7876, 2019 , DOI: doi.org/10.1021/acsnano.9b02209 (arXiv publication)	http://web.nano.cnr.it/sqel/2019/06/21/josephson-field-effect-transistors-based-on-all-metallic-al-cu-al-proximity-nanojunctions/



2.2 Talks

2.2.1 Conferences

The project results are presented as oral presentations, posters, etc. at major international meetings and conferences. Scientific meetings are useful forums for communicating the project results and sharing ideas with the SUPERTED target audience. Unfortunately, the opportunities to participate in face-to-face discussions at scientific meetings has been limited during the project due to the outbreak of COVID-19. However, the last reporting period has allowed more mobility and the project participants have been able to communicate their results also at in person scientific meetings.

Reporting Period III

Applied Superconductivity Conference, Honolulu, USA (23-28.10.2022). Talk by Elia Strambini: *"Biasless detection of electromagnetic radiation using a superconductor/ ferromagnet heterostructure"*

Applied Superconductivity Conference, Honolulu, USA (23.-28.10.2022) Talk by Ilari Maasilta *"Progress in superconductor-ferromagnet thermoelectric detector (SFTED) development"*.

Mole-Conference, San Sebastian (25-29.7.2022). Invited talk by Celia Rogero: *"Magnetic 2D semiconductor materials: developing materials for upcoming Digital Transformation"*.

Quantum designer physics workshop, San Sebastian, Spain (18-21.07.2022). Talk by Stefan Ilic: *"Supercurrent diode effect in Rashba superconductors with arbitrary disorder"*.

Quantum designer physics workshop, San Sebastian, Spain (18-21.07.2022). Poster by Stefan Ilic: *"Current rectification in junctions with spin-split superconductors"*.

Quantum spintronics workshop 2022, NTNU, Trondheim (13-15.6.2022). Invited talk by Tero Heikkilä: *"Magnetization dynamics in superconductor/ferromagnet heterostructures"*.

Novel Quantum Phases in Superconducting Heterostructures workshop, Bad Honnef, Germany (30.5.-2.6.2022). Invited talk by Sebastian Bergeret: *"Magnetoelectric effects and reciprocal-transport in superconducting systems with spin-orbit coupling and spin-splitting fields"*

Nanospain Conference 2022, Madrid (17-20.5.2022), Invited talk by Celia Rogero: *"Exploring new 2D halides materials for quantum devices"*.

Superconducting diode effects workshop, VSF Speakers Corner (11.05.2022). Online talk by Stefan Ilic: *"Supercurrent diode effect in Rashba superconductors with arbitrary disorder"*.

Quantum Materials and Devices at the Nanoscale Workshop, Madrid (7-9.2.2022). Invited talk by Celia Rogero: *"Ferromagnetic-insulator/superconductor interfaces as a platform for superconducting-based nanodevices"*.



JYU/Aalto/Michigan State University joint workshop Quantum technologies and hybrid systems (25.-29.10.2021). Talk by Tero Heikkilä: "*Coupling superconductivity and magnetism*".

Low dimensional superconducting hybrids for novel quantum functionalities, College de France, Paris (12.-14. 2021 Oct). Talk by Sebastian Bergeret: "*Superconductors with a spin-splitting field: fundamentals and applications*".

Low dimensional superconducting hybrids for novel quantum functionalities, College de France, Paris (12.-14. 2021 Oct). Poster by Stefan Ilic: "*Current rectification in junctions with spin-split superconductors*".

Research in superconductivity and beyond (Eliashberg Memorial Conference), Chernogolovka, Russia (23.-26. August 2021). Talk by Sebastian Bergeret: "*Paramagnetic response of Superconductors revisited: The role of spin-orbit coupling and finite-size effects*".

Reporting Period II

SPICE workshop Coherent order and transport in spin-active systems, on-line meeting on superconducting spintronics (19.11.2020). Invited tutorial talk by Tero Heikkilä: "Nonequilibrium phenomena in superconductors in proximity to magnets".

ASC2020 Applied Superconductivity Conference 2020, an online conference (24.10.-7.11.2020) Talk by Ilari Maasilta: "Recent progress in the development of the Superconductor-ferromagnet thermoelectric detector (SFTED)".

EASISchool 3 - Superconductivity and its Applications, Genoa, Italy (28.9.-9.10.2020). Invited talk by Francesco Giazotto: "Thermal Quantum Devices".

106mo Congresso Nazionale della Societa' Italiana di Fisica (14-18.9.2020). Invited talk by Francesco Giazotto: "Josephson field-effect transistors go metal: A groundbreaking route towards concrete superconducting electronics".

APS March Meeting 2020, Boulder, CO, USA (5.3.2020). Invited talk by Francesco Giazotto: "Advanced Josephson junctions circuits and nanoscale devices: The phase-coherence in heat transport".

SuperFOx2020, Conference on Superconductivity and Functional Oxides, Santa Margherita Ligure, Italy (12.2.2020). Invited talk by Francesco Giazotto: "Josephson field-effect transistors go metal: A groundbreaking route towards concrete superconducting electronics".

KITP meeting Spintronics meets topology in quantum materials, Santa Barbara, USA (13.11.2019). Talk by Tero Heikkilä: "Josephson-type dynamics of magnetic domain walls".

Yes, Those are the atoms: Trends in 35 years of STM in Spain, Madrid (25.-26.10.2019). Invited talk by Celia Rogero "Surface Science in San Sebastian: combining STM and ARPES".



During Nanowire Week held in Pisa from 23rd to 27th of September 2019, Elia Strambini gave a talk titled “*Magnetically-driven anomalous phase shift in InAs nanowire Josephson Junctions*”.
<http://web.nano.cnr.it/sqel/2019/09/28/sqel-at-the-nanowire-week-2019/>

M. Carrega, S. Guiducci, A. Iorio, L. Bours, E. Strambini, G. Biasiol, M. Rocci, V. Zannier, L. Sorba, F. Beltram, S. Roddaro, F. Giazotto, and S. Heun, “*Investigation of InAs-based devices for topological applications*,” Proc. SPIE 11090, Spintronics XII, 110903Z (16 September 2019); <https://doi.org/10.1117/12.2527754>

Reporting Period I

College on Energy Transport and Energy Conversion in the Quantum Regime, Trieste, Italy (12.-30.8.2019). Invited talk by Francesco Giazotto: “Phase-coherent thermal transport in superconducting nanocircuits”.

IBERTRIVA 2019, Seville, Spain (26.-28.6.2019). Talk by Carmen Gonzalez-Orellana ”Optimization of the epitaxial growth and characterization of ultrathin EuS films on InAs (001)”.

Quantum Thermodynamics Conference, Espoo, Finland (23.-28.6.2019). Invited talk by Francesco Giazotto: “Coherent Caloritronics in Josephson quantum circuits”.

PIERS 2019, Rome, Italy (17.-20.6.2019). Invited talk by Francesco Giazotto: “Phase-coherent caloritronics in Josephson nanocircuits”.

WE-Heraeus-Seminar on Superconductivity in low-dimensional and interacting systems, Physikzentrum Bad Honnef, Germany (3.-6.6.2019). Invited talk by Francesco Giazotto: “Superconductivity in low-dimensional and interacting systems”.

Vortex 2019 17th International Workshop on Vortex Matter in Superconductors, Antwerp, Belgium (20-25.5.2019). Invited talk by Francesco Giazotto: “Supercurrent and Josephson field-effect transistors go metal”.

International conference Nanomaterials and Nanotechnology, Rome, Italy (25.4.2019). Invited talk by Elia Strambini: “SM-RAM – Superconducting Magnetic Random Access Memory based on the absolute spin valve effect”.

DPG 2019, Regensburg (31.3.-5.4.2019), Talk by Carmen Gonzalez-Orellana ”Epitaxial growth of the ultrathin EuS films on the InAs(001) and magnetic coupling between these films and organometallic phthalocyanine monolayers”.

Conference on Non-equilibrium superconductivity and spintronics, The Royal Society, Kavli Royal Society Centre, Chicheley Hall, Newport Pagnell, UK (25.2.2019). Invited talk by Francesco Giazotto: “Superconducting field-effect transistors go metal”.



2.2.2 Outreach activities

The public lectures by the consortium researchers have taken place in events such as Researchers' Night, International day of the women and girls in science, the annual Jyväskylä summer school, etc. The events are mainly organized by partner institutes. While significant part of the public lectures or outreach activities were cancelled or organized in alternative format during reporting period II due to COVID-19, some of the outreach activities have resumed during the reporting period III.

2.3 Lab tours

The project partners have participated organizing a number of lab tours. At the JYU Nanoscience Center (NSC), the SUPERTED researchers are involved in guided tours and numerous visitors (school children, collaborators, public, etc.) visit the center yearly. Correspondingly, CFM carries out a program of visits for high school students, approximately every two weeks during the academic year. In addition to visits to the facilities, CFM and DIPC offers students the opportunity to directly interact with PhD students, post-doc researchers, professors, and other scientific staff. In year 2018, around 500 students visited CFM.

These visits and lab tours were carried out normally until March 2020. After the COVID-19 pandemic outbreak, the visits and lab tours came to an abrupt halt. At the time of the reporting period II, the COVID-19 pandemic was still in full force and the visits and lab tours were not reinstated. While only occasional, individual visits took place from March 2020 until the end of the year 2021, these activities started to slowly return to the pre COVID-19 levels during the year 2022.

2.4 Other activities

Other dissemination activities include institute reports, press releases related to the project in general, the project webpage and social media.

Institute reports

- [Newsletter of NSC in 2018](#)
- [Annual report of the Department of Physics at JYU in 2018](#)
- [Activity report of the CFM in 2018](#)

Press releases

- Doctoral dissertation: "*8.4.2022 M.Sc. Risto Ojajärvi (Faculty of Mathematics and Science, Department of Physics)*", JYU, 2/2022



- Doctoral dissertation: “18.11.2021 Mikel Rouco Martín – Superconductivity in the presence of spin-dependent fields”, CSIC, 11/2021
- "The American Physical Society recognized Ilari Maasilta's merits as a Referee", JYU, 3/2020
- Doctoral dissertation: "31.2.2020 M.Sc. Faluke Aikebaier (Faculty of Mathematics and Science, Physics)", JYU, 1/2020
- “Non-adiabatic dynamics of strongly driven diffusive Josephson junctions”, JYU, 12/2019
- Nadia Ligato awarded at “RAITH Micrograph Award 2019”, CNR, 11/2019
- "Researchers developing an ultrasensitive radiation detector meet in Jyväskylä", JYU, 9/2018
- "European Project SUPERTED", BIHUR, 8/2018
- "La Comisión Europea, dentro de su programa FET Open (Future Emerging Technologies), ha concedido tres millones de euros a Superted", CFM, 5/2018
- "European funding for developing a new type of radiation detector", JYU, 4/2018

YouTube videos

- Tero Heikkilä describes the challenges and advances of the SUPERTED project
<https://www.youtube.com/watch?v=JmAcmPStZ6Y>
- Tero Heikkilä explains the SUPERTED project and its goal to realize the world's first superconducting thermoelectric detector of light
<https://www.youtube.com/watch?v=svdSj0pqc0c&feature=youtu.be>.
- Ilari Maasilta, Zhuoran Geng and Ari Helenius focus on the practical aspects of the project
<https://www.youtube.com/watch?v=ccM3VekmLMw>.

Twitter

- SUPERTED project uses Twitter to tweet relevant information. So far, there has been 40 tweets and retweets on the SUPERTED-project account.
<https://twitter.com/SupertedP>



3. Conclusions

The publication activities of the project have nearly tripled compared to the expectations. Nearly 90 articles have been published with an affiliation to the project. Eighteen of the publications have been published in high impact journals and they have been linked to 8 press releases. One of the publications has also gained attention on multiple media outlets (Table 1).

Talks and lab tours as well as other outreach activities were significantly affected by the COVID-19 pandemic. As a result, events were cancelled or organized using a format that limits the overall outreach. However, at the 54th month of the project, talks and lab tours as well as other outreach activities have slowly returned, as it has become possible to organize on site events. As predicted during at the end of the reporting period II, the situation related to public events and traveling did not normalize during 2021, despite of the vaccination efforts. Thus, SUPERTED project considered alternative options to maximize the impact of research. Instead of the traveling that was originally planned, SUPERTED organized [9 seminars](#) between March and November 2021. These seminars, although mostly aimed at project participants, reached on average 15 participants per seminar.



Bibliography

1. European Commission, Dissemination & Exploitation of results in Horizon 2020 Online Manual Available from: https://ec.europa.eu/research/participants/docs/h2020-funding-guide/grants/grant-management/dissemination-of-results_en.htm.

