

C5 Activity Report for the IUPAP General Assembly October 2017

Officers/Members 2014-2017

Chair	John Saunders	UK
Vice-Chair	Srinivasan Ramakrishnan	India
Secretary	William Halperin	USA
Members:	Viktoria Bekeris	Argentina
	John Beamish	Canada
	Hong Ding	China
	Pertti Hakonen	Finland
	Jean-Pascal Brison	France
	Christian Pfeleiderer	Germany
	Naoto Nagaosa	Japan
	Hans Hilgenkamp	Netherlands
	Maxim Kagan	Russian Federation
	Peter Skyba	Slovakia
	Juhn-Jong Lin	Taiwan

1. Commission C5 meeting

C5 holds its triennial formal meeting in advance of the General Assembly at its major type A conference held every three years: the International Conference on Low Temperature Physics. The meeting took place on August 12th 2017, in Gothenburg, the venue for LT28. The previous meeting was held on August 8th 2014 in Buenos Aires. We have conducted business by e-mail effectively in the interim.

Details of the meeting are as follows:

1.1 Agenda:

1. Minutes of last C5 meeting (see C5 Activity Report to the General Assembly November 2014 and Council and Commission Chairs (CCC) meetings)
2. Minutes from General Assembly and Council and Commission Chairs meetings:
28th General Assembly, Nanyang Technical University, Singapore, Nov. 2014
CCC meeting, April 2015 ICTP Trieste
CCC meeting, Oct. 27 to Nov. 12, 2015 e-meeting
CCC meeting, Oct 2016 National Taiwan University
3. Review of Sponsored Conferences (2014-2017)
LT27 (type A) Buenos Aires, Argentina, August 2014
ULT 2014 (type B), San Carlos de Bariloche, Argentina, August 2014
QFS 2015 (type B), Niagara Falls, USA, August 2015
QFS 2016 (type B), Prague, Czech Republic, August 2016
LT28 (type A), Gothenburg, Sweden, August 2017
ULT 2017 (type B), Heidelberg, Germany, August 2017
4. Endorsed Conferences
QTC 2017 (Mesoscopic Transport and Quantum Coherence) Espoo, Finland, August 2017
5. Women in Physics, IUPAP policy
6. Conference Proposals type B: QFS 2018, August 2018
7. Conference Proposals type A: LT29, August 2020
8. C5 membership nominations and officers
9. LT28 summary of conference in progress
10. General Assembly meeting in Sao Paulo, Brazil Oct 2017
11. Other business

1.2 Discussion and Resolutions (in order of discussion):

Agenda topics 1-4: Activity reports were reviewed, no action necessary. It was noted that a scientific report, authored by secretary and chair of C5, summarising the type A conference LT27 was published as part of the proceedings. Journal of Physics Conference Series **568**, 001002 (2014).
<http://iopscience.iop.org/article/10.1088/1742-6596/568/1/001002>

Agenda topic 5: The IUPAP Policy on Women in Physics was reviewed. The members support IUPAP policy of working toward the goal of having 4 members of the commission who are women and will act accordingly as was discussed in considering agenda topic 8.

Agenda topic 6: It was noted that a proposal was approved by the Quantum Fluids and Solids steering committee for QFS2018 conference in Tokyo August 2018. C5 had previously agreed to support Type B sponsorship for that meeting.

Agenda topic 7: One proposal for LT29, a type A conference in 2020 in Sapporo Japan, was received and was presented by co-chairs Naoto Nagaosa and Yoshiteru Maeno. It was well organized and carefully prepared. The proposed date August 16-22, 2020 was carefully chosen to be sandwiched between the Tokyo Olympics and Para-Olympics. After the formal presentation and discussion among C5 members there was unanimous approval from all members present and it was also noted that there was no dissent from those members absent in response to their review of this proposal.

Agenda topic 9: The ongoing LT28 conference was summarized by the LT28 conference chair Per Delsing. The final report of the conference will be available after formal submission, but it appears that there are 904 registrants, 800 abstracts, submitted, 25 exhibitors, and 2 major sponsors. The demographics for the largest registrations include 270 from Japan, 80 from Germany, 80 from USA, and 65 from Sweden. The conference is extremely well-organized and running very smoothly.

Agenda topic 8: The chair presented the list of nominations from various Liaison Committees. The structure of the next term C5 was discussed and recommendations voted upon.

C5 approved the recommendation for Halperin (current secretary) to be the next chair, and Nagaosa the secretary. The culture in C5 is that the secretary, if re-nominated, would be the next chair. Hakonen is recommended as vice chair.

Agenda topic 10: The chair announced that he will attend the 29th General Assembly meeting in October 2017 and support the resolutions reached by C5.

2. Sponsored Conferences

2.1 2015

Type B: International Symposium on Quantum Fluids and Solids 2015 (QFS2015)

Aug 10-15, 2015, Niagara Falls, USA. Chair: F Gasparini, Co-Chair: E. Krotscheck.

The meeting attracted 191 participants from 15 countries. 17 participants were from developing/disadvantaged counties and received travel assistance. 15 of the participants were women, of which 6 gave invited papers. 18% of the international organizing committee were women.

See <http://www.physics.buffalo.edu/QFS2015/qfs2015.html> for details of the full programme, which featured connections with adjacent communities: nanomechanics/optomechanics; cold atoms: superconductivity. The conference was preceded by a meeting on Grand Challenges in Quantum Fluids and Solids, sponsored by NSF (USA), with contributions from several Nobellists. It was followed by the 18th International Conference in Many-Body theory, held at the same site as QFS2015. An additional feature of QFS2015 was a series of eight tutorial lectures targeting students and young investigators: it is anticipated that this will be replicated in future QFS symposia. These

activities added considerable value to QFS2015. A report received from the organisers is uploaded onto the IUPAP C5 web pages. The proceedings were published as a special issue of Journal of Low Temperature Physics **183**, Issue 3-4 (2016), with Francis Gasparani and Eckhard Krotscheck as guest editors, each paper receiving two independent reviews.

2.2 2016

Type B: International Symposium on Quantum Fluids and Solids 2016 (QFS2016)

Aug 10-16, 2016, Prague, Czech Republic. Chair: L Skrbek, Co-Chair: P. Skyba.

The meeting attracted 221 participants from 28 countries. 18% of the international organizing committee, which was 28 strong, were women. 20 of the participants were women, of which 1 gave an invited paper. This reflected the relatively low proportion of female researchers in this community.

The geographical spread of participants was reasonable. The countries having the most participants were Japan (45), UK (26), USA (22), Russia (18), Czech Republic (15), France (13), Finland (12), Ukraine (9), South Korea (9), Israel (7), Slovakia (7), India (6), Germany (6). 69 participants were granted partial or full support, of which 52 attended. This was administered by a small international committee.

See <http://qfs2016.org/> for details of the full programme, which featured connections with adjacent communities: nanomechanics/optomechanics; cold atoms; strongly correlated electron systems/superconductivity. Building on the practice established at QFS2015, the conference was preceded by a set of tutorial lectures targeting students and young investigators. This was attended by 80 young scientists. In addition poster prizes were awarded, with 3 European Physical Society Prizes for the best student posters. The proceedings were published as a special issue of Journal of Low Temperature Physics **187**, Issue 5-6 (2017), each paper receiving two independent reviews, L Skrbek and P Skyba serving as guest editors. A full report received from the organisers is uploaded onto the IUPAP C5 web pages.

2.3 2017

Type A

28th International Conference on Low Temperature Physics (LT28), Gothenburg, 9-16 August 2017.

Preliminary data available at this time:

904 registrants, 800 abstracts submitted, 25 exhibitors, and 2 major sponsors. The demographics for the largest registrations include 270 from Japan, 80 from Germany, 80 from USA, and 65 from Sweden. At least 10% of delegates were women: this fraction was similar for senior delegates and student delegates.

8 Plenary talks (0 women), 25 half-plenary talks (5 women), 64 Invited talks (>9 women).

Chair: P. Delsing, Co-Chairs: M. Fogelström, J Bylander, F Lombardi (one woman). For more details see <http://www.lt28.se/>

The Programme Committee was 28% women, and the International Advisory Committee 14.5% women. Financial support was received by 13 delegates (4 women).

More data will become available in due course and be presented as part of the conference reports. IUPAP C5 also sponsored poster awards at the meeting.

A scientific summary of the meeting is being prepared by IUPAP C5 for inclusion in the conference proceedings.

Type B

ULT2017, Frontiers of Low Temperature Physics. August 17-21 2017, Heidelberg, Germany.

180 registrants (21 women) from 21 countries. 27 invited talks (2 women), 28 contributed talks (1 woman), 106 posters. Three poster awards (1 woman).

Chair: C. Enss

This conference, which was a satellite of LT28, brought together a broad community of researchers to forge links between different experimental communities, with a common interest in ultralow temperature physics, from fundamental science to techniques and applications. Topics included; superfluid ^3He and topological matter; heavy fermions; disordered quantum systems; low dimensional systems; model systems for quantum turbulence; superconducting quantum technology; nanomechanical systems; cooling nanoelectronics into the microkelvin regime; cryogenic detectors for far-infra-red astronomy, determination of neutrino mass, dark matter searches.

Endorsed conference

Mesoscopic Transport and Quantum Coherence 2017 (QTC 2017). August 5-8 2017, Espoo, Finland. 175 registrants (14 women) from 20 countries, 22 invited talks (1 woman).

Chair: Mika Sillanpaa.

This conference, which was a satellite of LT28, presented the latest research, ongoing development and applications related to quantum effects in electron transport, superconducting qubits and hybrid circuits, quantum thermodynamics, circuit QED, cavity optomechanics, topological and two dimensional materials.

2.4 Anticipated sponsored conferences

Type A

29th International Conference on Low Temperature Physics (LT28)

August 16-22, 2020, Sapporo, Japan

About 1,200 participants

Chair: Naoto Nagaosa, Yoshiteru Maeno

This proposal was approved by C5 at its meeting at LT28. It will be submitted for approval of Type A sponsorship to IUPAP in due course.

Type B

International Conference on Quantum Fluids and Solids (QFS 2018)

July 25-31, 2018, Ito International Research Center, University of Tokyo, Japan

About 310 participants

Chair: Hiroshi Fukuyama

This proposal has been submitted to IUPAP for Type B sponsorship and is prioritized by C5.

Type B

International Conference on Quantum Fluids and Solids (QFS 2019)

August 7-13, 2019, University of Alberta, Edmonton, Canada

Chairs: John Beamish, John Davis

This proposal has been approved by the QFS steering committee (in August 2017) and will receive consideration by C5 in due course.

3. PRIZES

3.1 IUPAP Young Scientist Prize in Low Temperature Physics 2017

The solicitation of nominations and their subsequent consideration by C5 is made every three years in advance of the LT (Type A) conference. C5 made two awards on this occasion.

The prizes (medal and certificate) were awarded at LT28 in a full plenary session, with both winners giving an invited talk.

- **Dr. Clifford Hicks**
Max-Planck Institute for Chemical Physics of Solids, Dresden, Germany

Citation: “For his pioneering development of low temperature measurement techniques, notably concerning the application of uniaxial stress, and his experiments on unconventional superconductivity”.

Clifford Hicks received his Ph.D. from Stanford University in 2009, investigating unconventional superconductors. The work involved using a scanning SQUID magnetometer to search for chiral edge states in Sr_2RuO_4 , and the development of a new method, based on local measurements using a scanning SQUID susceptometer, for measuring the penetration depth of superconductors. For his postdoctoral work at the University of St Andrews, with Professor Andrew Mackenzie, he focused in part on transport and cantilever torque magnetometry on delafossite oxide metals. He also developed a piezoelectric-based uniaxial pressure cell, and applied it to study the superconductor Sr_2RuO_4 . In 2014, Clifford joined the Max Planck Institute for Chemical Physics of Solids, Dresden, to lead a new research group, focusing on the effects of uniaxial pressure on unconventional superconductors and magnets, and further development of the technique. Remarkably it was shown that strain can double T_c of the unconventional superconductor Sr_2RuO_4 . With two former students from St Andrews, he has also co-founded a company that has successfully commercialized piezoelectric-based pressure cells.

- **Vlad Pribiag**
University of Minnesota, Minneapolis, USA

Citation: “For his important contributions to two main areas of low temperature and nanoscale physics: superconductivity in the edge modes of two-dimensional topological insulators; spin-dependent quantum transport in one-dimensional semiconductors with strong spin-orbit coupling”. His results have elucidated key aspects of the electronic properties of these novel materials, which are candidates for quantum and classical information processing.

Vlad Pribiag received his Ph.D. in 2010 from Cornell University, investigating the magnetization dynamics magnetic vortices driven by spin-transfer torques. For his postdoctoral work at the Kavli Institute of Nanoscience Delft, he focused on quantum transport in low-dimensional materials with strong spin-orbit coupling, including single-spin dynamics in quantum dots and superconducting transport in 2D topological insulator devices. During this time he was the recipient of a VENI award from the Netherlands Organisation for Scientific Research. Dr. Pribiag then joined the School of Physics and Astronomy at the University of Minnesota in fall 2014. His current work focuses on the physics of nanoscale devices based on novel low-dimensional materials, such as 2D topological insulators, complex oxide interfaces, and semiconductor nanowires. He has recently been awarded a Sloan Fellowship (2017) and an NSF CAREER Award (2016).

3.2 Fritz London Memorial Prize and Simon Memorial Prize

These are the two major prizes in Low Temperature Physics, the former endorsed by IUPAP. As usual they were awarded at LT28, in special plenary sessions, with all winners giving an invited talk.

Fritz London Memorial Prize

Awarded to:

- William Halperin (Northwestern University)
- James Sauls (Northwestern University)
- Jeevak Parpia (Cornell University)

in recognition of their pioneering work on the influence of disorder on the superfluidity of helium- 3.

Simon Memorial Prize

Awarded to:

- Professor Louis Taillefer (University of Sherbrooke and the Canadian Institute for Advanced Research)

for pioneering transport measurements at high magnetic fields and low temperature in heavy-fermion and cuprate superconductors.

3.3 LT28 Poster Prize

LT 28 included four poster sessions, which emphasized presentations by young scientists. C5 co-sponsored poster prizes, chosen by a committee of 8 distinguished low temperature physicists: 8 awards were made (50% to women).

4. Status of Low Temperature Physics

The [LT28 programme](#) was extremely broad, reflecting the impact of our field on both fundamental science, materials, quantum technology and other applications. The major themes of the conference were: Quantum fluids and Solids; Superconductivity; Magnetism and quantum phase transitions; Quantum transport and quantum information in condensed matter; Cryogenic techniques and applications.

A scientific summary of LT28 is in preparation by the secretary and chair, for publication in the proceedings, which will be published in Journal of Physics: Conference Series (an open access journal).

On behalf of C5
John Saunders
(Chair)