

## Foreword Issue 56

We are pleased to present the Issue No. 56 of the Superconductivity News Forum. In addition to the presentations previously included in the preview of Issue 56, 13 new presentations are included.

In total, this issue includes a total of 21 presentations made at five conferences as well as a technical review paper. We first complete the presentations from three conferences already dealt in previous Issues and the preview of Issue 56: IRadiation Effects on HTS for Fusion (IREF 23) workshop celebrated in Arona (Italy) which also includes a link to several presentations made in this conference (<https://www.superfusion.org/iref23-program/>), the International Symposium in Superconductivity (ISS 2023) celebrated in Wellington (New Zealand) (<https://iss2023wlg.jp/>) and the Asian Conference on Applied Superconductivity and Cryogenics / International Cryogenic Materials Conference in Asia (ACASC 2023) (<http://www.acasc-2023.com/>).

The new conferences from which we include selected presentations are Workshop on Low Temperature Electronics (WOLTE – 16) celebrated in Cagliari, Sardinia (Italy) (<https://wolte16.org/>) (2 keynote conferences and 8 contributed talks) and the International Cryogenic Engineering Conference – International Cryogenic Materials Conference (ICEC – ICMC 2024) celebrated in Geneva (Switzerland) (<https://icec29-icmc2024.web.cern.ch/>) (3 Plenary talks).

From IREF 23 we include here the invited talk from Dr. Leonardo Civale and Dr. Boris Maierov entitled “Comparative Analysis of Particle Irradiation and Second-phase Additions Effects on the Critical Current Densities of  $\text{YBa}_2\text{Cu}_3\text{O}_7$  Single Crystals, Thin Films, and Coated Conductors”. From ISS 23 we include five invited talks covering issues related to materials, electronics and large scale. The first one was delivered by Dr. Teresa Puig with the title “Transient Liquid Assisted Growth (TLAG), a Method for Increasing Coated Conductors Throughput and Meeting Future.” The second one was delivered by Dr. Yanwei Ma and the title was “High Performance Iron-based Superconducting Wires: Fabrication and Properties.” A third presentation is from Dr. Steven M. Anlage with the title “Effects of Strong Capacitive and Inductive Coupling on Hysteretic rf SQUID Metamaterials.” Finally, two presentations on large scale applications were made by Dr. Kevin Berger on the “Current status and future prospects of the SuperRail project in France” and Dr. Kohei Higashikawa Kohei on “Development of Superconducting Cable with Energy Storage Function for Mass Utilization Society of Renewable Energy.”

From ACASC 23 we include in this issue one plenary presentation (large scale) and two invited presentations (electronics and materials). The plenary presentation is from Dr. Satoshi Awaji with the title “High field Superconducting Magnet Development with HTS - Lessons Learned.” The two invited presentations are from Dr. Xiaoming Xie with the title “Latest Development on

Superconductive Sensors, Detectors and Their Applications” and from Dr. Bowan Tao with the title “Highly Efficient Preparation of Double-sided YBCO Thin Films with MOCVD”.

WOLTE-16 showcased innovations in superconducting electronics as sensors, qubits, amplifiers, and more. Several talks addressed how superconducting electronics play a key role in scalable control and readout of quantum processors. We include first two keynote presentations from Dr. Fabio Sebastiano with the title “Cryogenic Electrical Interfaces for Large-Scale Spin-Qubit Quantum Processors” and from Dr. Francesco Tafuri entitled “Quantum computation boosting novel superconducting and hybrid solutions and the impact of PNRR in Italy”. We then include 8 contributed talks from Dr. Erik P. DeBenedictis (“JCMOS: Josephson-CMOS Hybrids”), Dr. Bryce Primavera (“Neuromorphic Optoelectronic Circuits with Integrated Josephson Junctions and Superconducting-Nanowire Single-Photon Detectors”), Dr. Roberto Moretti (“Quantum Sensing with Superconducting Qubits for Fundamental Physics”), Dr. Gwenael Le Gal (“Superconducting Josephson Traveling-Wave Parametric Amplifiers”), Dr. Luigi Di Palma (“On-chip Digital Readout of a Superconducting Qubit Using a Josephson Digital Phase Detector”), Dr. Marco Coangelo (“Photon Number Resolving Superconducting Nanowire Single-Photon Detectors”), Dr. Zheng Chang (“Opto-electrical Data Transfer from Room Temperature to 4K for Superconducting Quantum Computing”) and Dr. Manu Perumkunnil (“Superconducting Array of Arrays for Acceleration of Transformers”). The editorial team would like to express our gratitude to the WOLTE-16 organizers and presenters for their enthusiastic participation in SNF Issue No. 56.

Finally, we include in this Issue the technical review paper on the PrimA-LTD project entitled “Towards new primary activity standardisation methods based on low-temperature detectors” written by Dr. Frederic Juget. They present their advances in metallic microcalorimeter (MMC) technology for detection of radiation or particles at very low (<0.1 K) temperatures.

We hope that you will find the content of the SNF Issue No. 56 informative and interesting. Remember to periodically check back to the site for continuous updates and announcements.

Xavier Obradors and the SNF Editorial Team