

## **Scientific reports on International workshop: Condensed Matter Solitons 2023**

**Dates:** June 28 - 30, 2023

**Location:** PCS IBS, Daejeon, South Korea

**Scientific Coordinators:** Se Kwon Kim (KAIST), Sukbum Chung (U. of Seoul) Moon Jip Park (Hanyang U.) Yong-il Shin (SNU) Jee-Hoon Kim (Postech)

**Overview:** This scientific report provides a comprehensive overview of the workshop on "Exploring Topological Solitons in Quantum Materials," which aimed to bring together theoretical and experimental experts to discuss advancements in the understanding of topological solitons in various quantum materials. The workshop focused on topics such as topological superfluids, Majorana fermions and topological materials, skyrmions and spintronics, and non-equilibrium quantum phases.

**Participations:** The workshop saw the participation of a diverse group of experts, including theoretical and experimental researchers from around the world (**9 international speakers 5 domestic speakers**). Each talk consists of 45 minutes. In addition, there was small poster sessions for the students. The scientific coordinators and organizers ensured representation from various backgrounds, fostering collaborative discussions and interdisciplinary exchanges. The event attracted participants specializing in quantum materials, including magnets, superfluids, superconductors, and multiferroics.

**Key Discussions and Future Directions:** During the workshop, participants engaged in insightful discussions on the topics of topological solitons in quantum materials. The discussions highlighted advancements in understanding topological solitons such as skyrmion from many different physical setups including magnetism, BEC, ultra-cold atoms gases. Participants identified future research directions, including exploring novel materials, investigating soliton-soliton interactions from many different physical contexts, and understanding soliton-induced phase transitions.

**Conclusion:** The workshop successfully brought together theoretical and experimental experts to discuss advancements and explore the universal physics of topological solitons. The event provided a platform for sharing cutting-edge research developments and fostering collaborations among participants. The scientific coordinators, organizers, and attendees expressed their satisfaction with the workshop's organization and outcomes, indicating a strong interest in future meetings to further explore the exciting field of topological solitons in quantum materials.

Moon Jip Park  
Se Kwon Kim  
Sukbum Chung  
Yong-il Shin  
Jee-Hoon Kim