PCS NEWSLETTER





New members



Weihua Zhang has joined PCS as a visiting Ph.D student, Lanzhou University, China, in the Complex Condensed Matter Systems (CCMS) team. His research interests are the fluctuation properties of eigenvalues and properties of quantum lattice billiard wave functions in the nonrelativistic and relativistic energy regimes and in their transition regimes. They include flat bands and van Hove singularities in graphene and honeycomb kagome lattices and those in microwave photonic crystals as well.

Awards



Congratulations! Dr. Alexei Andreanov – Deputy Team Leader of CCMS – has won the 2021 IBS outstanding Research Award for his outstanding research performance in year 2021.



Congratulations! Dr. Hee Chul Park – a Junior Research Team Leader of PCS – has won the 10th IBS Anniversary Award for his long-term contribution with outstanding research performance.

PCS Workshops and Meetings



PCS had a Retreat December 13 - 15 at the Sangha Farm Resort. We enjoyed twenty talks and a number of further in- and outdoor activities.



New research results

The egg steamer paradox

S Flach, S Parnovsky and A A Varlamov Phys. Educ. 57, 025002

Did you ever wonder why you need less water to prepare more eggs to the same doneness in an egg cooker (or better steamer)? The combined power of author expertise in condensed matter, complex systems and even astrophysics found the answer through a mix of experimental data and theoretical reasoning. No, it is not because of pressure, or volume. It is because of more available surface for water steam to condense. Which means - whenever you steam your favorite food, you use the latent heat of water steam condensation to transfer the energy into your food. This energy transfer path is three orders of magnitude more efficient than inelastic individual molecule collisions.





Topological edge states in bowtie ladders with different cutting edges

Jung-Wan Ryu, Sungjong Woo, Nojoon Myoung and Hee Chul Park

Physica E: Low-dimensional Systems and Nanostructures 137, 114941 (arXiv:2012.00270)

The authors investigate topological edge states in bowtie ladders with various edge truncations. While a symmetric bowtie ladder exhibits an insulator-metal transition with trivial insulating states, the lattice can be transformed into an extended SSH lattice depending on the edge shapes with nontrivial insulating states. The winding numbers are permutationally designated in the phase diagram depending on the choice of unit cell. They find that the topological edge states are affected by the shape of the edge and the corresponding winding number. General bowtie ladder models with richer phase diagrams are also studied showing state bifurcation.

Puzzle of the month

December puzzle answer:

The first correct solution came from Tilen Cadez, a few minutes before Arindam Mallick's one arrived. The next ones (in the order of their arrival) were from Sanghoon Lee, Victor Kagalovsky, Merab Malishava, Ihor Vakulchyk, Barbara Dietz and Dario Rosa. Congratulations to all! Weiter so!

Puzzle of the month:

2022: three twos and a naught.

Construct the numbers from 1 to 10 with the digits 2, 0, 2 and 2.

You are allowed to use the mathematical symbols $+, -, \times, \div, \sqrt{}$, the factorial !, as many brackets as you like, concatenation and exponentiation.

Send your solution to <u>eun@ibs.re.kr</u> The winner will be announced in the next issue.



