PCS NEWSLETTER

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June 2024

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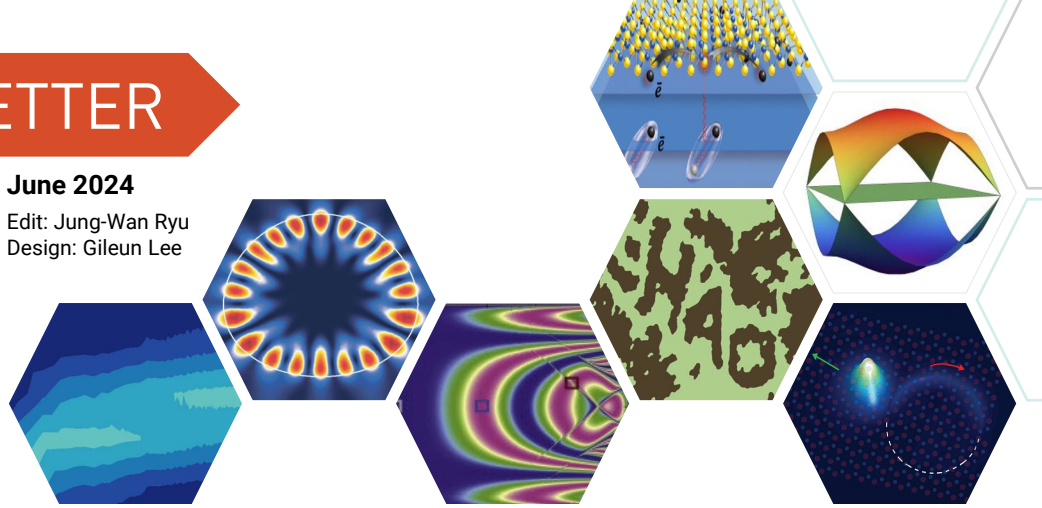


PCS IBS Seminars

Dr. Hyeongseop Kim has joined PCS as a post-doctoral fellow. He received his PhD from the Korea Advanced Institute of Science & Technology (KAIST), South Korea. His research interest is the transport signatures of Majorana Fermions in topological insulator Josephson junctions, especially the Majorana-induced Josephson current. Currently, he is trying to extend his research scope to quantum devices using Andreev bound state of Josephson junctions.

PCS IBS Seminars

"Finding the Missed Topological Operators in Lattice Models"

by Jing-Yuan Chen, Tsinghua University, China (May 2)

"Josephson tunneling controlled by spin-orbit interaction"

by Robert Shekhter, University of Gothenburg, Sweden (May 7)

"Quantum Scaling for the Metal-Insulator Transition in a Two-Dimensional Electron System"

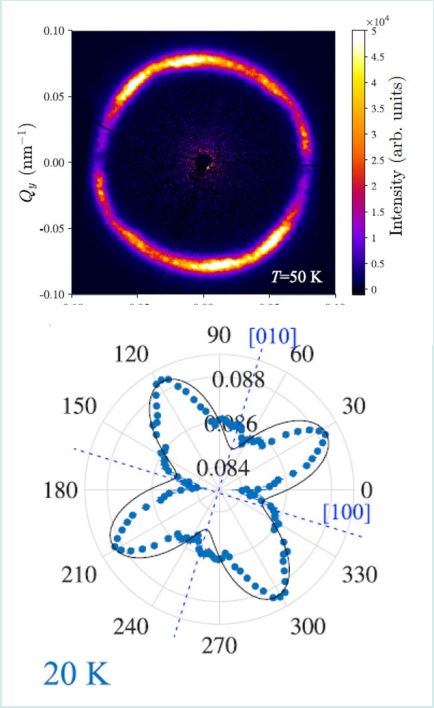
by Victor Kagalovsky, Shamoon College of Engineering, Israel (May 16)

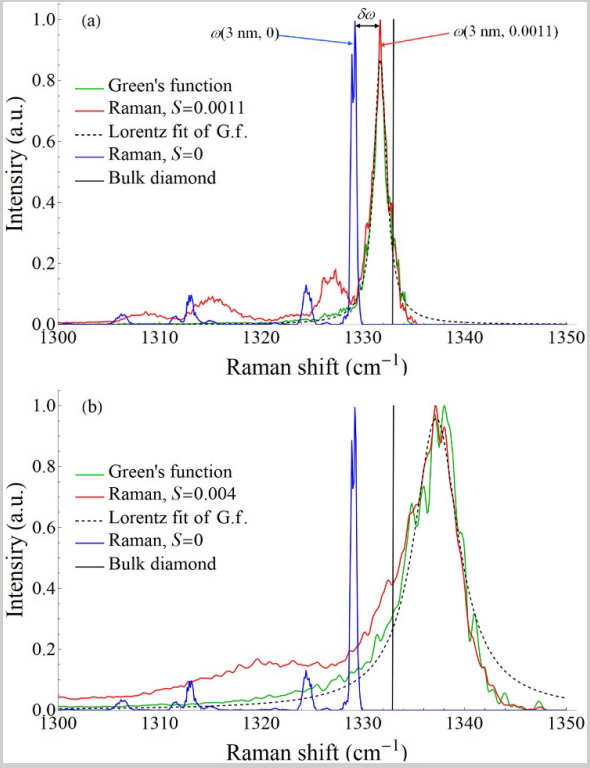
You can find more seminars on ***this page***.

New Research Results

Competing anisotropies in the chiral cubic magnet Co8Zn8Mn4 unveiled by resonant x-ray magnetic scattering
Victor Ukleev, Oleg I. Utesov, Chen Luo, Florin Radu, Sebastian Wintz, Markus Weigand, Simone Finizio, Moritz Winter, Alexander Tahn, Bernd Rellinghaus, Kosuke Karube, Yoshinori Tokura, Yasujiro Taguchi, and Jonathan S. White
Phys. Rev. B 109, 184415 (2024)

Using x-ray resonant magnetic scattering in vector magnetic fields, the authors explore the effect of the anisotropic exchange interaction on the magnetic spiral pitch in the cubic chiral magnet Co8Zn8Mn4. The experimental data reveal up to a 5% variation in the helical pitch within the (001) plane depending on temperature. Furthermore, the results reveal the existence of intrinsic competition between magnetocrystalline and exchange anisotropies in this material, with each favoring different orientations of the helical vector in the ground state.





Raman peak shift and broadening in crystalline nanoparticles with lattice impurities
S. V. Koniakhin, O. I. Utesov, A. G. Yashenkin
Diamond & Related Materials 146, 111182 (2024)

The effect of point-like lattice impurities on nanoparticle Raman spectra is studied using both numerical and analytical methods. Particular cases of replacement atoms of various masses, vacancies, and disorder in interatomic bonds are considered. It is shown that the disorder leads not only to the broadening of optical phonon lines but also to the shift of the corresponding Raman peak. The latter can be either positive (i.e., blueshift) or negative (redshift) depending on the type of impurities. Thus there is an additional contribution to the well-known redshift that occurs due to the size-quantization (confinement) effect. Considering nanometer-sized diamond particles as a representative example, the authors show that the broadening and the shift are, as a rule, of the same order of magnitude. The results are discussed in the framework of the self-consistent T-matrix approach. It is argued that both effects should be considered for accurate treatment of experimental Raman spectra. Simple recipes to do so are formulated for several important cases including NV centers in nanodiamonds.

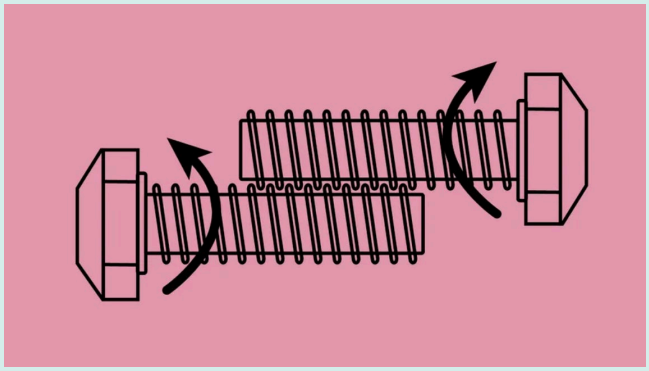
Puzzle of the Month

May puzzle solution: 256

Correct solutions were sent in by Sergei Koniakhin, Victor Kagalovsky and Oleg Utesov. Congratulations!

Puzzle of the month:

Two bolts are entangled as shown.
Then we rotate them as shown, one clock wise,
the other anti-clock wise.
In which direction do the bolts move?



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