PCS NEWSLETTER

QR to PCS Webpage

July 2025
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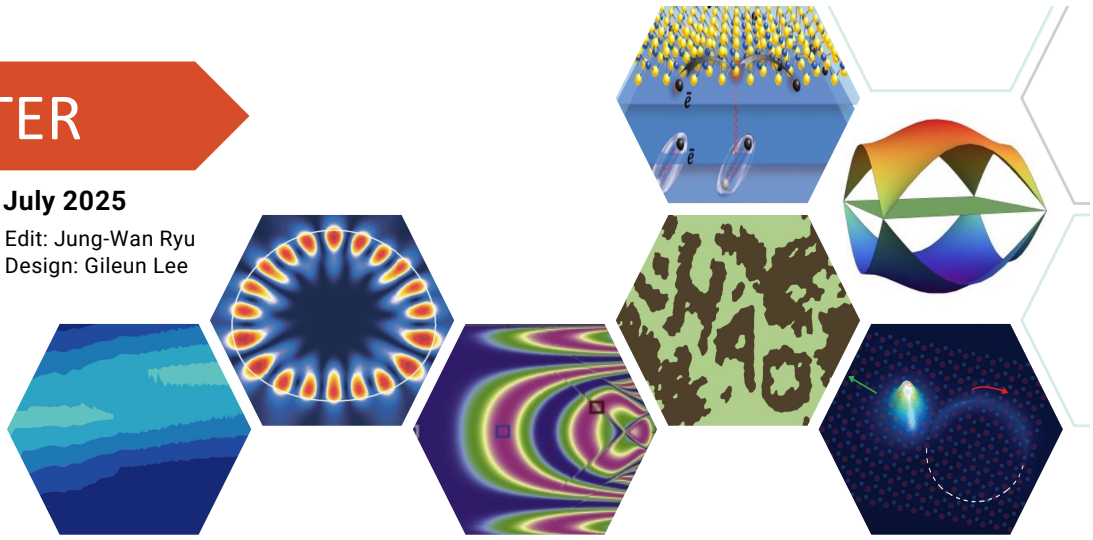
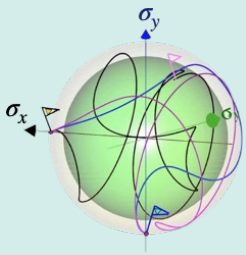


PCS Workshops and Meetings

PCS will run and host International Workshop Quantum Computing, Complexity, and Control (QCCC25) on July 28 - August 1, 2025



PCS IBS Seminars

"Emergent physics from nuclear lattice simulations"
by Dean Lee, Michigan State University, USA (June 4), IBS Physics Colloquium @ Daejeon

"Using and analyzing quantum computation: material phase classification and entropy dynamics"
by Tomi Ohtsuki, Sophia University, Japan (June 5)

"Thermoelectric transport across a tunnel contact between two charge Kondo circuits"
by Nguyen Thi Kim Thanh, Vietnam Academy of Science and Technology, Vietnam (June 10)

"Mysteries of Cosmic Rays: Recent Discoveries and Future Prospect"
by Eun-Suk Seo, University of Maryland, USA (June 16), IBS Physics Colloquium @ Daejeon

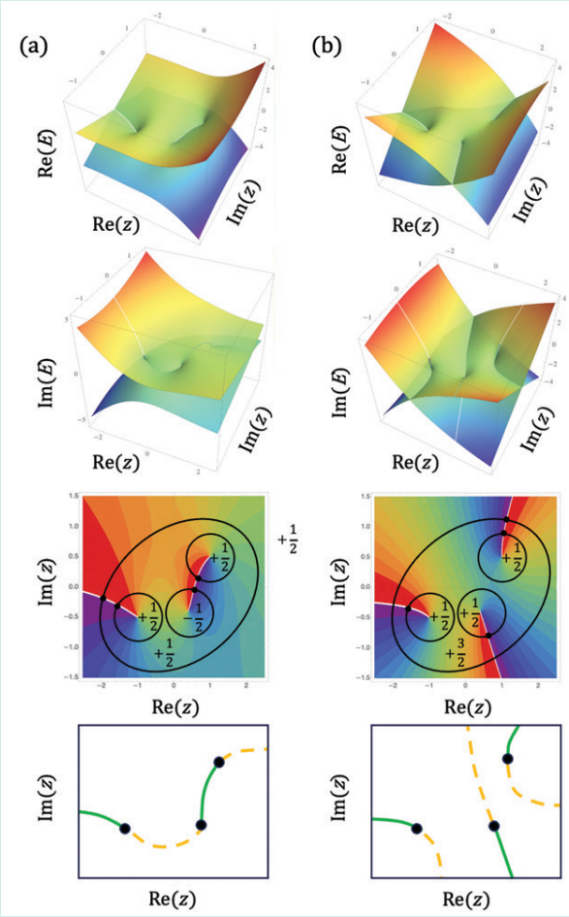
You can find more seminars on this page.

Complex energy structures of exceptional point pairs in two-level systems

Jung-Wan Ryu, Chang-Hwan Yi and Jae-Ho Han

Europhysics Letters 150, 45001 (2025)

The authors investigate the topological properties of multiple exceptional points in non-Hermitian two-level systems, emphasizing vorticity as a topological invariant arising from complex energy structures. They categorize EP pairs as fundamental building blocks of larger EP assemblies, distinguishing two types: type-I pairs with opposite vorticities and type-II pairs with identical vorticities. By analyzing the branch cut formation in a two-dimensional parameter space, they reveal the distinct topological features of each EP pair type. Furthermore, the authors extend their analysis to configurations with multiple EPs, demonstrating the cumulative vorticity and topological implications. To illustrate these theoretical structures, they model complex energy bands within a two-dimensional photonic crystal composed of lossy materials, identifying various EP pairs and their branch cuts. These findings contribute to the understanding of topological characteristics in non-Hermitian systems.



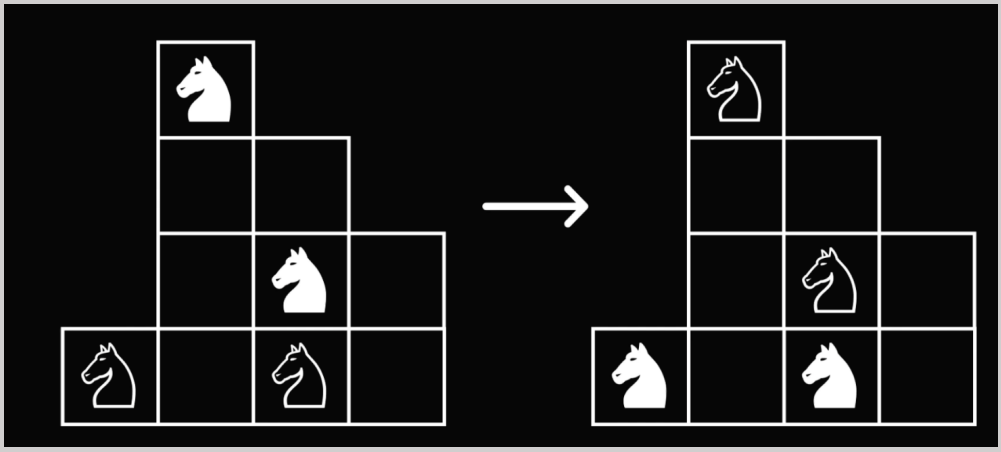
Puzzle of the Month

June puzzle solution: 2N(N+1)

The correct solution (see below) was sent in by Oleg Utesov. Congratulations!

1. We want $z=q/p<1$.
2. 10^N $q/p=a$ and 10^N $p/q=b$ should be integers. So, we want $10^{(2N)} = ab$, $a<b$.
3. We can write $a=2^x 5^y$, $b = 2^{(2N-x)} 5^{(2N-y)}$.
4. Relaxing the condition $a<b$, we have $(2N+1)(2N+1)$ combinations. $a=b$ does not suit us (it is equivalent to $z=1$); among other possibilities, we need only half (by symmetry arguments) due to the criterion $a<b$.
5. So, the answer is $((2N+1)(2N+1)-1)/2=2N(N+1)$. For $N=2$, we have 12 numbers, for $N=3$ - 24.

Puzzle of the month:



Move the two white knights from the left configuration to the right one, only standard chess moves allowed, as well as zero or single occupancy per square. Jumping off the ten squares is not allowed. What is the minimal number of moves?

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