

# CONDENSED MATTER COLLOQUIUM SERIES

## # Ankara

# Onur Erten

Arizona State University

## **Exploring emergent phases in moiré magnets: fractionalization, fragmentation and new particles**

Moiré superlattices of van der Waals materials have opened an unexplored venue of tunable quantum platforms for realization of emergent phases on every front. While moiré-induced electronic phases have been extensively explored over the past few years, moiré engineering of magnetic phases is a newer emerging topic. In the first part of my talk, I will discuss how stacking dependent interlayer exchange can be used to create skyrmions in twisted chiral magnets. I will illustrate this mechanism by applying it to bilayers of Cr-based trihalides (1). In the second part, I will focus on quantum spin liquid bilayers and show discuss how twist angle and interlayer exchange can be utilized to create new topological phases with new emergent quasiparticles such as 'fractionalized Goldstone bosons' in these systems (2, 3). I will conclude with an outlook and discuss the tunability of Kitaev-type models in the presence of Dzyaloshinskii-Moriya interaction (4) and in quasicrystals (5).



**Onur Erten** obtained his doctorate at The Ohio State University in 2013 and has worked at Rutgers University and Max Planck Institute for the Physics of Complex Systems before joining Arizona State University as an assistant professor. His research interests lie in the field of theoretical condensed matter physics: strongly correlated electron systems, quantum magnetism, superconductivity and topological phases in heavy fermions and transition metal oxides.

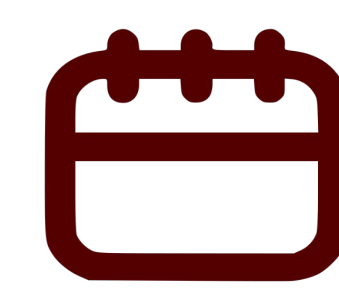
*This colloquium series aims to be accessible to undergraduate students.*

*We thank the physics departments of Ankara University, Bilkent University, Gazi University, Hacettepe University and METU for their help.*

*For more information, please contact [oktel@fen.bilkent.edu.tr](mailto:oktel@fen.bilkent.edu.tr)*

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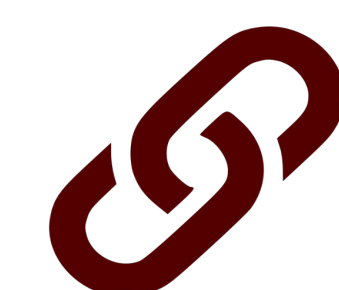
<https://forms.gle/dQM6CPgAXiaqLqBD6>



January, 16  
Tuesday



19:00, (Ankara Time)



Click [here](#) for zoom link

Meeting ID: 432 931 6595

Password: 326852

(1) M. Akram, H. LaBollita, D. Dey, J. Kapeghian, O. Erten, A. Botana Nano Lett. 15, 6633 (2021).

(2) E. Nica, M. Akram, A. Vijayvargia, R. Moessner, O. Erten npj Quantum Materials 8, 9 (2023).

(3) A. Vijayvargia, E. Nica, R. Moessner, Y.-M. Lu, O. Erten Phys. Rev. Research 5, L022062 (2023).

(4) M. Akram, E. Nica, Y.-M. Lu, O. Erten Phys. Rev. B 108, 224427 (2023).

(5) M. A. Keskiner, O. Erten. M. Ö. Oktel Phys. Rev. B 108, 104208 (2023).