



Solid State Institute
המכון למצב מוצק

TECHNION
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הטכניון
מכון טכנולוגי
לישראל

SPECIAL SEMINAR

סמינר מיוחד

Engineering synthetic gauge fields, Weyl semimetals, and anyons

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Abstract

I will present two topics of research in our group related to synthetic topological quantum matter [1]: (i) topological phases in 3D optical lattices, more specifically a proposal for experimental realization of Weyl semimetals in ultracold atomic gases [2], and (ii) anyons [3,4]. I will present one possible route to engineer anyons in a 2D electron gas in a strong magnetic field sandwiched between materials with high magnetic permeability, which induce electron-electron vector interactions to engineer charged flux-tube composites [3]. I will also discuss intriguing concepts related to extracting observables from anyonic wavefunctions [4]: one can show that the momentum distribution is not a proper observable for a system of anyons [4], even though this observable was crucial for the experimental demonstration of Bose-Einstein condensation or ultracold fermions in time of flight measurements. I will show how time of flight measurements can be used to extract anyonic statistics [4].

[1] N. Goldman, G. Juzeliunas, P. Ohberg, I. B. Spielman, *Rep. Prog. Phys.* 77, 126401 (2014).

[2] Tena Dubček, Colin J. Kennedy, Ling Lu, Wolfgang Ketterle, Marin Soljačić, Hrvoje Buljan, *Weyl points in three-dimensional optical lattices: Synthetic magnetic monopoles in momentum space*, *Phys. Rev. Lett.* 114, 225301 (2015).

[3] M. Todorčić, D. Jukić, D. Radić, M. Soljačić, and H. Buljan, *The Quantum Hall Effect with Wilczek's charged magnetic flux tubes instead of electrons*, arXiv:1710.10108 [cond-mat.str-el]

[4] Tena Dubček, Bruno Klajn, Robert Pezer, Hrvoje Buljan, Dario Jukić, *Quasimomentum distribution and expansion of an anyonic gas*, arXiv:1707.04712, PRA Rapid Communication.

ההרצאה תתקיים ביום ראשון, ה-7.1.18 בשעה 12:30
באודיטוריום המכון למצב מוצק, קומת כניסה

The lecture will take place on Sunday, 7.1.18 at 12:30
at the Solid State Institute auditorium, entrance floor

Host: Distinguished Professor Moti Segev