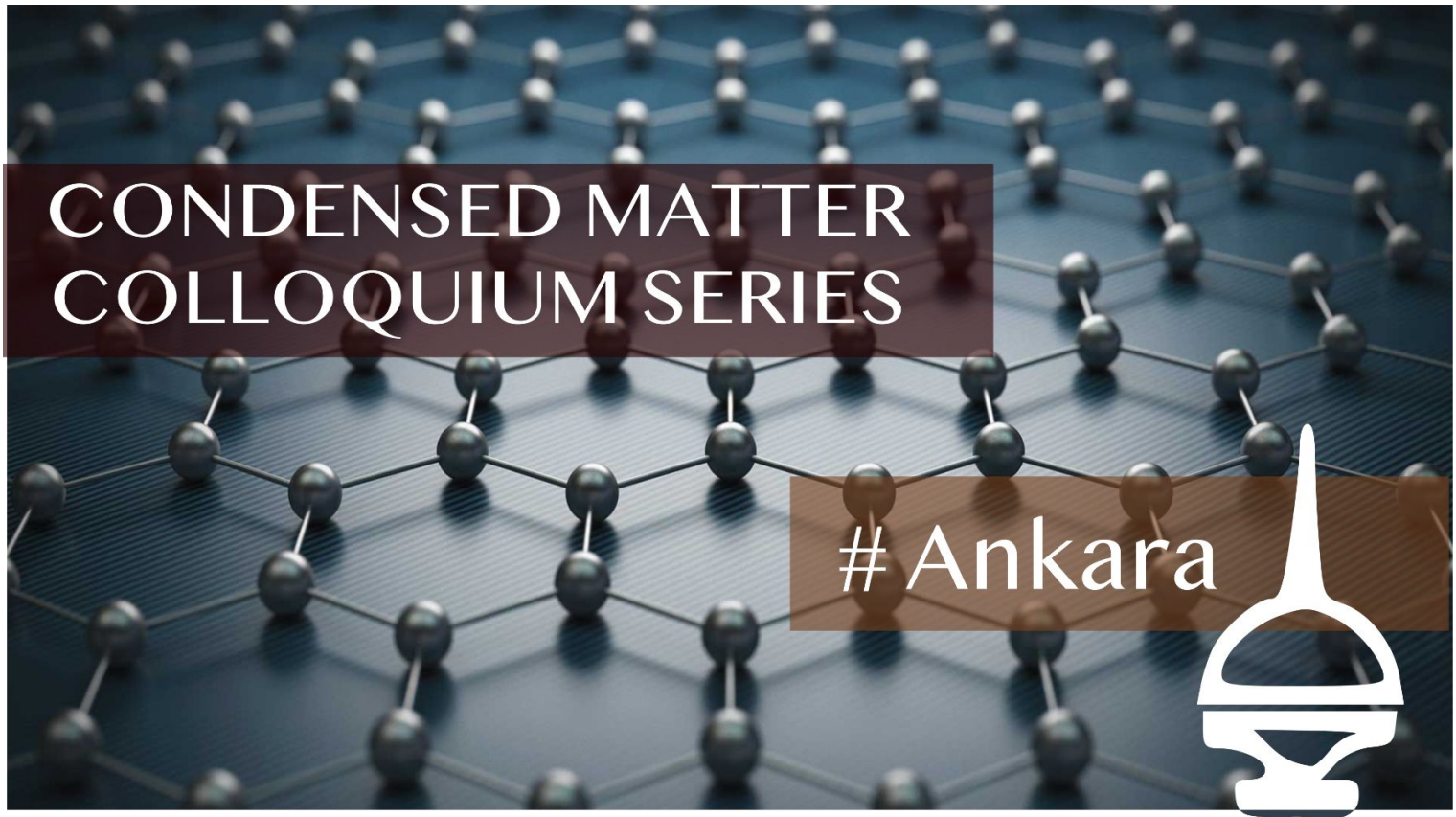

Hitesh Changlani

Florida State University and National High Magnetic Field Laboratory

Novel phases and dynamics of strongly-correlated magnetic quantum matter

March, 26
Tuesday

19:00, (Ankara Time)

Click here for zoom link
Meeting ID: 432 931 6595
Password: 326852

We know from everyday life that depending on the external conditions, a large collection of atoms organizes itself into a solid, liquid, or gas phase. But how does a large number of interacting electrons (a situation frequently encountered in solid state systems) collectively behave? How does electronic matter respond to external electric and magnetic fields? Systems where these questions are difficult to answer are those where the correlations between electrons are strong, which is the case for unconventional high temperature superconductors and quantum magnets. Using examples of real materials and toy models, I show that such strongly correlated systems harbor a rich panoply of phases, which include "valence-bond solids," "quantum spin liquids," and "Fermi gases", and require us to embrace concepts such as "fractionalization" and "topological order".

In the second part of the talk, I will focus on our investigations of frustrated magnetic materials (such as those on the kagome and pyrochlore geometries) that are fertile hunting grounds for novel phases of quantum matter. Frustration arises when multiple spatial arrangements of electron spin orientations each have similar collective energy, so there is no clear winner. I will discuss recent exciting experimental and theoretical developments in equilibrium and nonequilibrium dynamics that are enabling a comprehension of how such magnetic systems thermalize or act glassy (in the absence of disorder) in different situations. I conclude with stating some theoretical challenges that need to be addressed to achieve a more complete understanding of strongly correlated quantum magnetic matter.

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Hitesh Changlani is an assistant professor of physics at Florida State University and National High Magnetic Field Laboratory. His research interests span various theoretical aspects of strongly correlated quantum systems, with a focus on magnetic frustration. His group closely collaborates with experimentalists and also develops and applies computational algorithms for these systems. More information can be found at https://sites.google.com/site/hiteshchanglani/

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