“CORRELATED ELECTRON SYSTEMS – NOVEL DEVELOPMENTS”
WORKSHOP SUMMARY

In the spring of 2018, the FTPI sponsored the workshop “Correlated electron systems – novel developments” held in Minneapolis from Wednesday, May 16th to Saturday, May 19th 2018. The meeting organizers were Andrey Chubukov, Rafael Fernandes, Martin Greven, Bharat Jalan, and Chris Leighton. The workshop was organized in collaboration with Minnesota Center for Quantum Materials.

The purpose of the workshop was to cover novel experimental and theoretical developments in the field of correlated electron systems. The idea was to bring together the leading experts in the study of the cuprates and Fe-based superconductors, as well as titanates, nickelates, and other systems with the goal to discuss the latest experiments and also have in-depth discussion of new theoretical ideas on correlated electron systems. We wanted to make the meeting attractive to both theorists and experimentalists in the field, with the primary aim being the stimulation of discussions and promotion of interactions among the participants.

The workshop was very well attended with 120 registered participants and 44 talks over 3.5 days. The talks on cuprate superconductors included presentations of latest results by the experimentalists (Neven Barisic, Vienna; Ivan Bozovic, BNL; Riccardo Comin, MIT, Damjan Pelc, UMN, Louis Taillefer, Sherbrooke; Claudio Giannetti, Italy; Nigel Hussey, Radboud University; John Tranquada, BNL) and review talks by theorists (Subir Sachdev, Harvard; Chandra Varma, UC- Riverside).

The talks on Fe-based superconductors mostly focused on highly non-trivial physics of pure and doped FeSe and included presentations by experimentalists (Girsh Blumberg, Rutgers; Sergey Borisenko, Dresden; Pengcheng Dai, Rice; Chris Homes, BNL; Matthew Watson, University of St. Andrews, Yuan Li, Peking University), and by theorists (Brian Andersen, Kobenhagen, Luca DeMidici, ESPCI, Paris; Avraham Klein, UMN; Jian Kang, FSU; Takasada Shibauchi, Tokyo University), who debated between itinerant and localized (Mott) approaches to these systems.

We had lively discussion on recently discovered superconductivity and insulating state in twisted graphene, with talks by Liang Fu, MIT, Senthil Todadri, MIT, and Oscar Vafek, FSU. The current status of experimental and theoretical studies of frustrated magnetic systems has been discussed by Collin L. Broholm, Johns Hopkins; Christian Batista, UT-Knoxville, and Yuji Matsuda, Kyoto. Dung-Hai Lee from UC- Berkeley and Yuxuan Wang, University of Illinois discussed various aspects of topological states of matter.

One of our key goals was to have in-depth discussion of the status of theoretical studies of correlated electron systems. On this, we had talks on the current status of numerical studies.
(Erez Berg, U. Chicago; Emanuel Gull, U of Michigan), and on various analytical approaches (Ar Abanov, TAMU, Steven Kivelson, Stanford, Gabriel Kotliar, Rutgers, and Sung-Sik Lee, Perimeter Institute).

One session was devoted to new developments in the studies of Strontium Titanate and related materials, with talks by Han Fu, U. Chicago, Maria Navarro Gastiasoro, UMN, Vlad Pribiag, UMN, Willem Rischau, University of Geneva, James Rondinelli, Northwestern University Susanne Stemmer, UCSB, Jean-Marc Triscone, University of Geneva. Peter Littlewood from U of Chicago gave a talk on Metal-insulator transitions in elastic media.

We believe the workshop was a success. We managed to get leading experts in the fields of correlated electron systems and unconventional superconductivity, get good picture of the status of the field and gauge the progress of this highly popular and rapidly developing branch of condensed-matter physics. The organizers were especially pleased by high attendance and many after-talk questions from junior participants. A poster session on Wed. evening was very well attended and lasted much longer than planned.

Summary by Andrey Chubukov