

## CONDENSED MATTER SPECIAL SEMINAR

Tuesday 11 July at 11:00  
Simpkins Lee room

### “Physics of excitons in novel semiconductors”

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The ability to synthesize and probe new classes of semiconducting materials with photophysics tunable via structure and composition – such as halide perovskites, van der Waals heterostructures, and molecular crystals – has driven the need for new intuition about the nature and kinetics of their photoexcited electrons and holes, which can often condense into excitons. In these novel semiconductors, excitons can be strongly bound and do not conform to simple models, and new understanding is needed to interpret and predict their behavior. Here, I will discuss recent examples of ab initio calculations – based on density functional theory and many-electron Green's function approaches – of excitons in these complex materials, focusing on the effect of the lattice structure and dynamics, temperature, dielectric screening, and carrier concentration. I will compare with experiments where possible and illustrate how new intuition developed in these studies could guide the design of future energy materials.

*Host: Prof Marina Filip*