The 21th Condensed Matter Physics Seminar of the 2015/2016 Series

will be presented in the James Fletcher Building (JFB), room 334 on Thursday, March 8, 2016 at 4pm by

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Charge Transport Limits in Organic Materials and Devices

Organic semiconductors are becoming increasingly attractive given their solution processability, which allows for low-cost production on flexible media like paper, plastic, or textiles. But in spite of these advantages, the complexity of the film formation resulting from solution growth process makes it challenging to control the device performance in a reliable way. In this talk I will discuss the growth, structure and electronic properties of functionalized pentacenes and anthradithiophenes organic thin-film transistors deposited by scalable solution deposition methods, such spray deposition or vibration-assisted crystallization. The results will be compared with those obtained in single crystal devices and several approaches to improve film quality and device performance will be presented. The effect of processing parameters on charge carrier mobilities, on/off ratios and interfacial trap densities will be detailed. Transitioning from mono-molecular crystals to multi-component materials, such as the organic charge transfer complexes, which are combinations of charge donating (D) and charge accepting (A), I will show examples on how novel functionalities can emerge from D/A intermolecular interactions.