



## Physical Sciences Seminar

# From Single to interacting Polarons in Bose-Einstein condensates

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**Host: Misha Lemeshko**

Mobile impurities in a Bose-Einstein condensate can form quasi-particles termed Bose-Polarons. In this talk I show how these quasi-particles are originated when a single impurity is dressed by the excitations of the quantum bosonic bath. The moststriking advantage of these polarons is the huge degree of controllability of the coupling strength between the impurity and the bosonic bath. Thus, one can realize polarons from weak all the way up to the strong interacting regime [1,2]. For strong interactions two polaron can bind together forming bound bipolarons states. They emerge due to the induced non-local interaction mediated by density oscillations of the bath [3,4]. Polarons and bipolarons in ultra-cold quantum gases could be used as a robust platform for quantum simulation in a condensed matter context. REFERENCES.[1] N. B. Jrgensen, L. Wacker, K. T. Skalmstang, M. M. Parish, J. Levinsen, R. S. Christensen, G. M. Bruun, and J. J. Arlt. Phys. Rev. Lett. 117 . 055302 (2016).[2] M-G Hu, M. J. V. de Graaff, D. Kedar, J. P. Corson, E. A. Cornell, and D. S. Jin. Phys. Rev. Lett. 117, 055301 (2016).[3] L. A. P. Ardila and S. Giorgini. Phys. Rev. A 92, (2015).[4] A. Camacho-Guardian, Luis. A. Pea Ardila, Thomas Pohl and G. M. Bruun. Phys. Rev. Lett. 121, 013401 (2018)

**Tuesday, January 15, 2019 11:00am - 12:30pm**

IST Austria Campus Big Seminar room Ground floor / Office Bldg West (I21.EG.101)



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