

Abstract Submitted  
for the MAR14 Meeting of  
The American Physical Society

**Un-Fermi Liquids: Unparticles in Strongly Correlated Electron Matter**<sup>1</sup> BRANDON LANGLEY, PHILIP PHILLIPS, University of Illinois at Urbana-Champaign, JIMMY HUTASOIT, The Pennsylvania State University — Since any non-trivial infrared dynamics in strongly correlated electron matter must be controlled by a critical fixed point, we argue that the form of the single-particle propagator can be deduced simply by imposing scale invariance. As a consequence, the unparticle picture proposed by Georgi[1] is the natural candidate to describe such dynamics. Unparticle stuff is scale-invariant matter with no particular mass. Scale invariance dictates that the propagator has an algebraic form which can admit zeros and hence is a candidate to explain the ubiquitous pseudogap state of the cuprates. The non-perturbative electronic state formed out of unparticles we refer to as an un-Fermi liquid. We show that the underlying action of the continuous mass formulation of unparticles can be recast as an action in anti de Sitter space which serves as the generating functional for the propagator. We find that this mapping fixes the scaling dimension of the unparticle to be  $d_U = d/2 + \sqrt{d^2 + 4}/2$  and ensures that the corresponding propagator has zeros with  $d$  the spacetime dimension of the unparticle field. [1] H. Georgi, Phys. Rev. Lett. 98, 221601 (2007) [2] B.W. Langley, P.W. Phillips, J.A. Hutasoit, Phys. Rev. B 88, 115129 (2013)

<sup>1</sup>This work was funded by NSF DMR-1104909, DMR-1005536 and DMR-0820404

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Date submitted: 15 Nov 2013

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