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**Composite Dirac liquids: exotic gapless states at an electronic topological insulator surface** DAVID MROSS, ANDREW ESSIN, JASON ALICEA, Caltech — We introduce exotic gapless states ‘composite Dirac liquids’ that can appear at a strongly interacting surface of a three-dimensional electronic topological insulator. Composite Dirac liquids exhibit a gap to all charge excitations but nevertheless feature a single massless Dirac cone built from emergent electrically neutral fermions. These states thus comprise electrical insulators that preserve all symmetries and, interestingly, retain thermal properties similar to those of the non-interacting topological insulator surface. To controllably access the composite Dirac liquid we exploit a quasi-1D deformation of the original electronic Dirac cone that enables us to analytically address the fate of the strongly interacting surface.

David Mross  
Caltech

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