

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Continuous-wave Landau-level laser in graphene** ALEXEY BELYANIN, YONGRUI WANG, Texas A&M University, MIKHAIL TOKMAN, Institute of Applied Physics, Russian Academy of Sciences — We prove the general feasibility and demonstrate the design of a continuous-wave terahertz laser operating between Landau levels in graphene placed on a polar substrate. Steady state population inversion under a continuous wave optical pumping becomes possible due to surface-phonon mediated relaxation of carriers. Our microscopic kinetics simulations including all relevant scattering processes show the existence of a steady state gain of magnitude up to 5% per monolayer. The laser concept is transferable to other materials with massless Dirac fermions, notably to surface states in 3D topological insulators such as  $\text{Bi}_2\text{Se}_3$ .

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Date submitted: 13 Apr 2017

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