**Topological Phases in One-dimensional Graphene Nanoribbons**

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Topology of electronic band structures has been of great interest to unusual physical phenomena derived from topologically nontrivial Bloch band systems. Recently, atomically thin one-dimensional graphene nanoribbons (GNRs) have been shown to possess distinct topological phases in general, characterized by a *Z*2 invariant. [1] In this work, we extend the study of GNR topological phases to various GNR geometries such as cove-edged and chevron GNRs. [2] We then explore the consequences of having topological phase differences at heterojunctions or ends of finite segments of such GNRs, resulting in emergence of topologically-driven metallic states at interfaces or ends, respectively. The topological physics in GNR systems can be developed for valuable applications, including e.g., quantum topological band engineering and quantum information

1. Ting Cao, Fangzhou Zhao, and Steven G. Louie, Phys. Rev. Lett. **119**, 076401 (2017).
2. Yea-Lee Lee, Fangzhou Zhao, Ting Cao, Jisoon Ihm, and Steven G. Louie, Nano Lett. *accepted* (2018).