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Topological Phases in Graphene Nanoribbons[1] TING CAO, FANGZHOU ZHAO, STEVEN G. LOUIE, Physics Department, UC Berkeley and Lawrence Berkeley National Lab — Using first-principles and model Hamiltonian calculations, we find that the band structures of various graphene nanoribbons give rise to interesting quantized Zak phases, depending on ribbon shape, width and edge termination. The Zak phase, an invariant of the occupied bands of the graphene nanoribbon, identifies the topological phase of the system and dictates the number of end states through the bulk-boundary correspondence. We moreover show that it can be modified by introducing an array of appropriate dopant atoms in the graphene nanoribbons. We demonstrate the origin of these findings, and connect our results to experimental measurements.

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