Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Coherent single-spin source based on topological insulators[1] YANXIA XING, ZHONG-LIU YANG[2], Beijing institute of technology, QING-FENG SUN, Peking University, JIAN WANG, HongKong University — We report on the injection of quantized pure spin current into quantum conductors. In particular, we propose an on-demand single-spin source generated by periodically varying the gate voltages of two quantum dots that are connected to a two-dimensional topological insulator via tunneling barriers. Due to the nature of the helical states of the topological insulator, one or several spin pairs can be pumped out per cycle giving rise to a pure quantized alternating spin current. Depending on the phase difference between two gate voltages, this device can serve as an on-demand single-spin emitter or single-charge emitter. Again, due to the helicity of the topological insulator, the single-spin emitter or charge emitter is dissipationless and immune to disorder. The proposed single-spin emitter can be an important building block of future spintronic devices.

[1]We gratefully acknowledge the financial support from from NSF-China under Grant (Nos. 11174032 and 11374246), NBRP of China (2012CB921303), and a RGC Grant (HKU 705212P) from the Government of HKSAR.
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Date submitted: 15 Dec 2014 Electronic form version 1.4