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Generating Giant Spin Currents by Majorana Flat Bands in Nodal Topological Superconductors NOAH FANQI YUAN, YAO LU, JAMES JUN HE, KAM TUEN LAW, The Hong Kong University of Science and Technology — When a normal lead is coupled to a single Majorana fermion, electrons with certain spin polarization can undergo equal spin Andreev reflections, in which the reflected holes have the same spin as the incoming electrons. Moreover, electrons with opposite spin are all normally reflected. This process is called Majorana fermion induced selective equal spin Andreev reflections (SESARs) [1]. As a result of SASARs, spin polarized currents can be generated at the normal lead. Nevertheless, in this case, the maximum conductance of the normal lead/superconductor junction is $2e^2/h$ [2]. In this work, we show that Majorana fermions associated with Majorana flat bands in nodal topological superconductors can also induce SESARs. Importantly, due to the large number of Majorana fermions, the conductance at the normal lead/nodal topological superconductor junction is enormous. As a result, giant spin currents can be generated in the normal lead. Particularly, we point out that UPt_3 can be the candidate to induce giant spin currents.

[1] James J. He, T. K. Ng, Patrick A. Lee, K. T. Law, Phys. Rev. Lett. 112, 037001 (2014).
[2] K. T. Law, Patrick A. Lee, T. K. Ng, Phys. Rev. Lett. 103, 237001 (2009).

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