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Spin Pumping by Antiferromagnetic material RAN CHENG, Department of Physics, University of Texas at Austin, JIANG XIAO, Department of Physics, Fudan University, ARNE BRATAAS, Department of Physics and Astronomy, Norwegian University of Science and Technology, QIAN NIU[1], Department of Physics, University of Texas at Austin — For a long time, spin-pumping is supposed to be impossible using antiferromagnetic materials (AFM) with compensated magnetization. We show that spin-pumping does not only exist in AFM with precessing staggered order, but is even stronger than its counterpart in ferromagnets. By calculating the scattering matrix of a normal metal/AFM interface based on a tight-binding model, we derive the pumped spin current in terms of the staggered order parameter and its time derivative. It is found that spin-pumping is of the same order of magnitude for both compensated and uncompensated interfaces. And the pumped spin current can be switched by changing the circular polarization of light exciting antiferromagnetic resonance, which introduces potential application. Besides spin current, we also define a new quantity–staggered spin current–and propose a novel pumping effect in AFM.

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