Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Revealing the ultrafast light-to-matter energy conversion before heat diffusion in a layered Dirac semimetal YUKIAKI ISHIDA, Institute for Solid State Physics, University of Tokyo, HIDETOSHI MASUDA, HIDEAKI SAKAI[1], SHINTARO ISHIWATA[2], Department of Applied Physics, University of Tokyo, SHIK SHIN, Institute for Solid State Physics, University of Tokyo — There is still no general consensus on how one can describe the out-of-equilibrium phenomena in matter induced by an ultrashort light pulse. We investigate the pulse-induced dynamics in a layered Dirac semimetal $SrMnBi_2$ by pump-and-probe photoemission spectroscopy [1]. At <1 ps, the electronic recovery slowed upon increasing the pump power. Such a bottleneck-type slowing is expected in a two-temperature model (TTM) scheme, although opposite trends have been observed to date in graphite and in cuprates. Subsequently, an unconventional power-law cooling took place at ˜100 ps, indicating that spatial heat diffusion is still ill defined at ˜100 ps. We identify that the successive dynamics before the emergence of heat diffusion is a canonical realization of a TTM scheme. Criteria for the applicability of the scheme is also provided. [1] Phys. Rev. B 93, 100302(R) (2016).

[1]also at: Department of Physics, Osaka University
[2]also at: JST PRESTO; Institute for Solid State Physics, University of Tokyo

Yukiaki Ishida
Institute for Solid State Physics, University of Tokyo

Date submitted: 10 Nov 2016 Electronic form version 1.4