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Title

Photon generation by injection of electrons via quantum Hall edge channels

Source

Physical Review B (Condensed Matter and Materials Physics), vol.84, no.15, 15 Oct. 2011, 155313 (5 pp.). Publisher: American Physical Society, USA.

Abstract

Photon emission caused by quantum electron transport has been found in the quantum Hall effect regime through photon-counting THz microscopy. The imaging reveals that Landau-level emission occurs at the confluence of unequally occupied edge channels in the quantum Hall effect plateau (filling factor = 4) when a potential barrier across the Hall bar is introduced. It is also found that the confluence at the lower-potential sample boundary (with positive Hall voltage) emits more photons than that at the higher-potential one. Since electrons and holes are injected via phase-coherent conducting channels, this photon emission phenomenon will provide a new platform for studying the interplay between quantum electron transport and quantum optics. (19 References).