

Single electron transport through quantum point contacts induced by a surface acoustic wave

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A surface acoustic wave (SAW) travelling along the surface of a GaAs heterostructure can drive single electrons through a quantum point contact in the 2DEG of the heterostructure [1, 2]. The acousto-electric current I_{ae} shows then stable plateaus at integer multiples of

$$I_{ae} = e \cdot f, \quad (1)$$

where f is the frequency of the SAW. Today devices working at several GHz can be made. Such a device at a lateral n-i-p junction would emit single photons at the same frequency because of electron-hole recombination, paving the way for secure optical communications. To fabricate such a device is currently the aim of our SAWPHOTON project [3].

I will present the current status of the SAWPHOTON project and discuss some of the experimental problems encountered there.

[1] J. Cunningham, V.I. Talyanski, J.M. Shilton, M. Pepper, M.Y. Simmons, D. A. Ritchie, Phys. Rev. **B 60**, 4850 (1999).

[2] J. Cunningham, V.I. Talyanski, J.M. Shilton, M. Pepper, A. Kristensen, P. E. Lindelof, Phys. Rev. **B 62**, 1564 (2000).

[3] SAWPHOTON project. Project No IST-2000-26020.