

Spin dynamics in semiconductor nanostructures

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In this lecture we are going to present our latest comprehensive theoretical investigations on spin kinetics of electrons and holes in semiconductor quantum wells, quantum wires and quantum dots based on microscopic many-body as well as single-particle approaches under various conditions, such as temperature, external static electric and magnetic fields, THz radiations, confinement of the structure, strain etc. Both transient and steady-state transports are addressed. In addition to the cases near the equilibrium, spin kinetics *far away* from the equilibrium such as electrons of high spin polarization and/or electrons under strong electric field (hot electrons) is also discussed in detail. Good agreements with the available experiments are presented and many novel effects are predicted.

Bibliography

- [1] M. W. Wu and H. Metiu, Phys. Rev. B **61**, 2945 (2000).
- [2] M. W. Wu and C. Z. Ning, Eur. Phys. J. B **18**, 373, Rapid Note (2000).
- [3] M. Q. Weng and M. W. Wu, Phys. Rev. B **66**, 235109 (2002).
- [4] M. Q. Weng and M. W. Wu, J. Appl. Phys. **93**, 410 (2003).
- [5] M. Q. Weng and M. W. Wu, Phys. Rev. B **68**, 075312 (2003).
- [6] M. Q. Weng, M. W. Wu, and Q. W. Shi, Phys. Rev. B **69**, 125310 (2004).
- [7] J. L. Cheng, M. W. Wu, and C. Lü, Phys. Rev. B **69**, 115318 (2004).
- [8] J. Zhou, Q. W. Shi, and M. W. Wu, Appl. Phys. Lett. **84**, 365 (2004).
- [9] M. Q. Weng, M. W. Wu, and L. Jiang, Phys. Rev. B **69**, 245320 (2004).
- [10] M. W. Wu, J. Zhou, and Q. W. Shi, Phys. Lett. **85**, 1012 (2004).
- [11] Q. W. Shi, J. Zhou, and M. W. Wu, Appl. Phys. Lett. **85**, 2547 (2004).
- [12] M. Q. Weng and M. W. Wu, Phys. Rev. B **70**, 195318 (2004).
- [13] C. Lü, J. L. Cheng, and M. W. Wu, Phys. Rev. B **71**, 075308 (2005).
- [14] L. Jiang and M. W. Wu, Phys. Rev. B **72**, 033311 (2005).
- [15] J. L. Cheng and M. W. Wu, Appl. Phys. Lett. **86**, 032107 (2005).
- [16] L. Jiang, M. Q. Weng, M. W. Wu, and J. L. Cheng, J. Appl. Phys. **98**, 113702 (2005).
- [17] M. W. Wu and J. Zhou, Phys. Rev. B **72**, 115333 (2005).
- [18] Y. Y. Wang and M. W. Wu, Phys. Rev. B **72**, 153301 (2005).
- [19] C. Lü, J. L. Cheng, and M. W. Wu, cond-mat/0512398.
- [20] Y. Y. Wang and M. W. Wu, cond-mat/0601028.