Pure Spin Currents and Heat

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Heat is the bane of modern electronics reaching limits where it future development is threatened. Much of the energy that it takes to run computers and other digital devices is wasted as heat and an important part of the sustainability effort is directed towards reducing the consumption of energy. Spintronics offers one possible route to achieving this aim by reducing the overheads of transferring information around a circuit. Pure spin currents transfer angular momentum without transferring charge and hence no Joule heating. This project aims to better understand the physics of pure spin currents and to measure heating effects in nanocircuits. In a collaboration with IBM we are developing methods of measuring heat transfer in lateral spin valves used to generate spin currents. IBM have a scanning nano-scale thermometer on the end of an AFM head that we use to measure temperature in a spin valve while a spin current is flowing. This project will involve working with IBM Zurich.