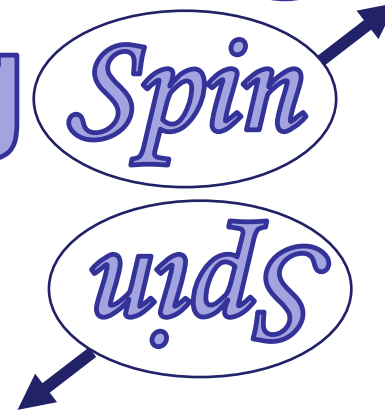


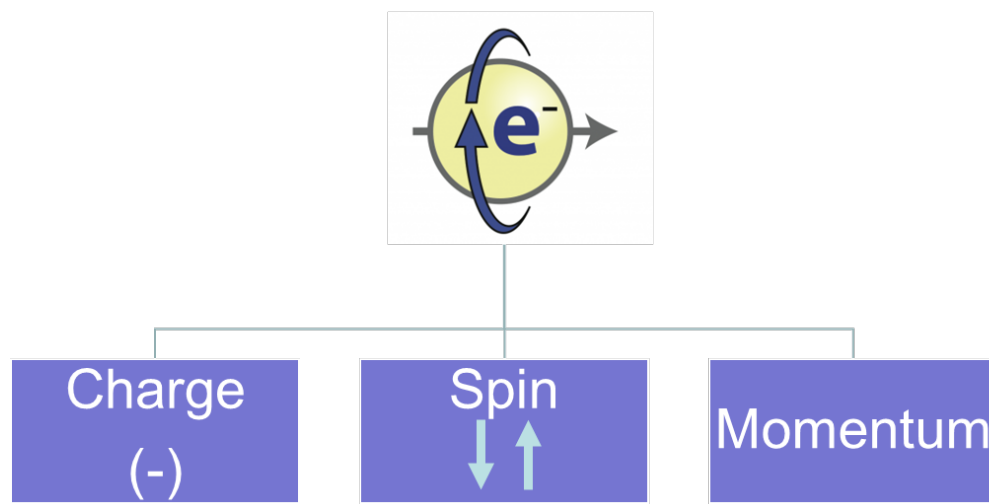
Device for Injecting and Detecting



Ramya Gurunathan

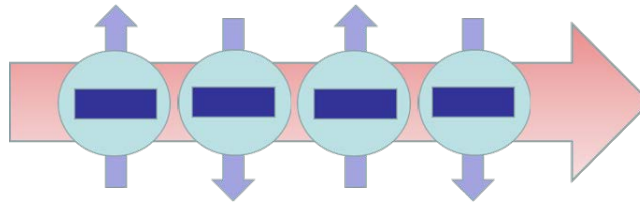
Pennsylvania State University → Leiden University





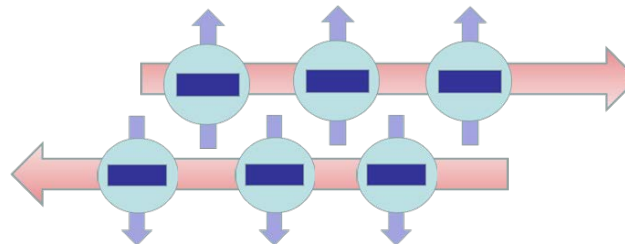
Charge Current

Charge Travels,
Spin cancels



Spin Current

Spin travels,
Charge cancels

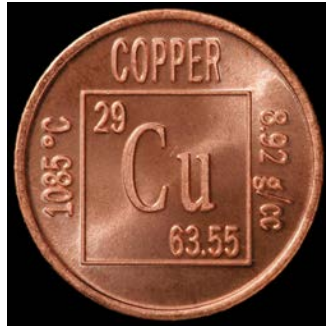



MOTIVATION: Produce and Measure a *pure spin current*
Less power dissipation. Magnetic memory applications.

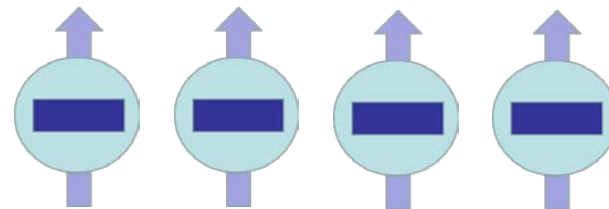
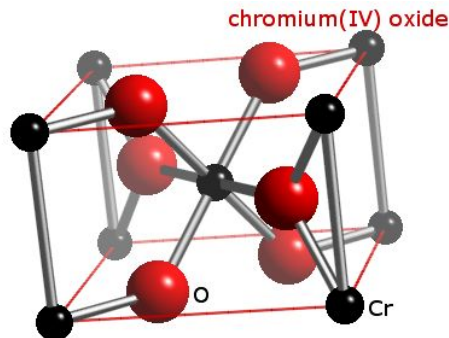
Considering a Spin Current Device....

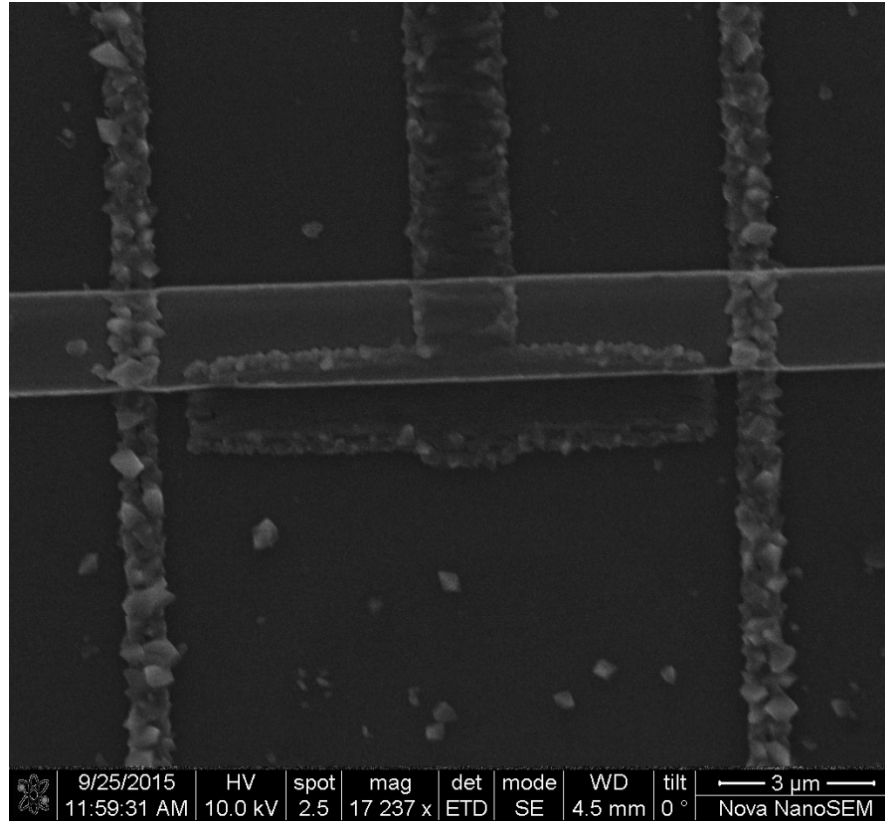
Two Major Materials Science Questions:

- 1) Best material to transport the spin current?
⇒ Must have a long “spin lifetime”



- 2) Best material to generate or “inject” spin current?
⇒ Electrons in material should have aligned spins





My project:

- 1) Optimize the device fabrication
- 2) Take electrical measurements in a *cryostat* → allows you to apply large magnetic fields and liquid helium temperatures

References and Acknowledgments

- (1) Cho, A. Spin Currents—Free Of Charge. *Focus* 2003, 11.
- (2) Yang, T.; Kimura, T.; Otani, Y. Giant Spin-Accumulation Signal And Pure Spin-Current-Induced Reversible Magnetization Switching. *Nat Phys* 2008, 4, 851-854.

Thank you to the members of the Jan Aarts Group
at Leiden University especially my mentor Dr.
Amrita Singh.

Hebben jullie nog vragen?