Long range spin transport in organic and inorganic solids

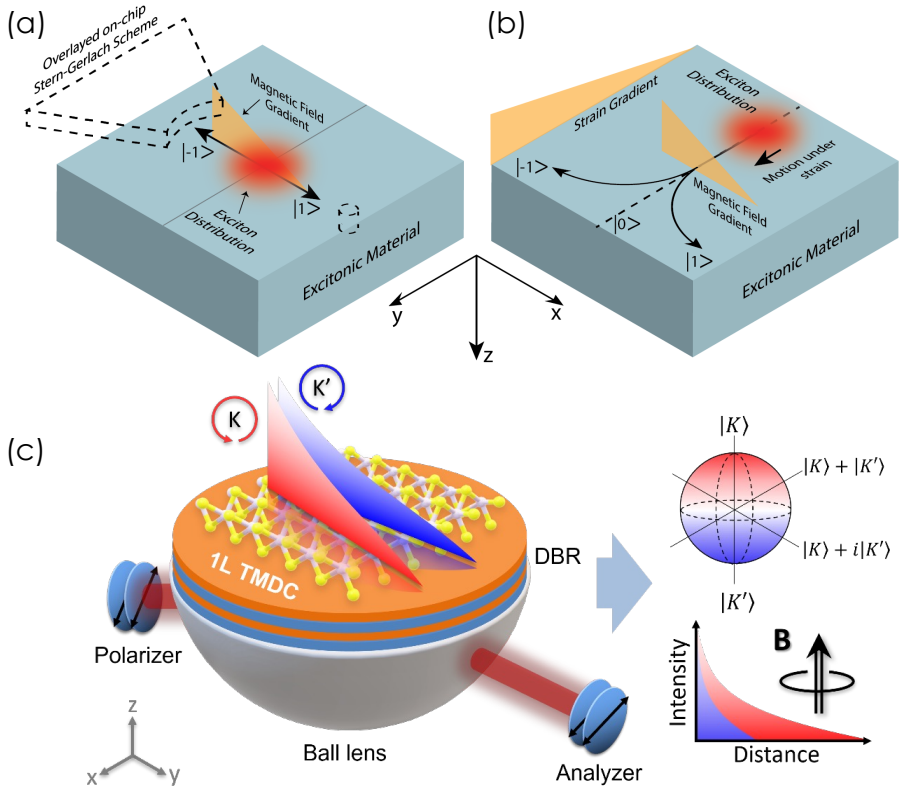

Figure:(a) On-chip Stern-Gerlach device. The exciton diffusion with spin states ↑ and ↓ is separated by the magnetic field gradient. (b) The spin states ↑ and ↓ are separated by the magnetic field gradient perpendicular to the exciton driving force using a strain field. (c) Pseudospin states K and K' carried by the Bloch surface wave polaritons. The out-of-plane magnetic field lifts the degeneracy of the pseudospin states and manipulates the propagation of the polariton transport carrying different pseudospin information.

Objective

➢ To investigate novel photophysical and magnetic properties that arise due to energetic interactions based on spin transfer and transport under external or internal magnetic fields

Impact

Stern-Gerlach geometry is used to induce spin separation in an excitonic material. This allows for the potential to achieve long range spin/pseudospin control and transport governed by triplets in organics or spin states in inorganics. Additionally, on-chip nanoscale spin transport could be realized, enabling applications in spintronic devices.

Facilities and Methods Used

- Fourier-space microscopy in a magnetic cryostat
- Vapor thermal evaporation / Chemical vapor deposition
- Lithography
- Nearfield scanning optical microscopy

Relevant Papers

- S. Shi, et al., *JACS*, DOI: 10.1038/nphys3891

Funding

- US Department of Defense

Collaborators

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