

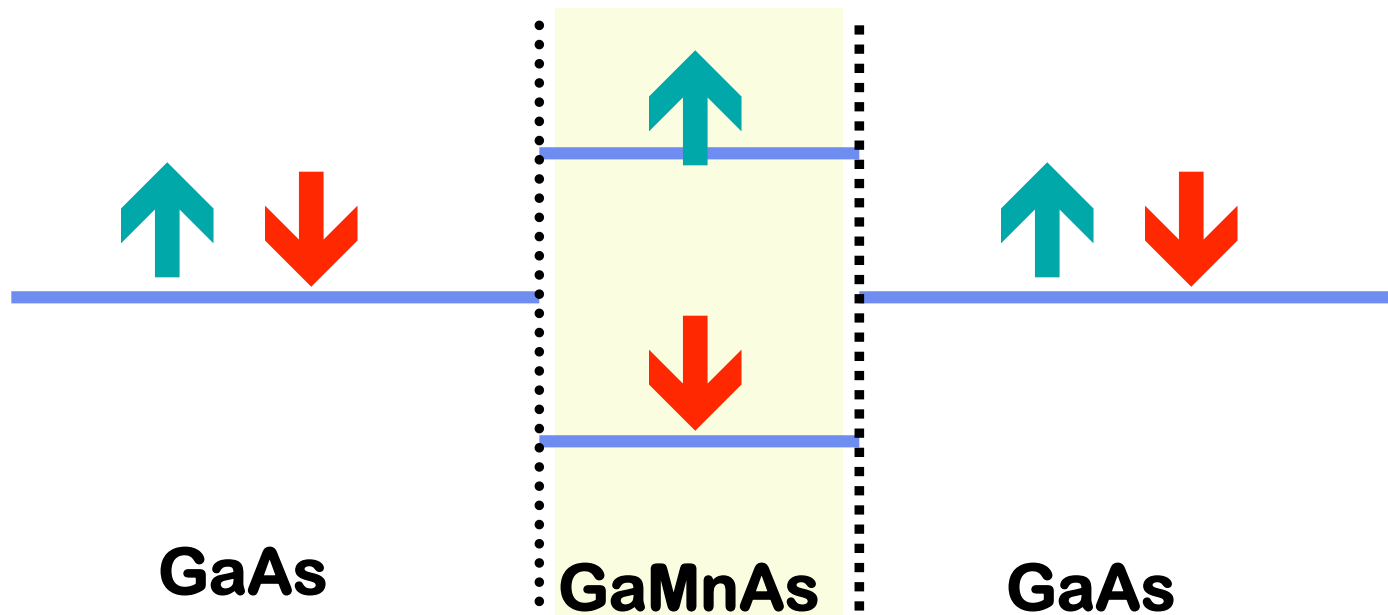
Spin transport through GaAs/GaMnAs/GaAs

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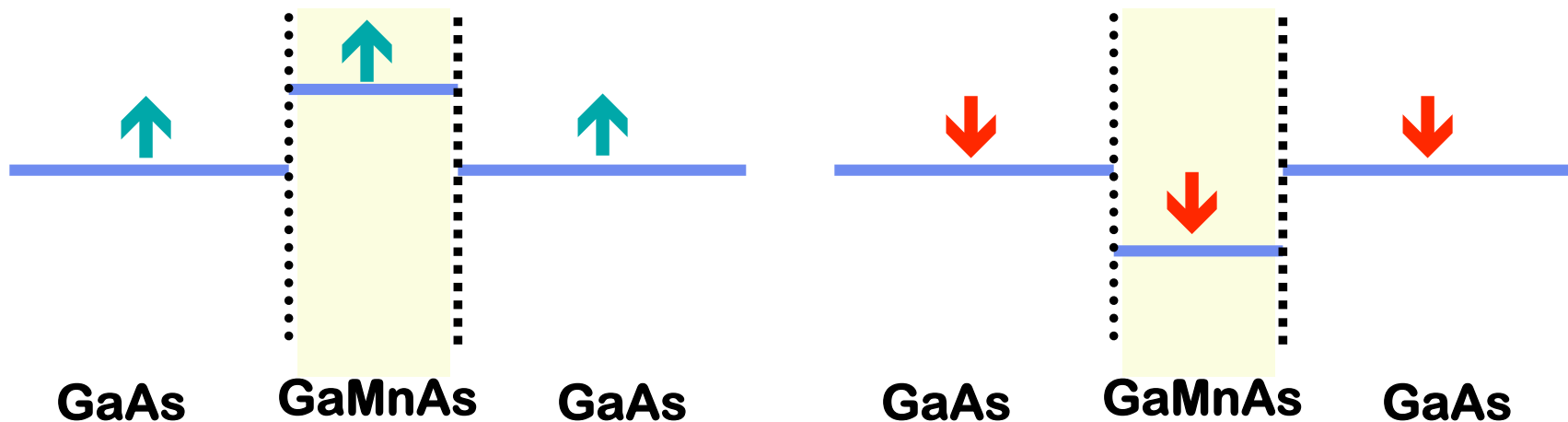
What's the idea

- Local moment Mn → **effective magnetic field**
- **Different potential** for **different spin !!**



Method

- Quantum Mechanics scattering problem



Then we can obtain wavefunction, R and T, current density for spin up and spin down respectively.

What's the interaction

- p-d exchange interaction between Mn and holes
- Mean-field approximation

$$H = H_0 + H_{ex}$$

$$H_{ex} = \sum_{R_i} J(r - R_i) \vec{S}_i \cdot \vec{\sigma} = \sigma_z \langle S_z \rangle x \sum_R J(r - R)$$

$(R_i : Mn, R : cation)$

Expect to see

- Spin dependent current density – “spin filter”
- Tunneling effect for critical GaMnAs thickness
- GaMnAs multilayers – GaAs/GaMnAs superlattice