1. 影响热致磁子流输运的因素：

界面（自旋霍尔磁阻）；磁性样品的厚度；温度和外加磁场，温度影响磁子衰减长度，强磁场抑制低频磁子的激发。

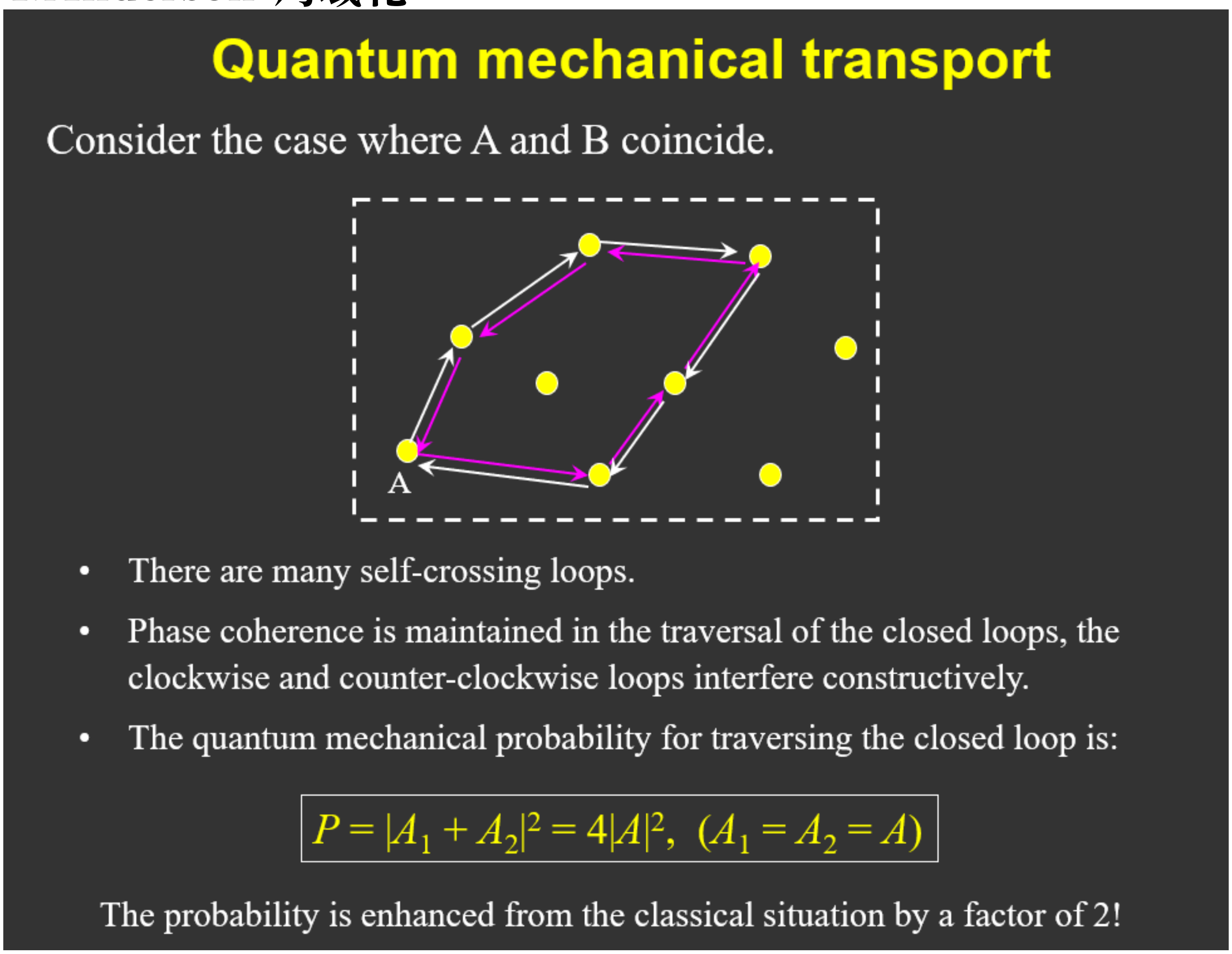
2.SHE 和 ISHE 产生的电子极化角动量和电流的方向如何确定？

SHE: $\boldsymbol{\sigma} \propto \boldsymbol{j_s} \times \boldsymbol{j_c}$

ISHE: $\boldsymbol{\sigma} \propto \boldsymbol{j_c} \times \boldsymbol{j_s}$

3.SSE 依赖于激发的磁子的频谱

4.Anderson 局域化



- Physical phenomena: **disorder** induced localization of waves
- Mechanism: enhanced return probability due to constructive interference of self-crossing loops (phase coherent backscattering)
- New concept: traditionally only the interaction strength is important, Anderson told us that the distribution of the interaction strength is also important
- It’s a generic wave-related phenomena having broader and broader implications in recent years.
- Theoretically to solve Anderson localization rigorously is very challenging.

- Experimentally it is hard to realize ideal Anderson localization.
- So there are many remaining questions, such as: Will correlation enhance or hamper localization? Traditional localization theory is single particle, non-interacting theory. How to explain the Anderson transition found in 2D system?
- It is still an intensively studied area in physics.

5. 在重金属中自旋流和电流的关系式

$$\hat{\mathbf{j}} = \frac{c}{2}\hat{\mathbf{E}} + \frac{c_h}{4}(\hat{\mathbf{E}} \times \boldsymbol{\sigma} - \boldsymbol{\sigma} \times \hat{\mathbf{E}}), \qquad (1)$$

6.YIG 的一些参数

for the yttrium iron garnet (YIG) layer,the Curie temperature Tc = 550 K, the lattice constant a_{0I} = 12.376 $\mathring{A}$, the spin wave gap g = 10^{-6} eV, and the magnon relaxation time τ_{th} = 10^{-6} s .