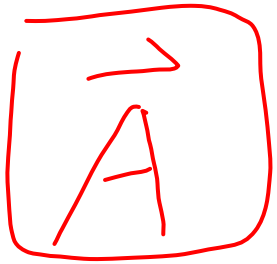
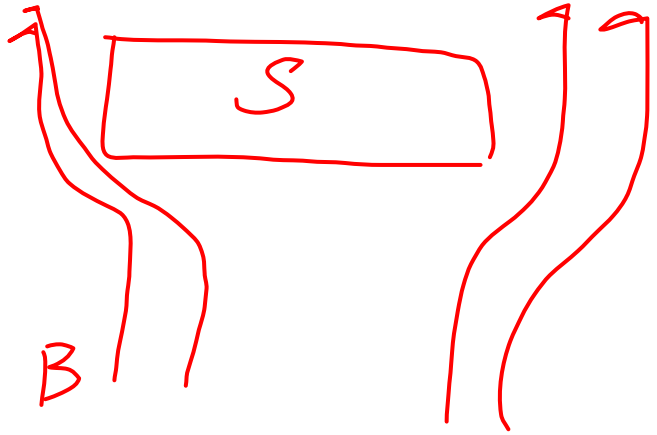
Aharonov - Bohm (AB)

QM

Interference effect

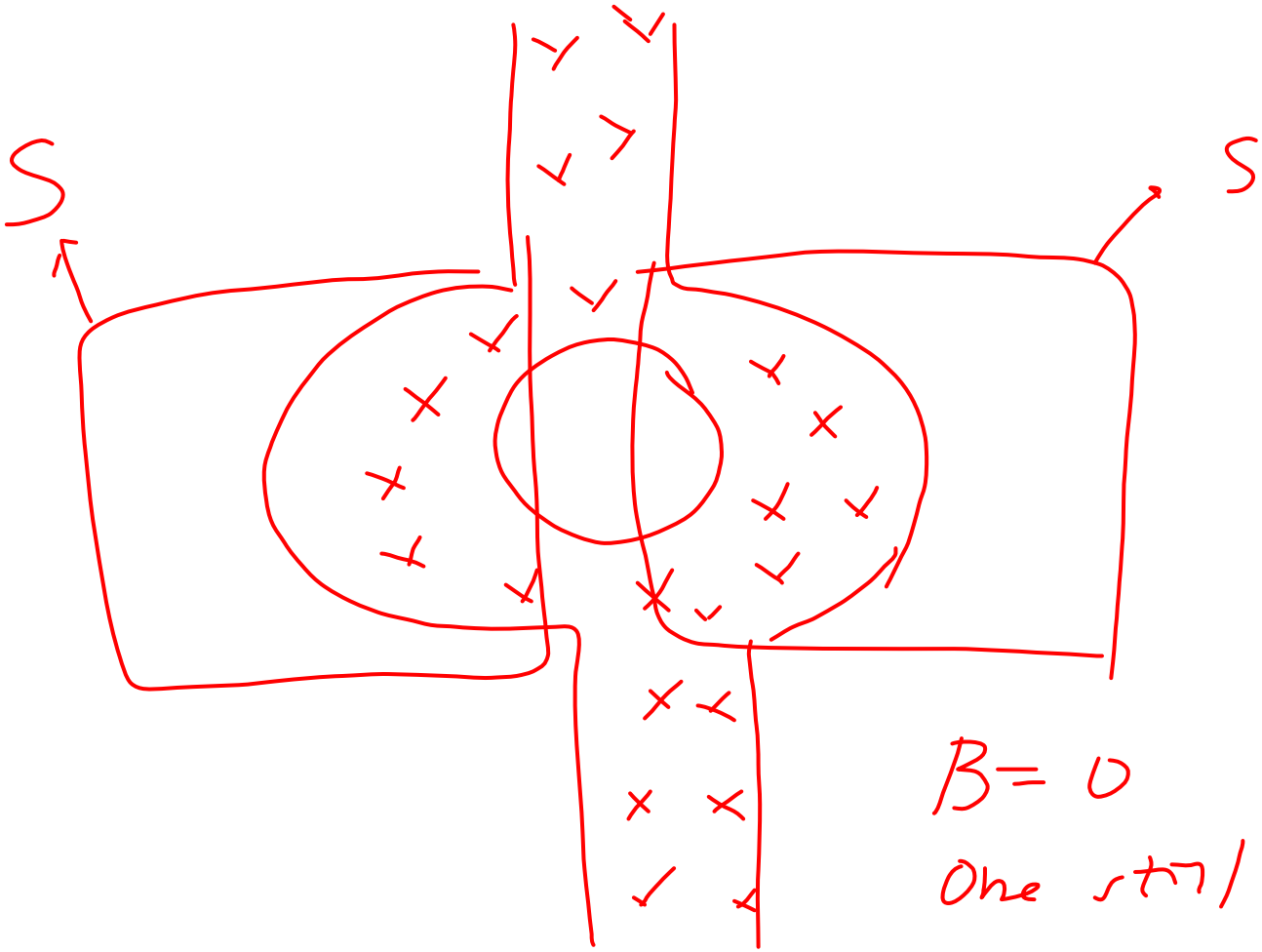




$B = 0$ low B

Meisner Effect

Superconductor



$B = 0$

One still sees this.

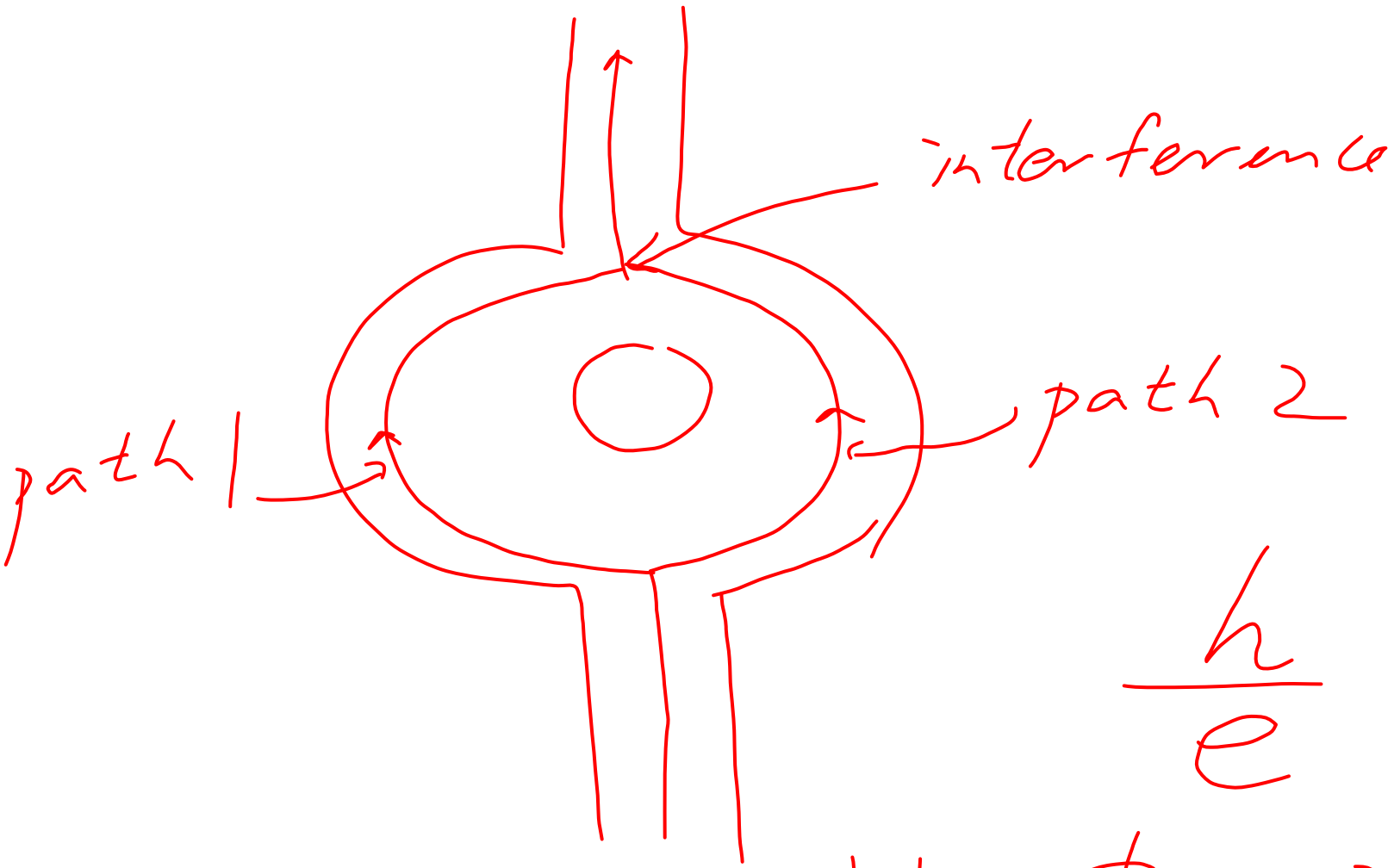
$\vec{A}$

$$\int \vec{A} \cdot d\vec{\ell} = \int (\nabla \times \vec{A}) \cdot d\vec{S}$$

$$\vec{B}$$

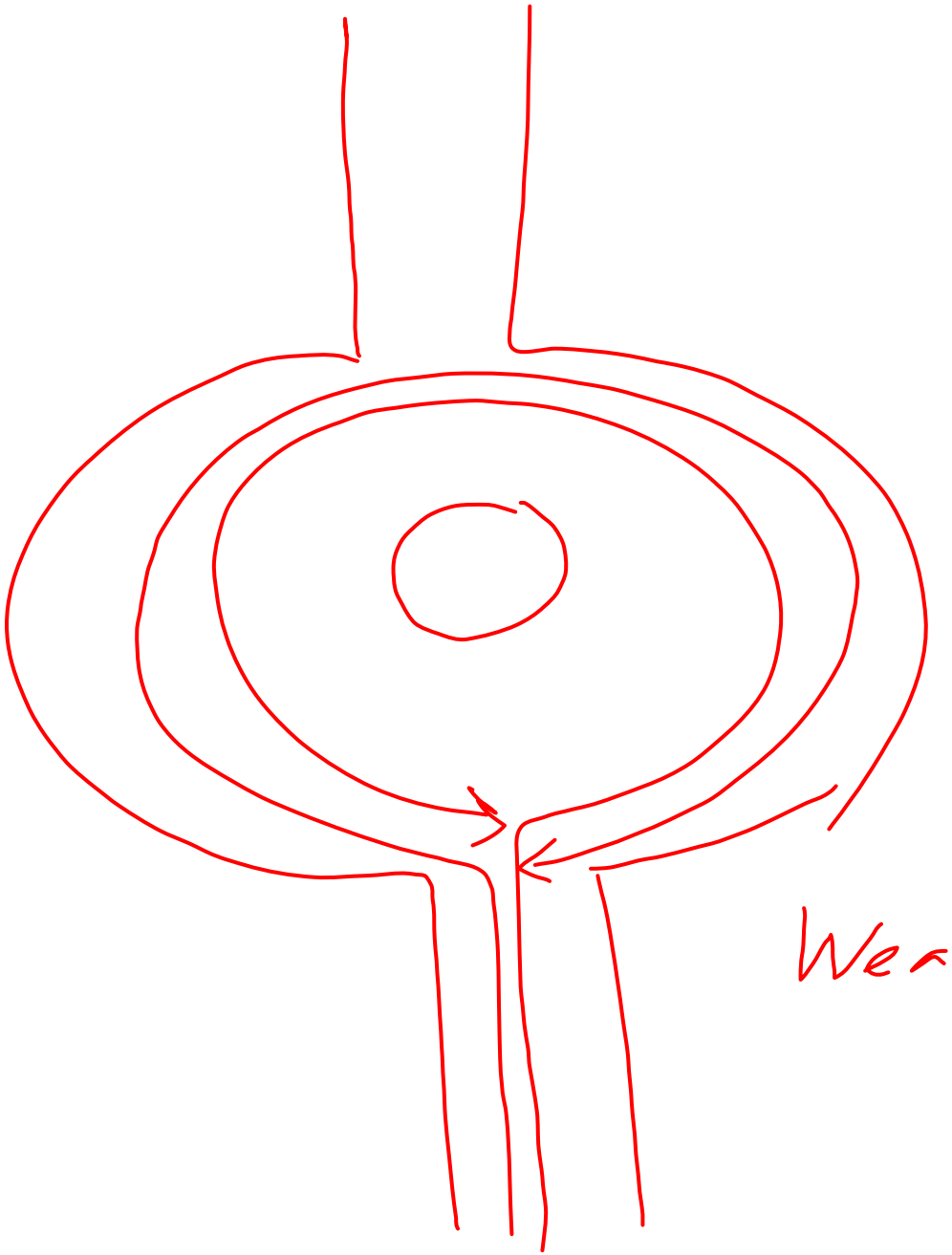
$$\Phi = BS$$

$$\Phi_0 = \left(\frac{h}{e}\right)$$



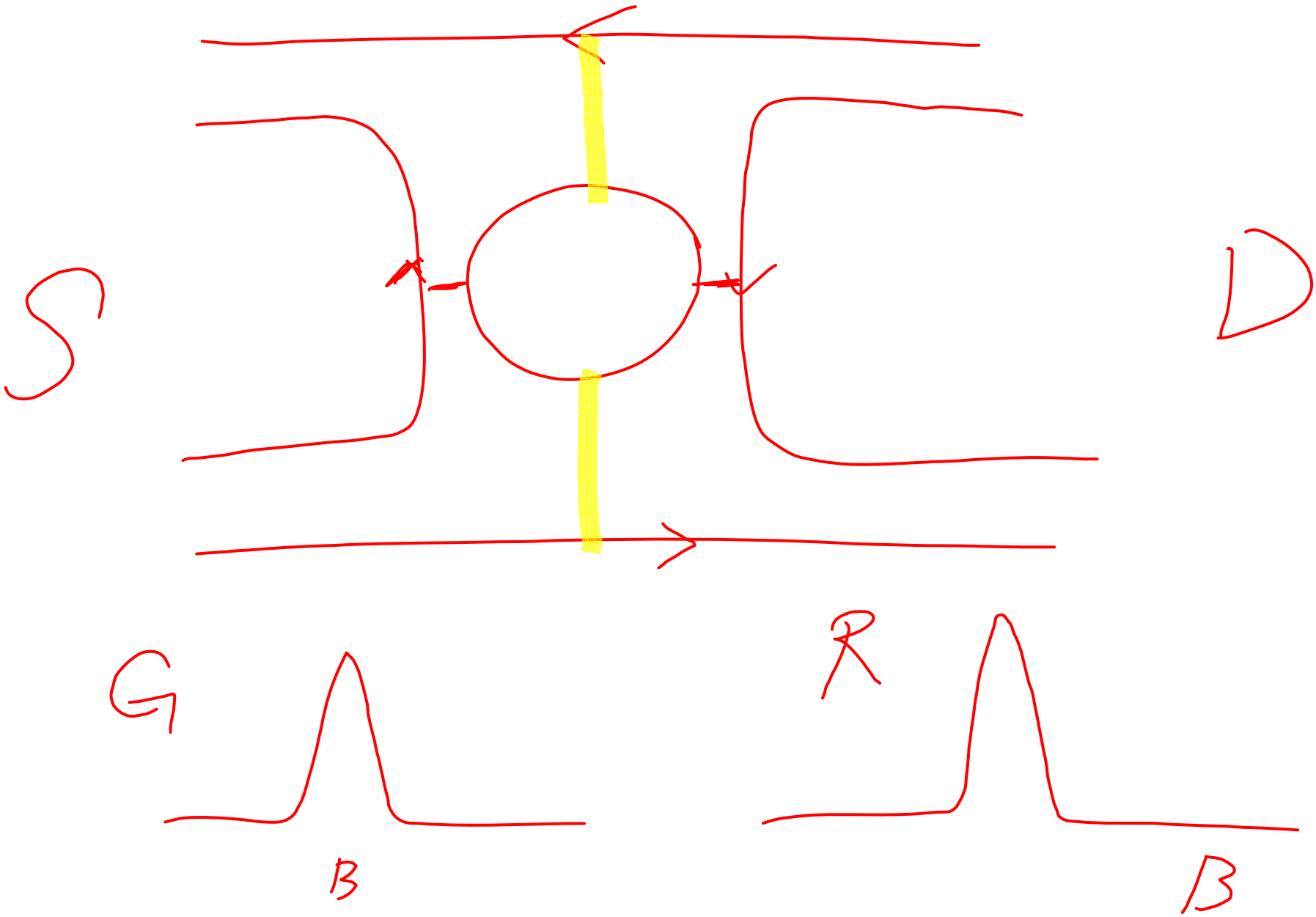
$\frac{h}{e}$

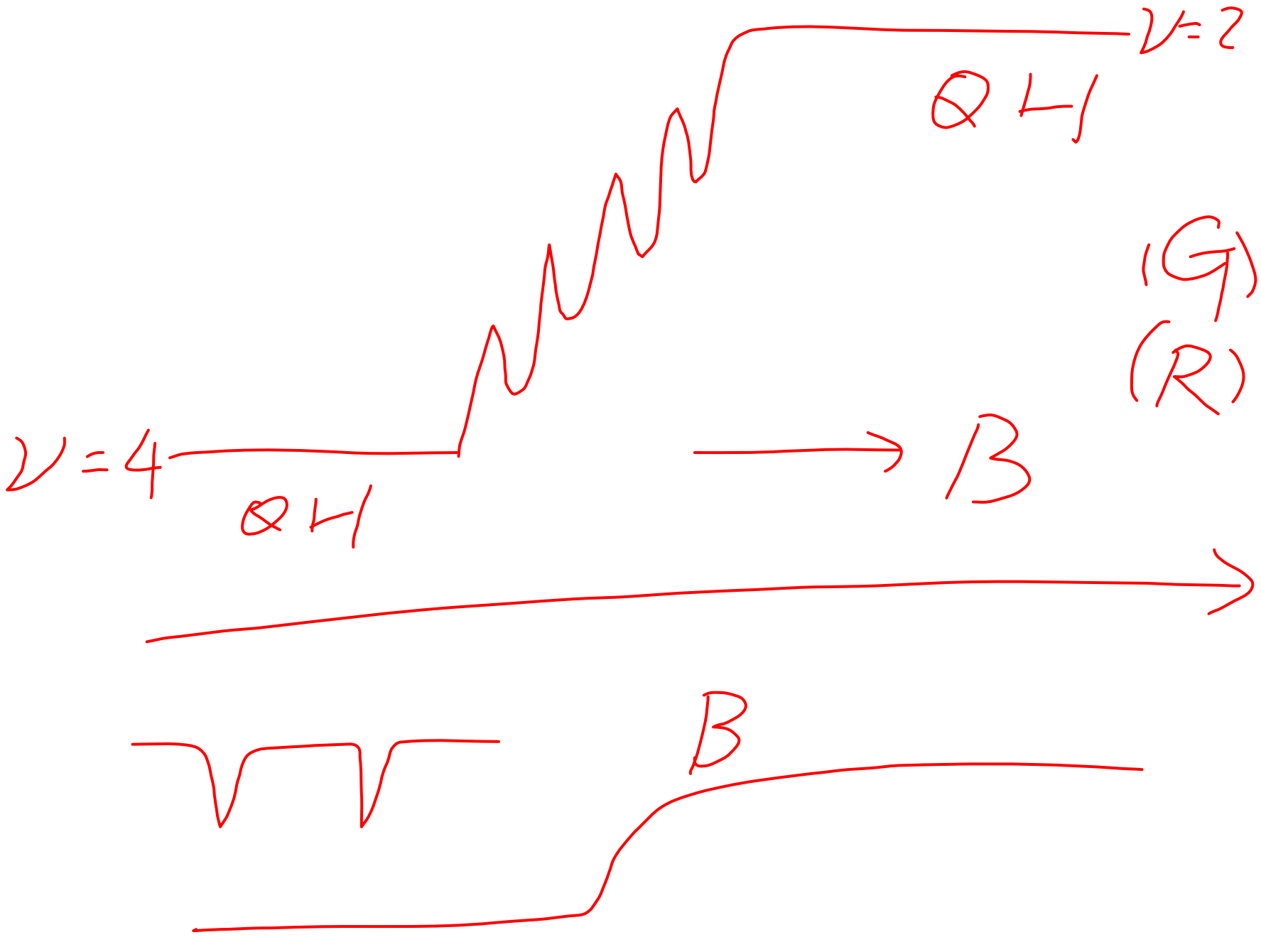
wave function splits $\frac{\Phi}{2\pi} = \frac{BS}{\left(\frac{h}{e}\right)}$

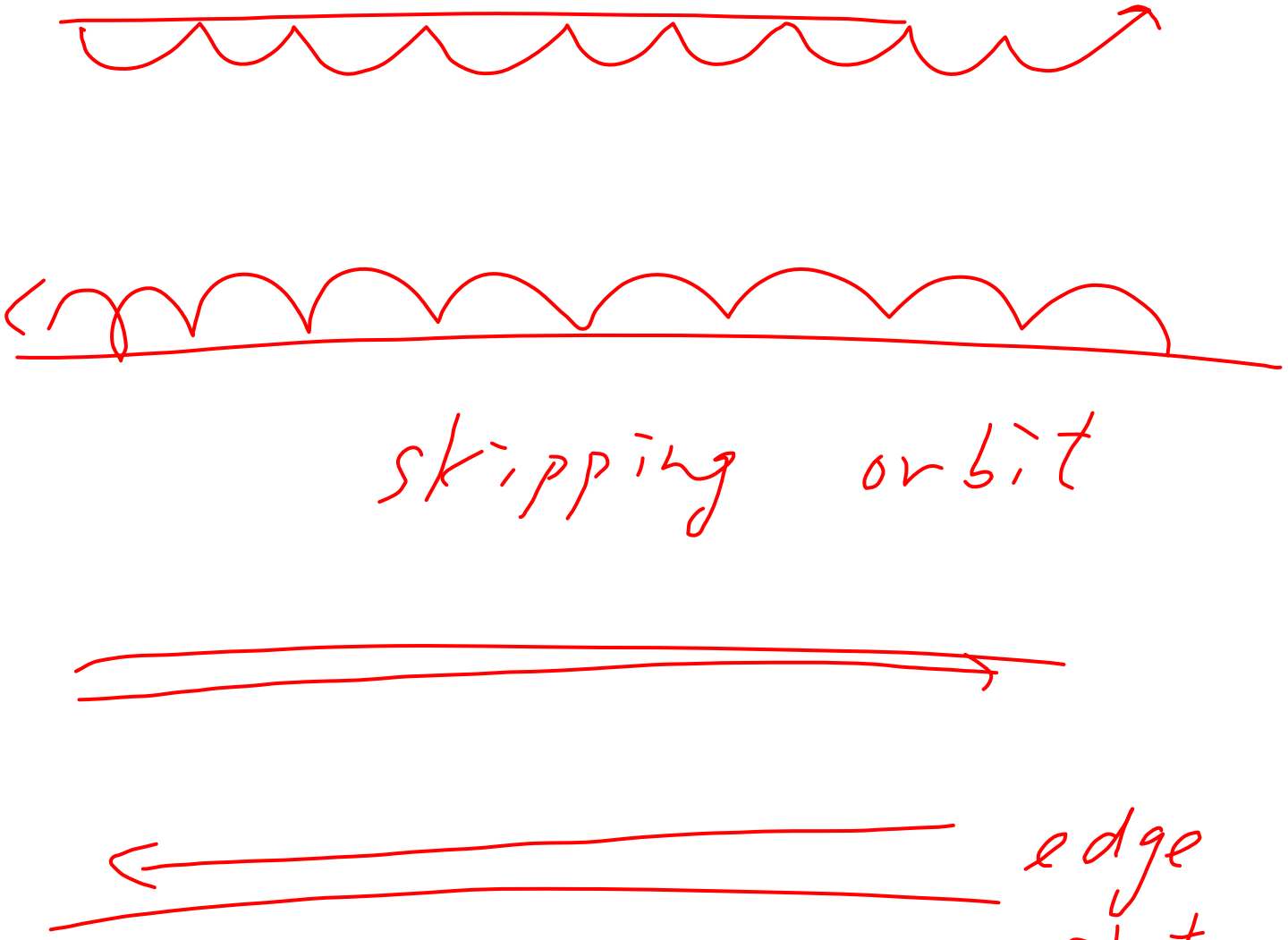


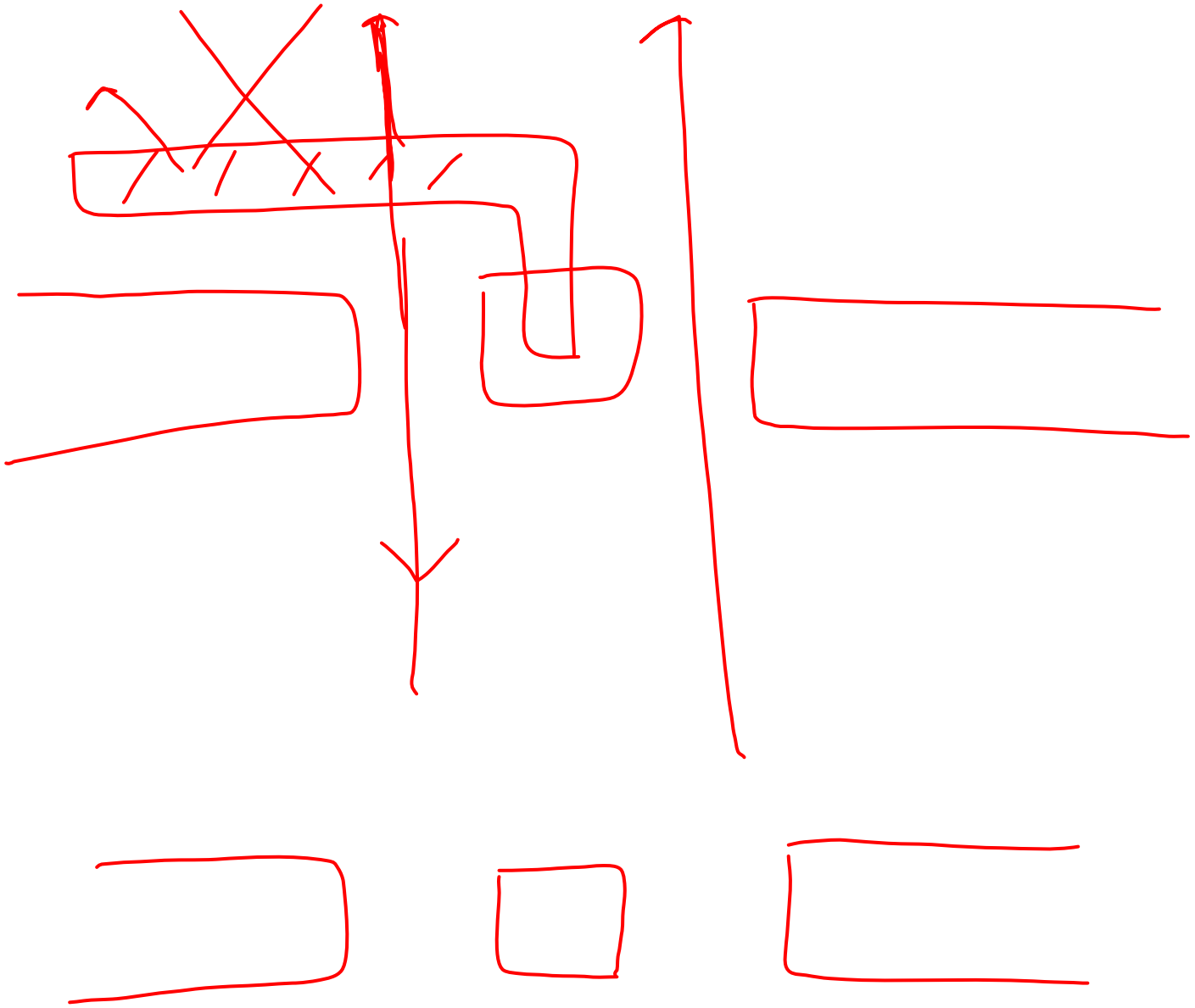
$\frac{h}{2e}$

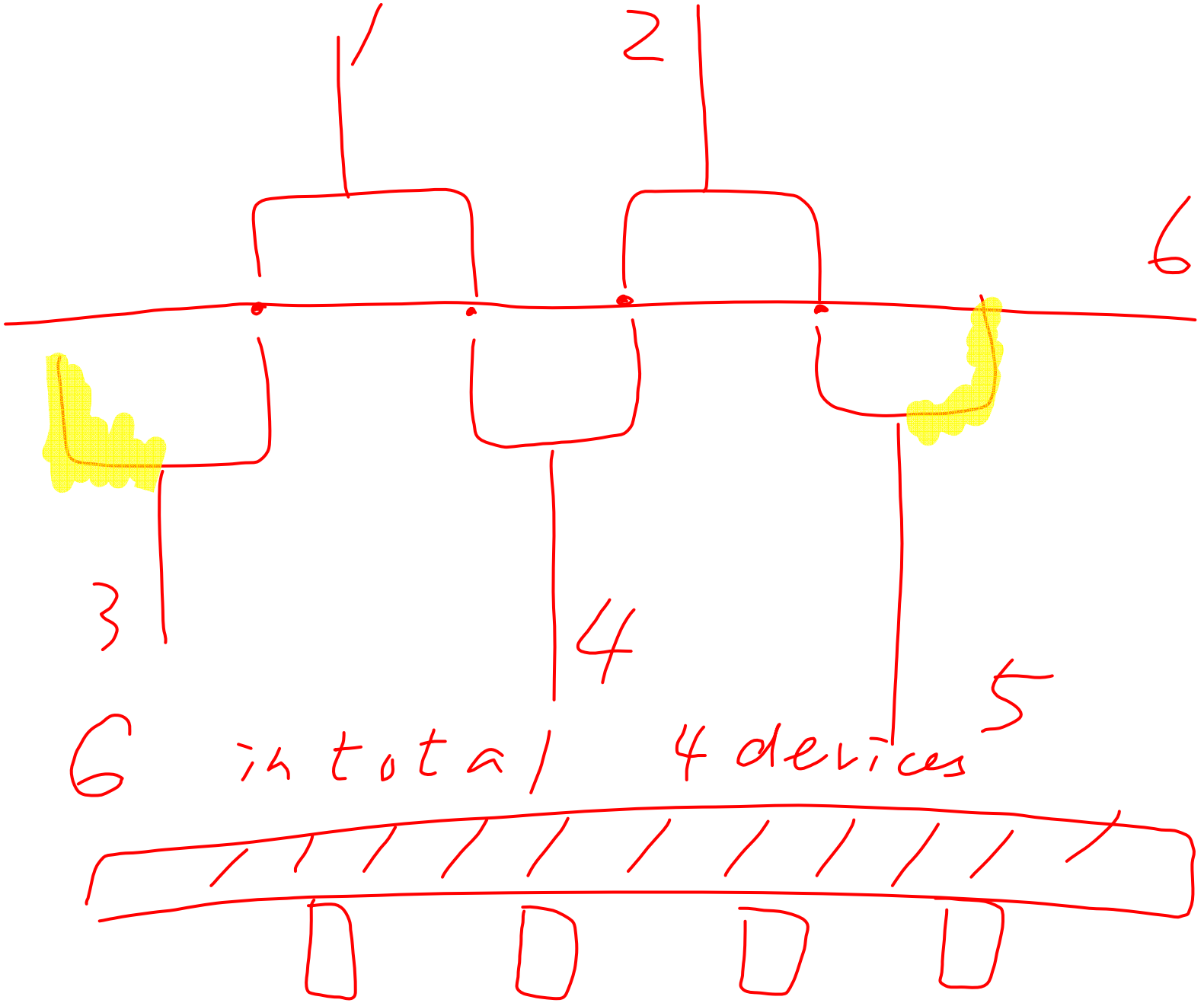
Weak Localization

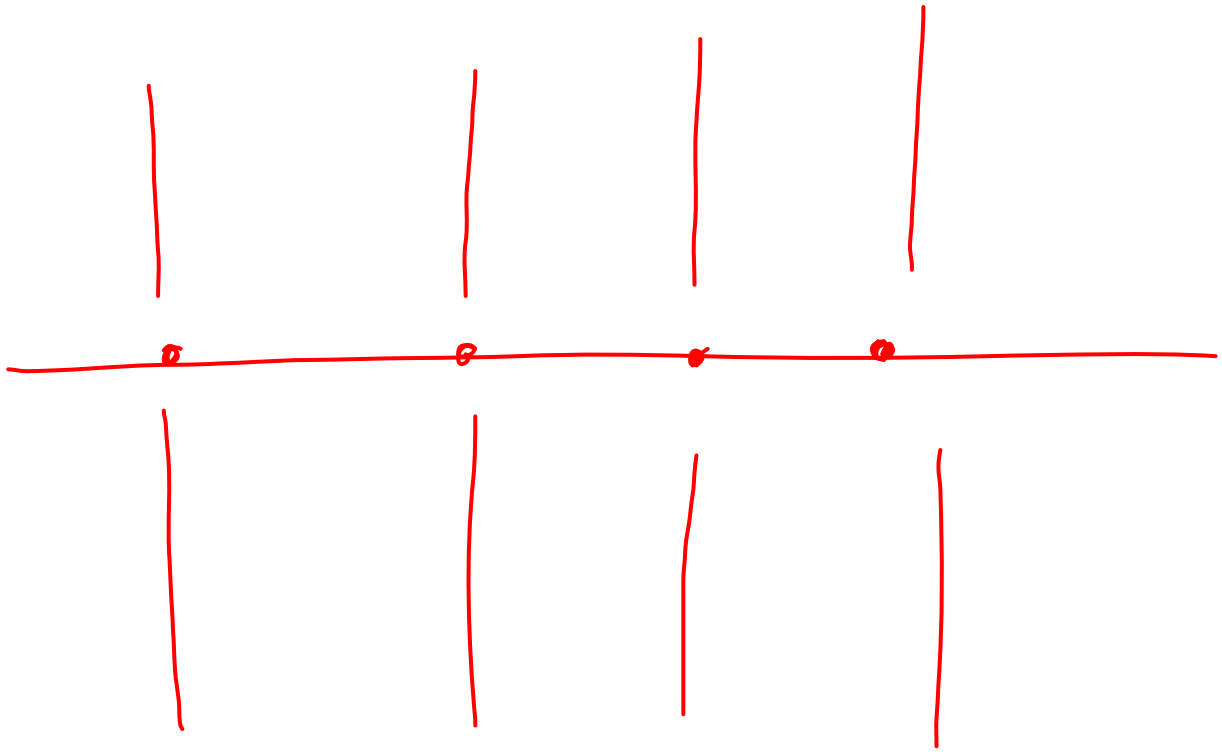

S
D
G
B
R
B


v=2
QH
(G)
(R)
v=4
QH
B
B


skipping orbit
edge
states




1
2
6
3
4
5
6 in total
4 devices



9 connections

4 devices

$$\frac{(B)\,S}{\frac{h}{e}}$$

$\Delta B \simeq 4\ mT$

$S = 1\ \mu m^2$

periodic in B

$$\frac{h}{e} = 4.14\ mT(T)\,\mu m^2$$

$$\frac{6.62 \times 10^{-34}}{1.6 \times 10^{-19}} \simeq 4 \times 10^{-15}$$