FUNDAMENTALS OF NANOELECTRONICS

B. Quantum Transport

1. Schrodinger Equation
2. Contact-ing Schrodinger

More Examples →

4. Spin Transport

3.1. Introduction

3.2. Quantum Point Contact

3.3. Self-Energy

3.4. Surface Green's Function

3.5. Graphene

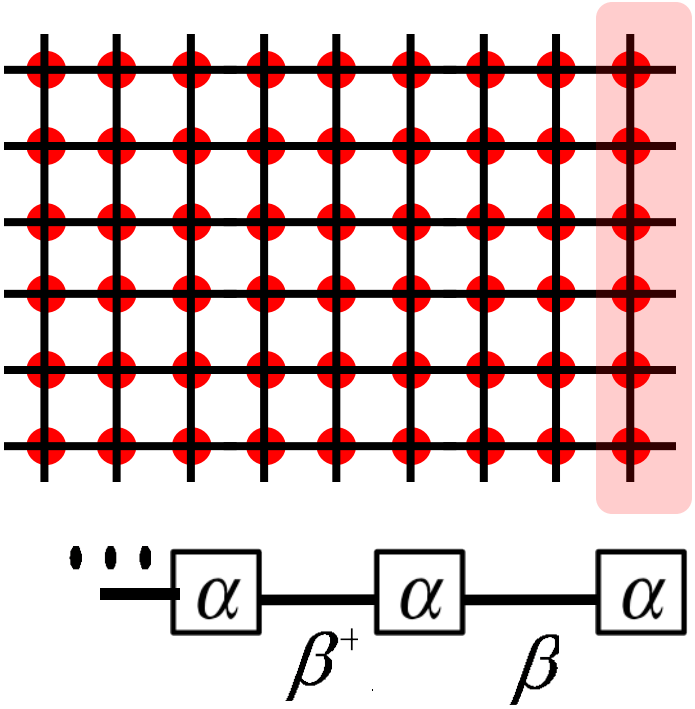
3.6. Magnetic Field

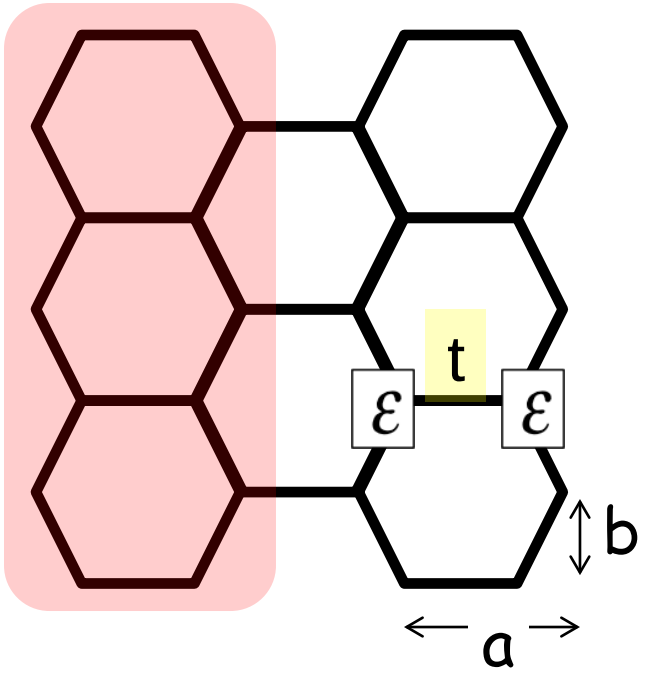
3.7. Golden Rule

3.8. Inelastic Scattering

3.9. Can NEGF Include Everything?

3.10. Summing up ..

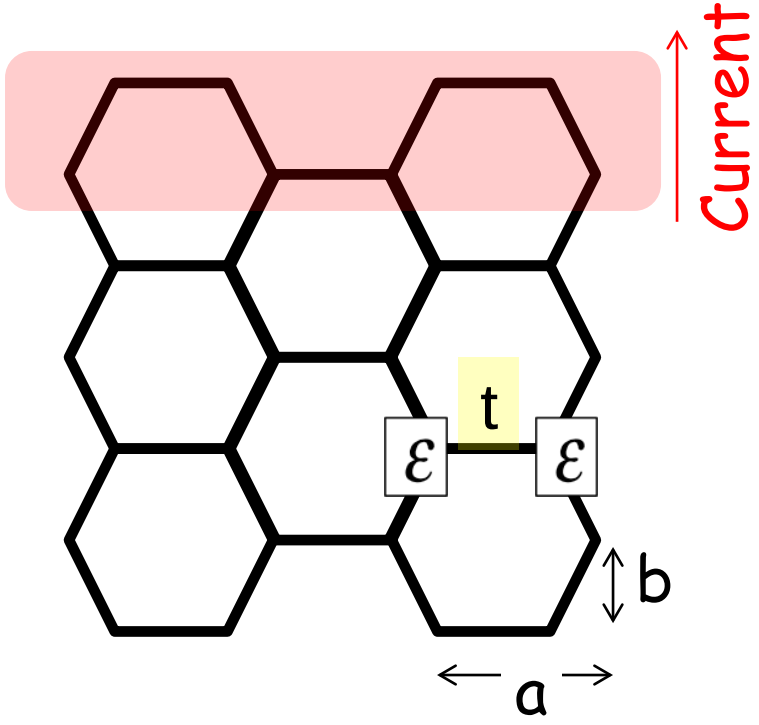




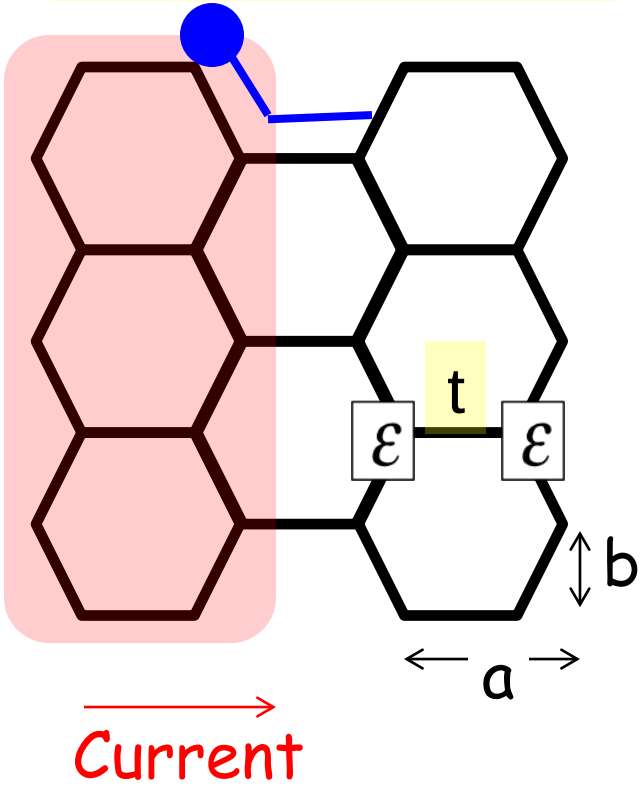
$$\alpha = \begin{bmatrix} \varepsilon & t & 0 \\ t & \varepsilon & t \\ 0 & t & \varepsilon \end{bmatrix}$$

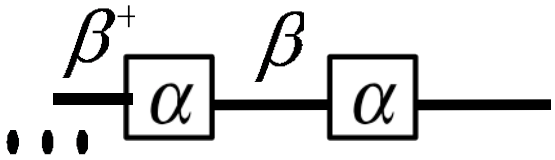
$$\beta = \begin{bmatrix} t & 0 & 0 \\ 0 & t & 0 \\ 0 & 0 & t \end{bmatrix}$$

Zigzag Edge



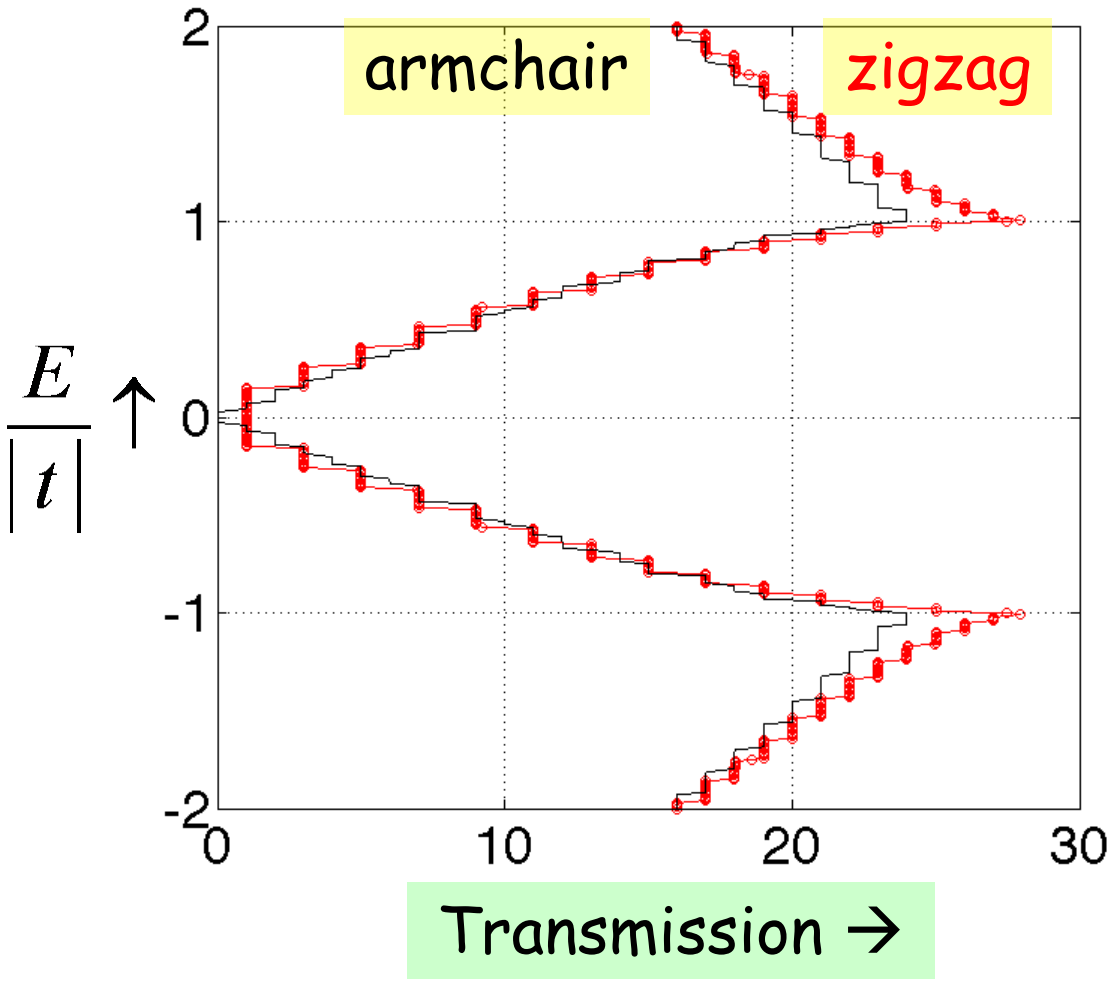
Armchair Edge

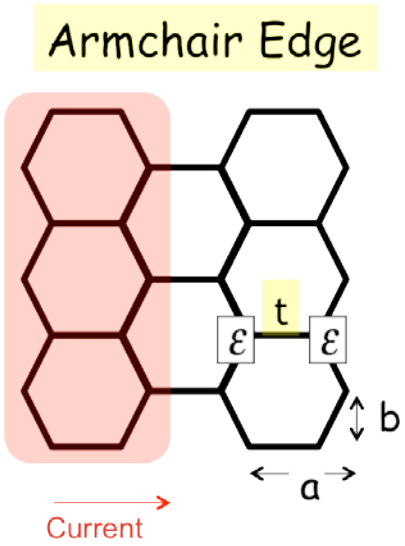


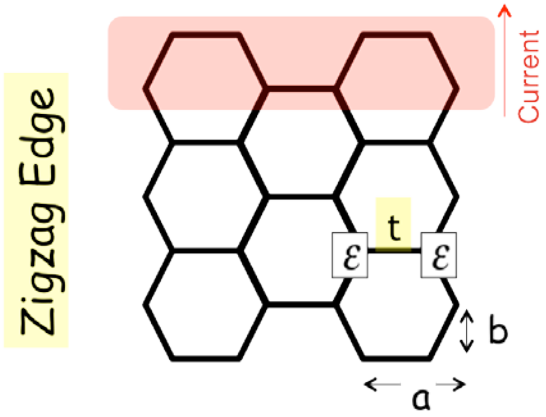


$$g = [E + i\eta - \alpha - \beta^{+} g \beta]^{-1}$$

$$\Sigma = \tau g \tau^{+}$$


armchair
zigzag
$\frac{E}{|t|}$
2
1
0
-1
-2
0
10
20
30
Transmission →


Armchair Edge
t
ε
ε
b
a
Current

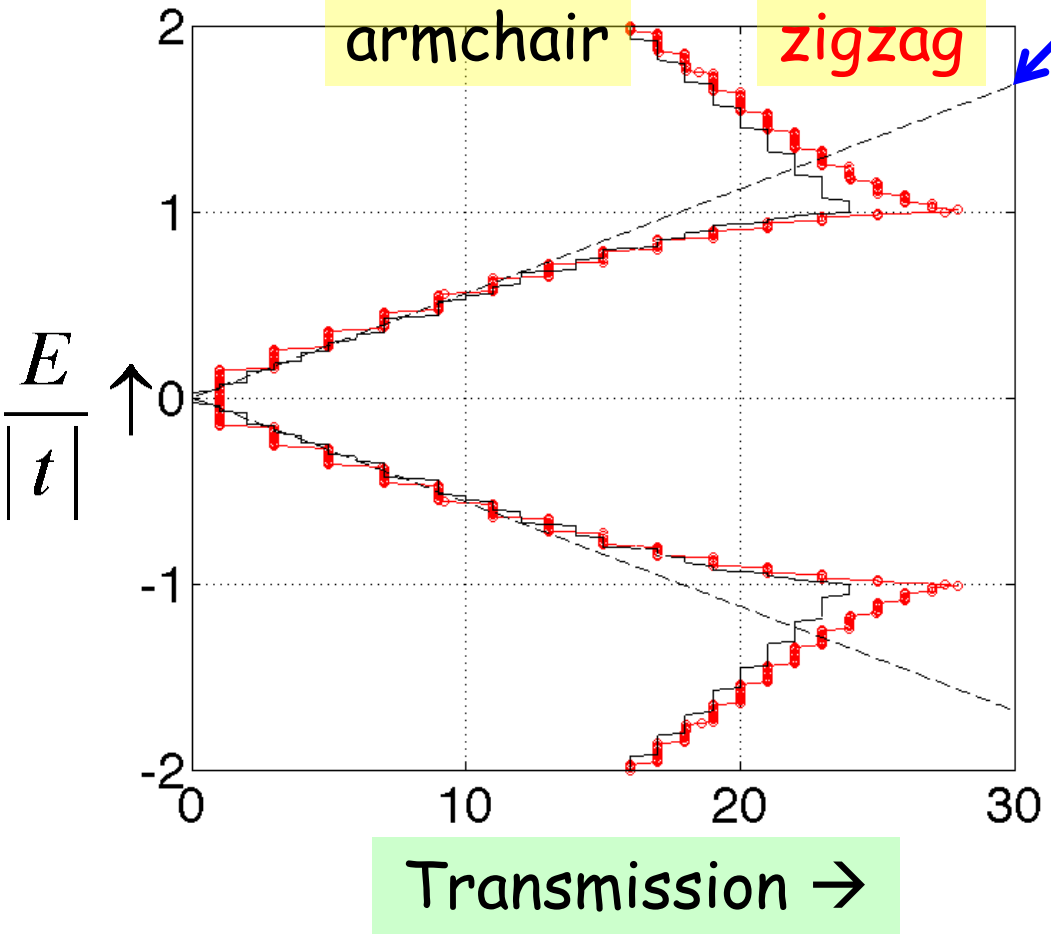

Zigzag Edge
Current
t
ε
ε
b
a

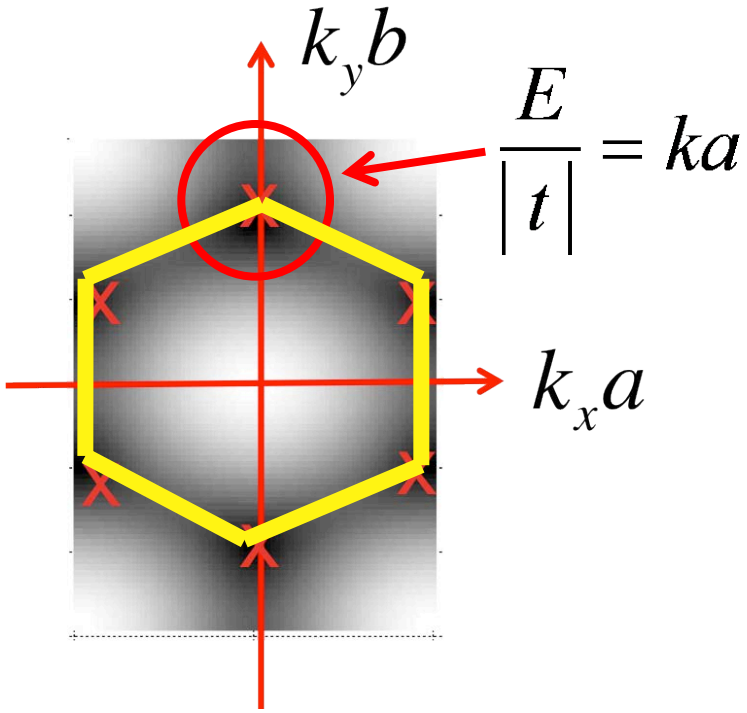
$$M \approx 2 * \frac{kW}{\pi} = \frac{W}{a}\frac{2}{\pi}\frac{E}{|t|}$$

Semi-classical

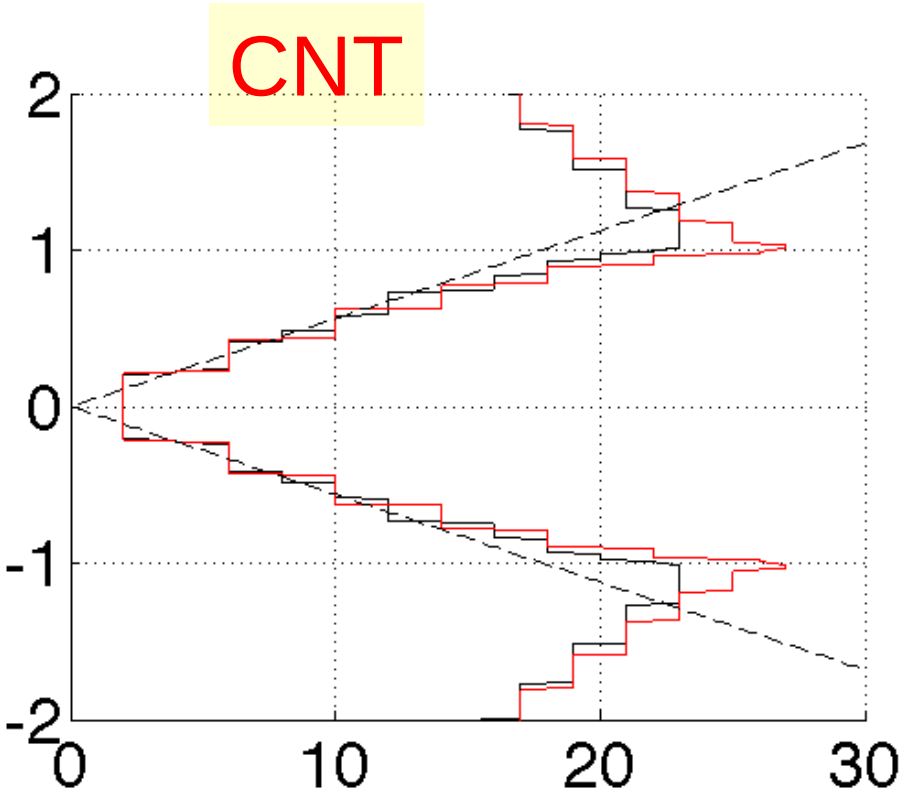
armchair

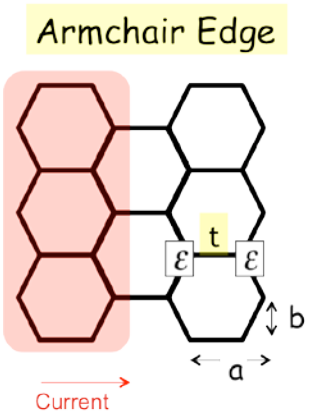
zigzag

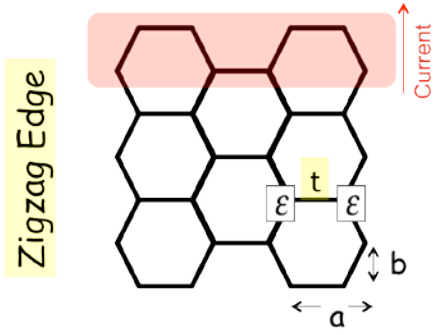


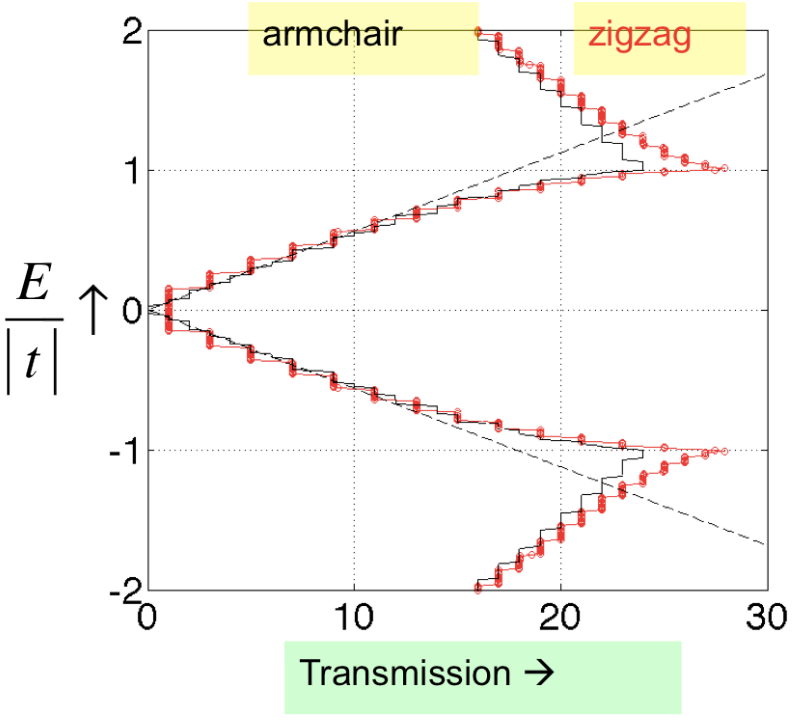


3.5e Graphene

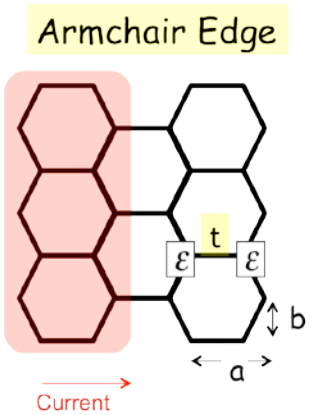


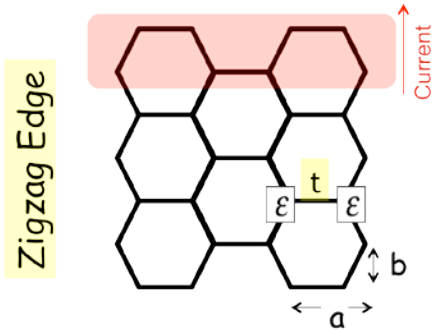


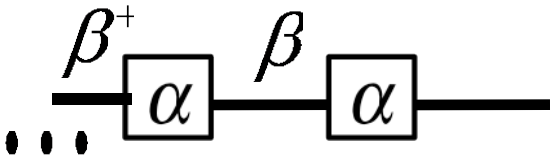


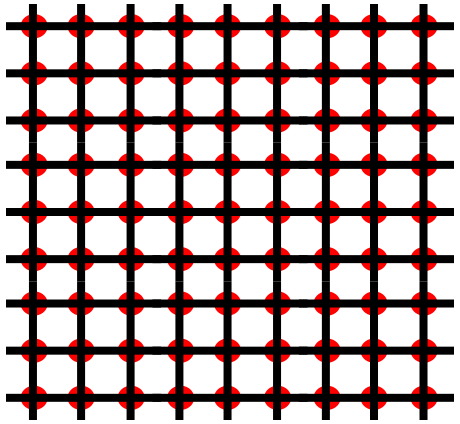


Coming up next ..









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