Fermi surface

Occupied states
$\varepsilon(\boldsymbol{k}) < E_F$
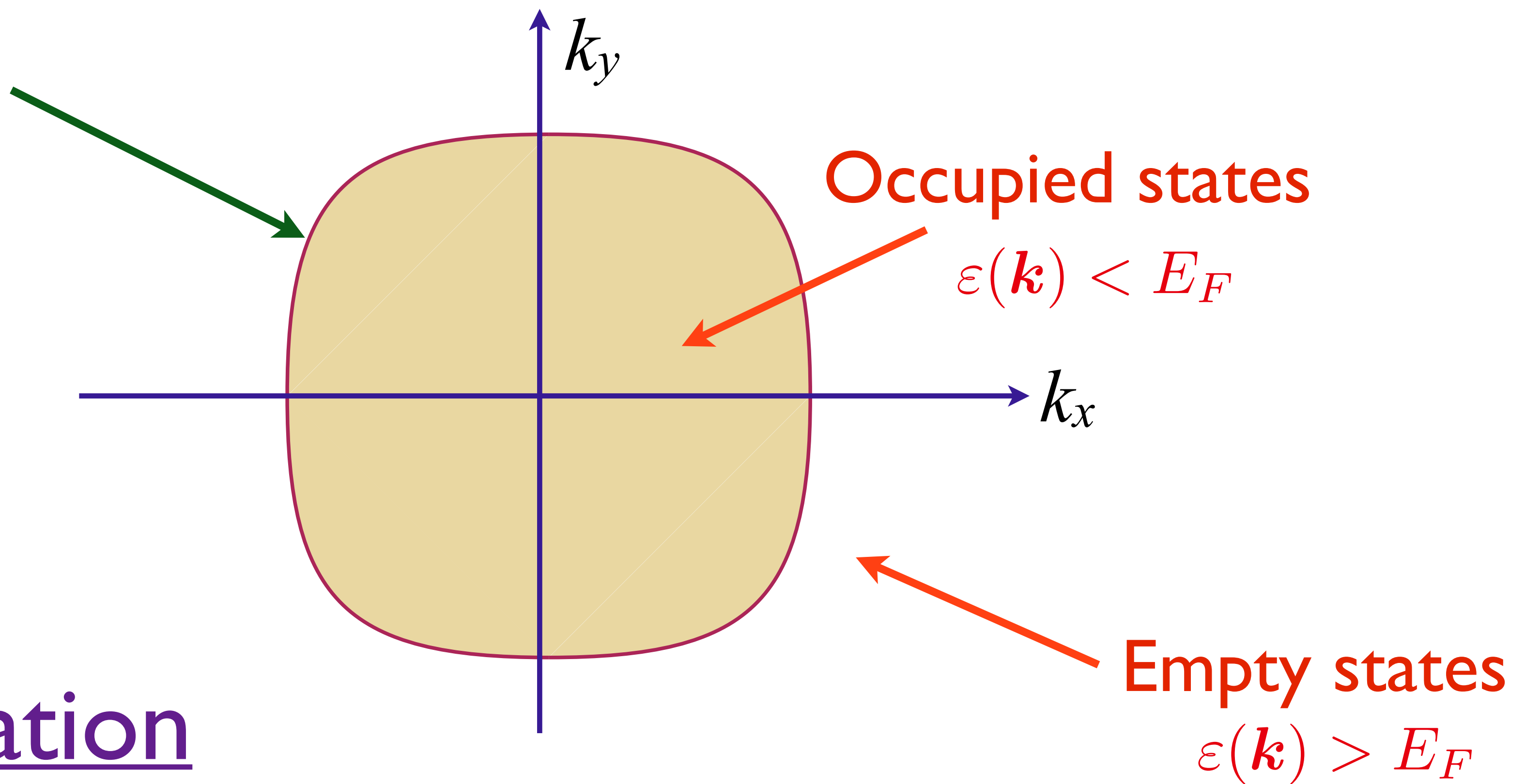
k_y

k_x

Empty states
$\varepsilon(\boldsymbol{k}) > E_F$

Luttinger relation

$$2 \times \frac{\text{Volume inside Fermi surface}}{(2\pi)^d} = \text{density of electrons (mod 2)}$$