Second Quantization Review

Bosons: Canonical Commutation Rules

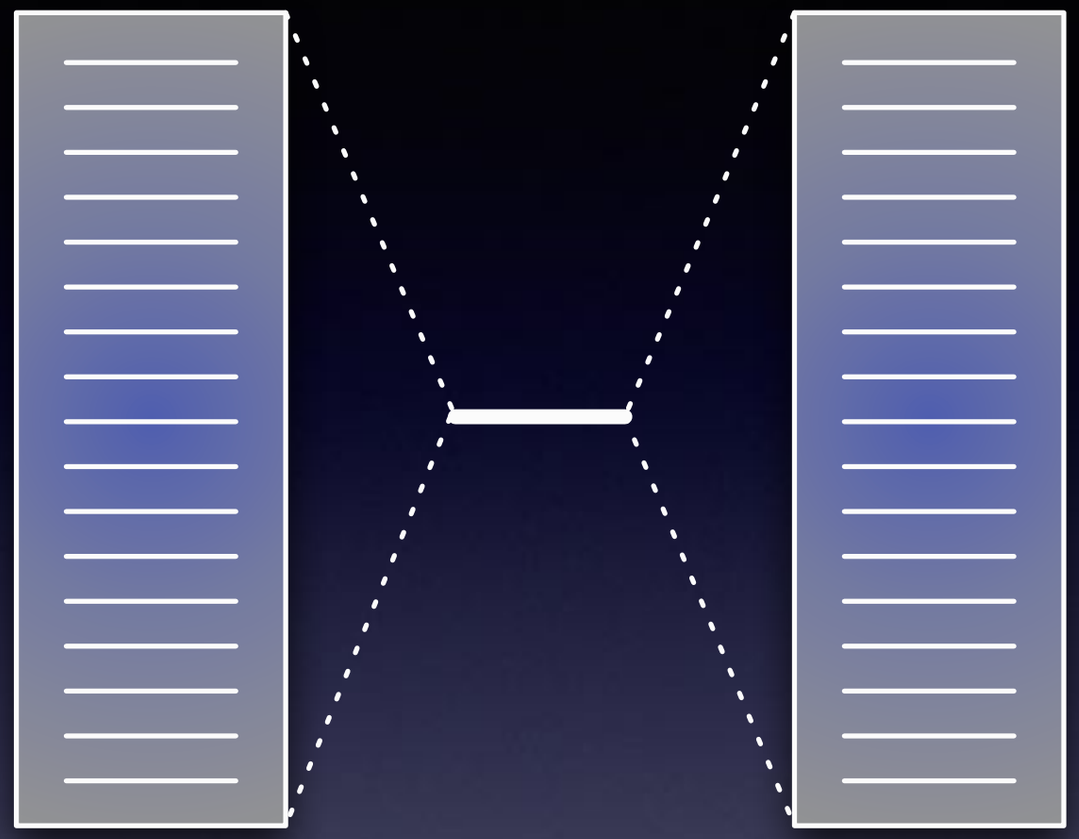
$$\left[\hat{b}_i^\dagger, \hat{b}_j\right] = \delta_{ij} \qquad \left[\hat{b}_i, \hat{b}_j\right] = 0$$

Fermions: Canonical *Anti*commutation Rules

$$\left\{\hat{a}_i^\dagger, \hat{a}_j\right\} = \delta_{ij} \qquad \{\hat{a}_i, \hat{a}_j\} = 0$$

(Leads to "normal order" terms in matrix elements)

Landauer Model



$$\hat{H} = \sum_{k\in L} \epsilon_k \hat{a}_k^\dagger \hat{a}_k + \epsilon_0 \hat{a}_0^\dagger \hat{a}_0 + \sum_{k\in R} \epsilon_k \hat{a}_k^\dagger \hat{a}_k$$
$$+ \sum_{k\in L} t_k \left(\hat{a}_0^\dagger \hat{a}_k + \hat{a}_k^\dagger \hat{a}_0 \right) + \sum_{k\in R} t_k \left(\hat{a}_0^\dagger \hat{a}_k + \hat{a}_k^\dagger \hat{a}_0 \right)$$