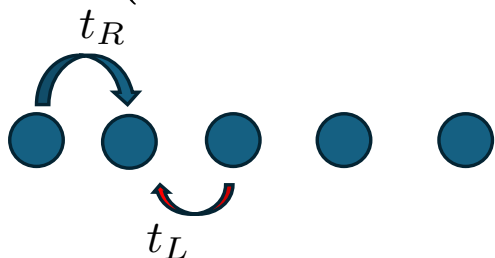# Skin effect and the bulk-boundary correspondence
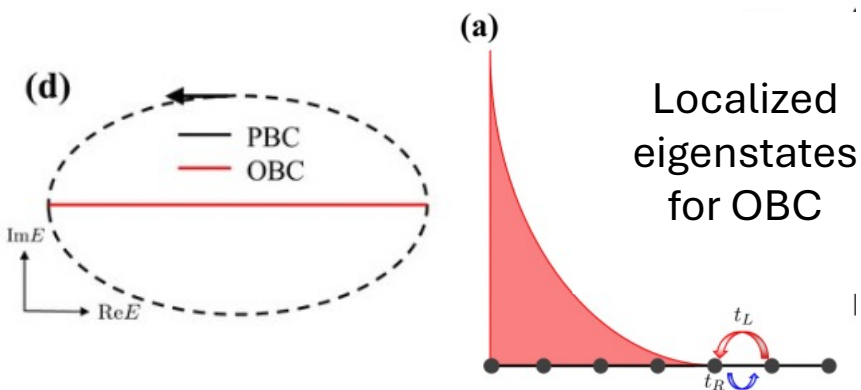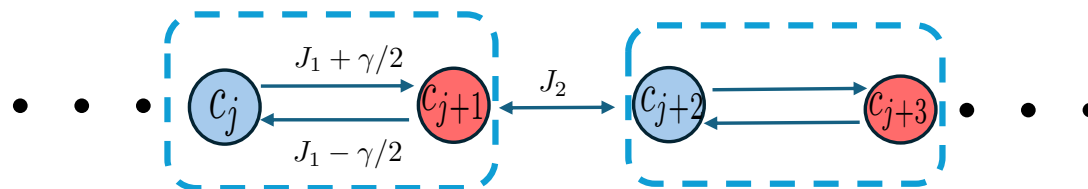
Hatano-Nelson model

$$H = \sum_{n=1}^{L-1} \left(t_R c_{n+1}^\dagger c_n + t_L c_n^\dagger c_{n+1} \right)$$
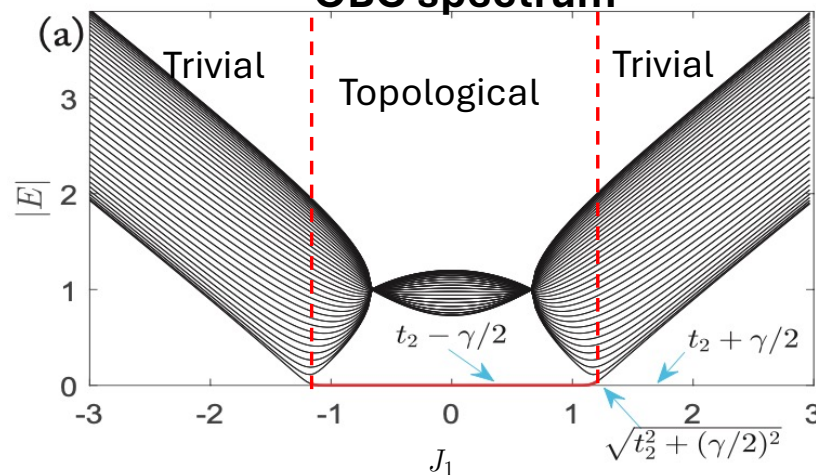

SSH model

$$H_{\text{targ}}^{\text{SSH}} = \sum_j \left(t_1 c_{A,j}^\dagger c_{B,j} + t_2 c_{B,j}^\dagger c_{A,j+1} + h.c. \right)$$
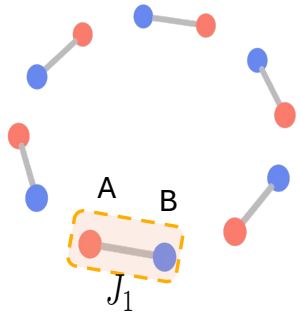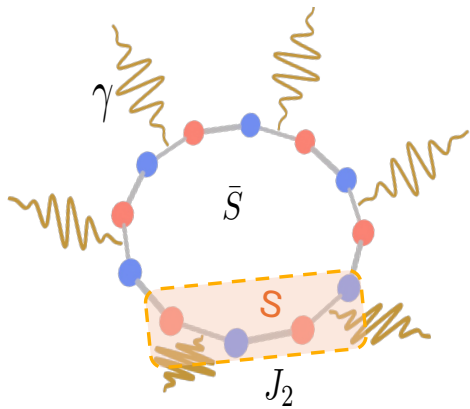

Localized eigenstates for OBC

OBC spectrum

Zero energy for PBC!

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Numerics

(a) $t = 0$

A B

J_1

$t > 0$

γ

$\bar{S}$

S

J_2

(b) Phase diagram

$\omega_{\text{OBC}} = 0$
$\omega_{\text{PBC}} = 0$

$\omega_{\text{OBC}} = 0$
$\omega_{\text{PBC}} = 1/2$

$\omega_{\text{OBC}} = 1$

$\omega_{\text{OBC}} = 0$

$\omega_{\text{PBC}} = 1/2$

$\omega_{\text{OBC}} = 1$
$\omega_{\text{PBC}} = 1$

$\omega_{\text{PBC}} = 1/2$
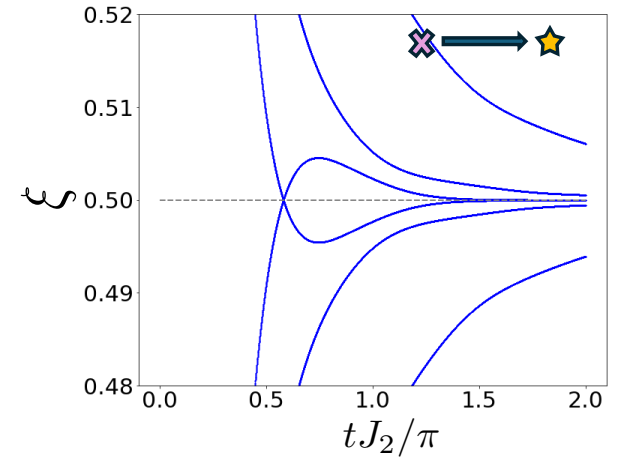
$\omega_{\text{OBC}} = 0$
$\omega_{\text{PBC}} = 0$

γ/J_2

J_1/J_2
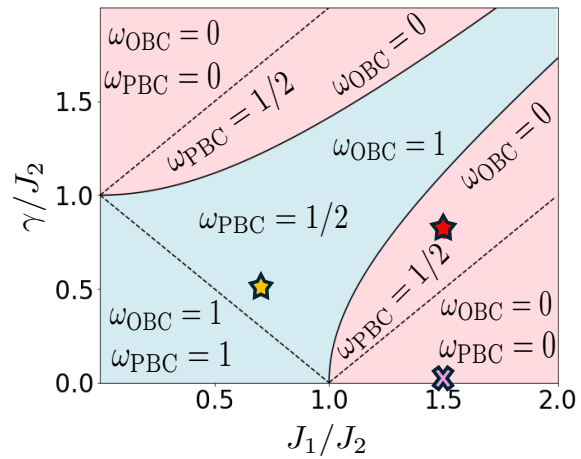
$$C_{mn} : \text{Tr}[\rho(t) c_n^\dagger c_m]$$

$$\xi_k = \frac{1}{e^{\epsilon k} + 1}$$

(c) Trivial to topological

ξ

tJ_2/π

(d) Trivial to trivial

ξ

tJ_2/π

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