# Pseudospintronics

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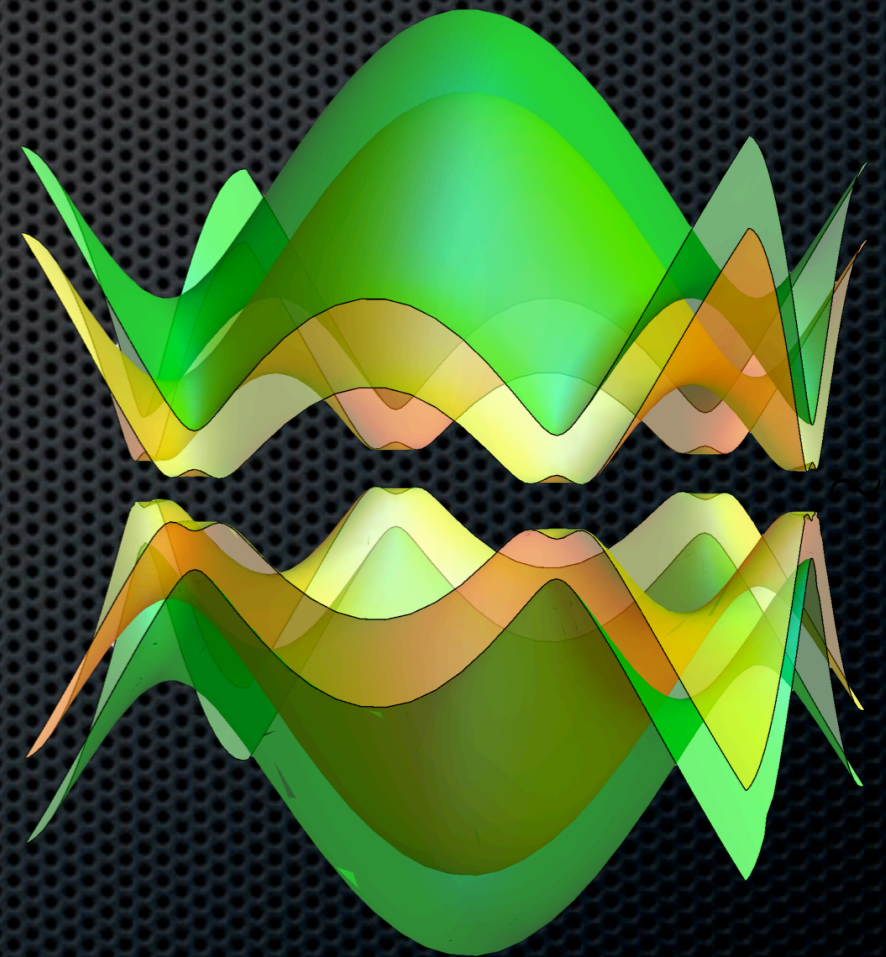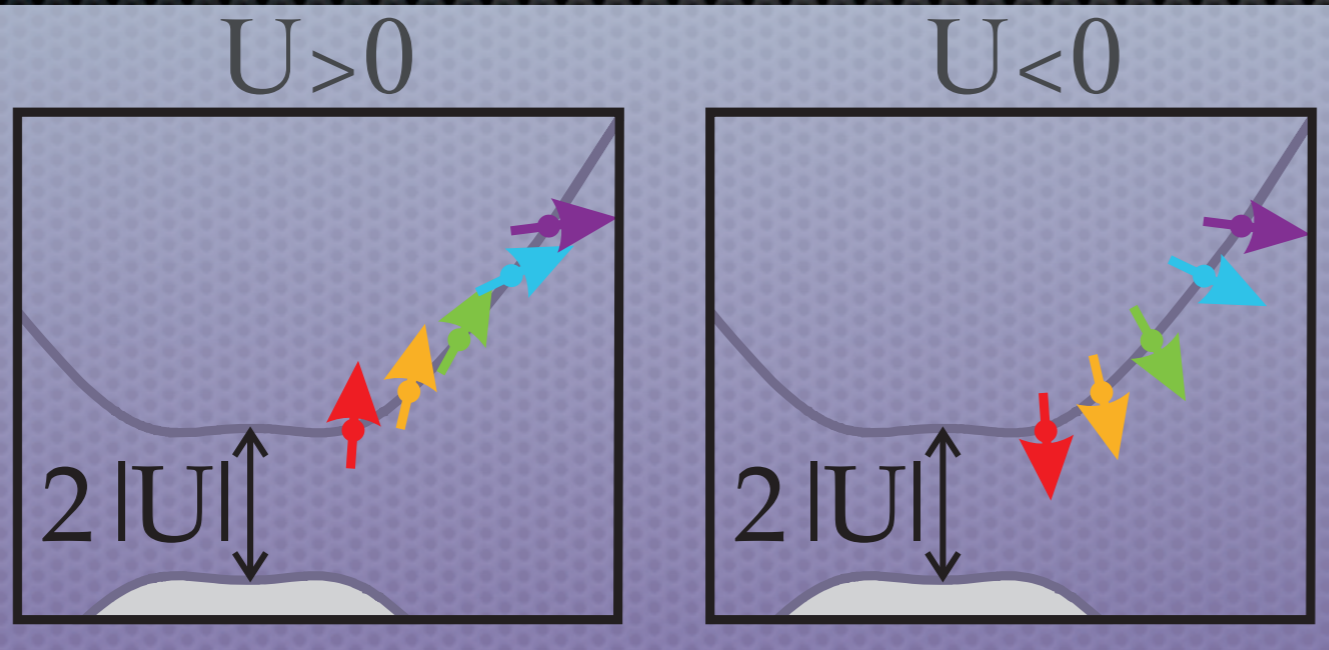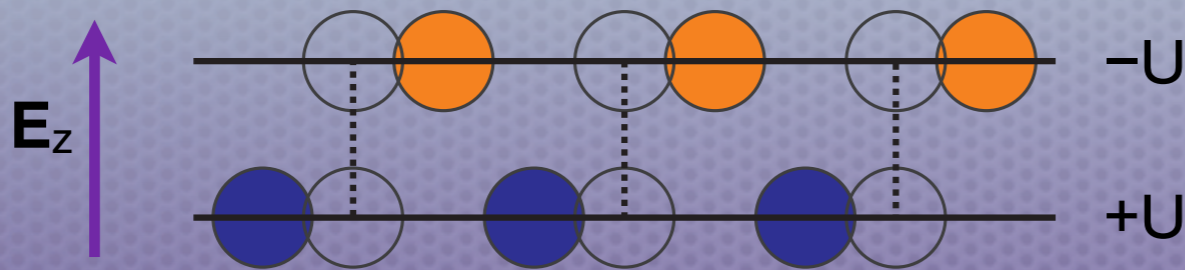
Elsa Prada

Edward McCann

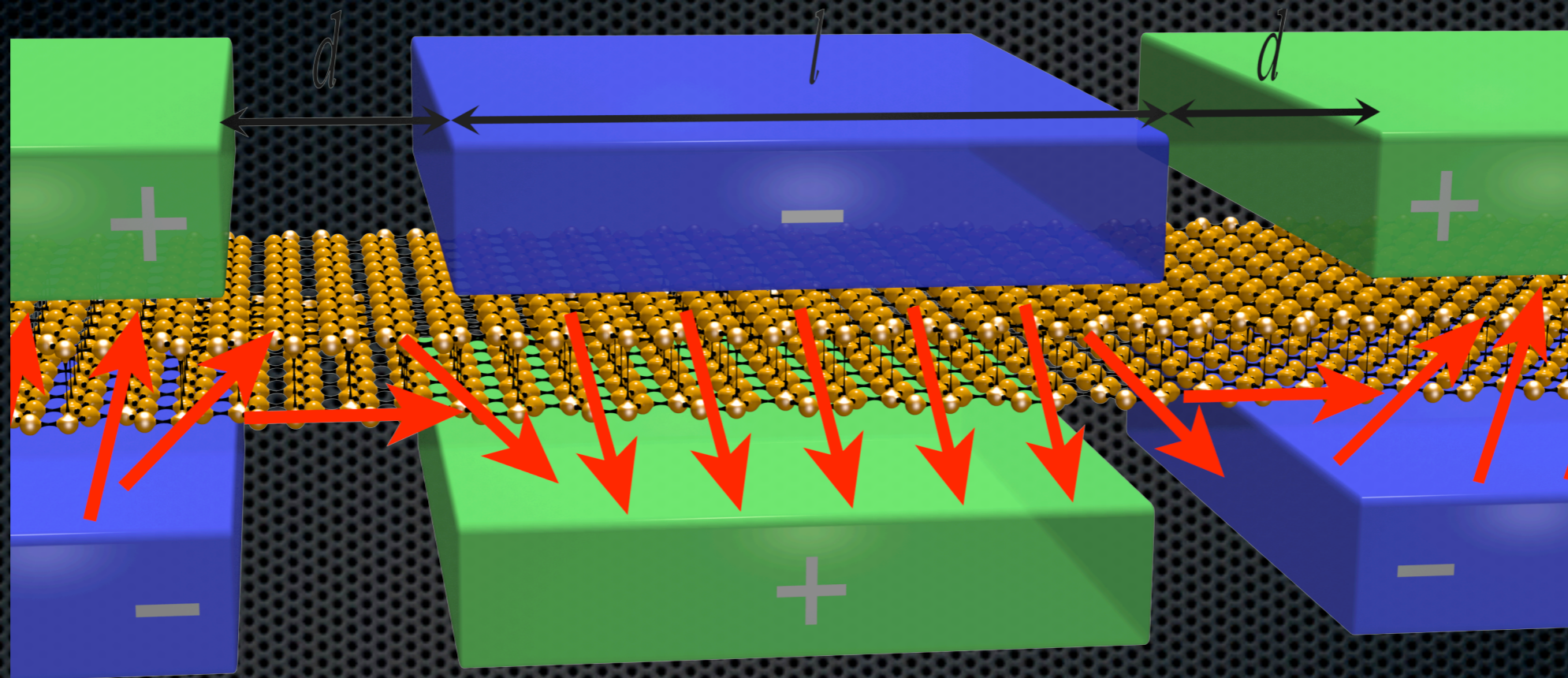Henning Schomerus

# Pseudospin and gaps

$$H_{\text{eff}} = \sum_{\mathbf{k}\sigma} \left( a^+_{\mathbf{k}\sigma}, \tilde{b}^+_{\mathbf{k}\sigma} \right) \begin{pmatrix} U & \frac{(\pi^+)^2}{2m^*} \\ \frac{\pi^2}{2m^*} & -U \end{pmatrix} \begin{pmatrix} a_{\mathbf{k}\sigma} \\ \tilde{b}_{\mathbf{k}\sigma} \end{pmatrix}$$

$\mathbf{E_z}$    −U    +U

U > 0      U < 0

$2\,|U|$       $2\,|U|$

$$\boldsymbol{\sigma} = \mp \sqrt{1 - \left(\frac{U}{E}\right)^2} \times \left( \hat{\imath} \cos 2\theta_{\mathbf{k}} + \hat{\jmath}\, \xi \sin 2\theta_{\mathbf{k}} \right) + \hat{k}\frac{U}{E}$$

# Pseudospin transistor



$$\text{PMR} = \frac{R_{\text{AP}} - R_{\text{P}}}{R_{\text{AP}}}$$