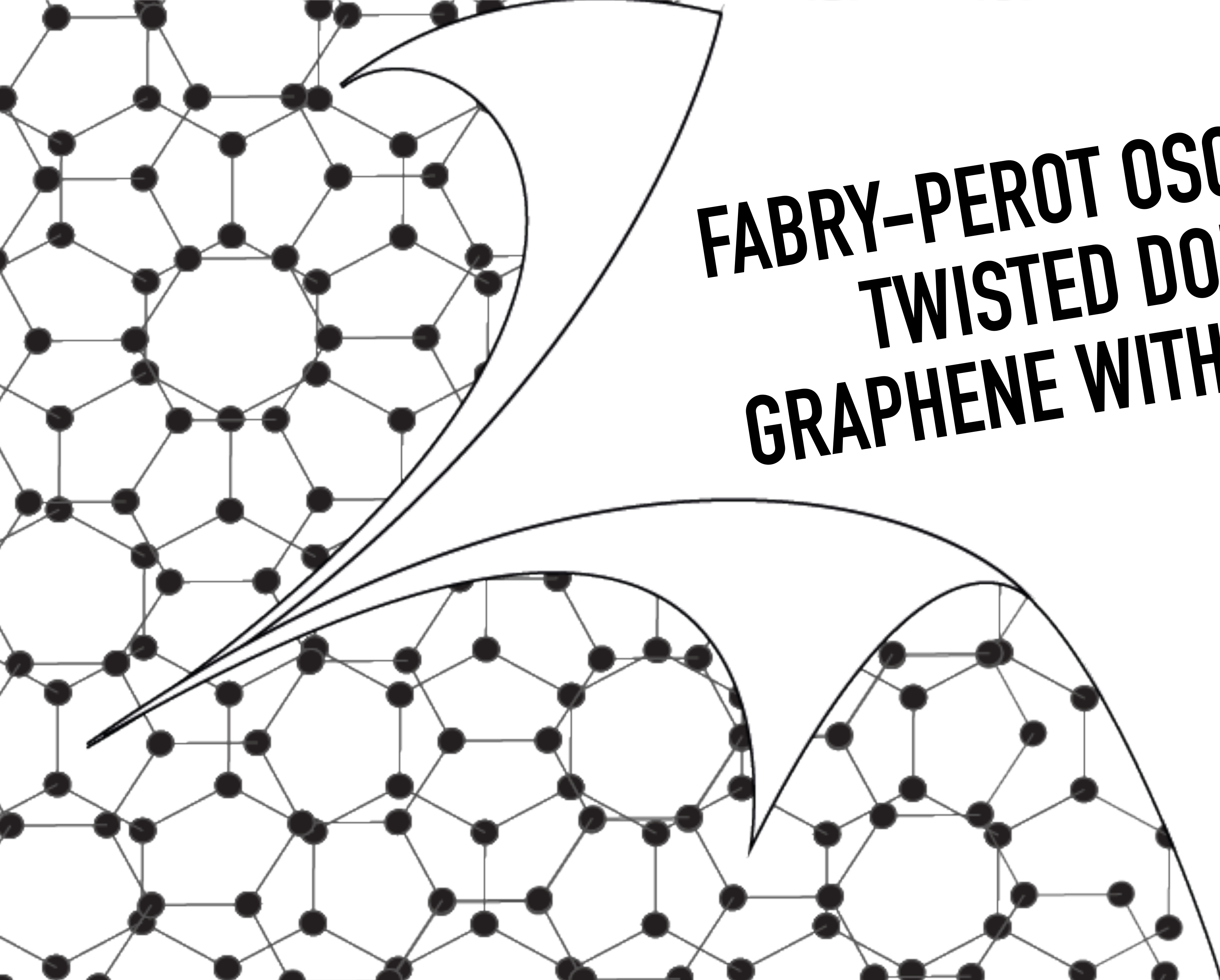




FABRY-PEROT OSCILLATIONS IN TWISTED DOUBLE BILAYER GRAPHENE WITH AND WITHOUT PN JUNCTIONS

Giulia Zheng
@Nanophysics
ETH zürich

Funding agencies

Quantum
e-leaps

QSIT Quantum
Science and
Technology
National Centre of Competence in Research

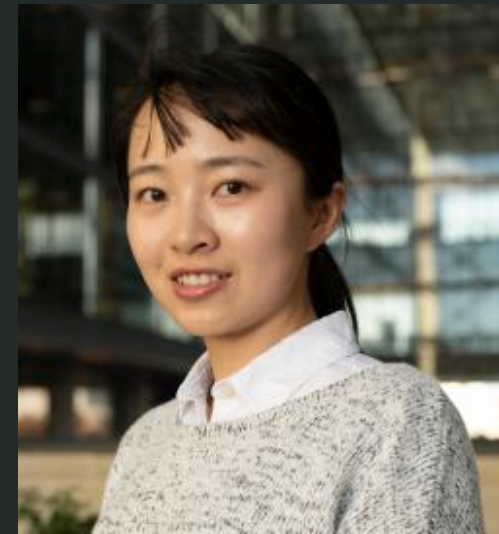
 **GRAPHENE**
FLAGSHIP

FNSNF

FONDS NATIONAL SUISSE
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FONDO NAZIONALE SVIZZERO
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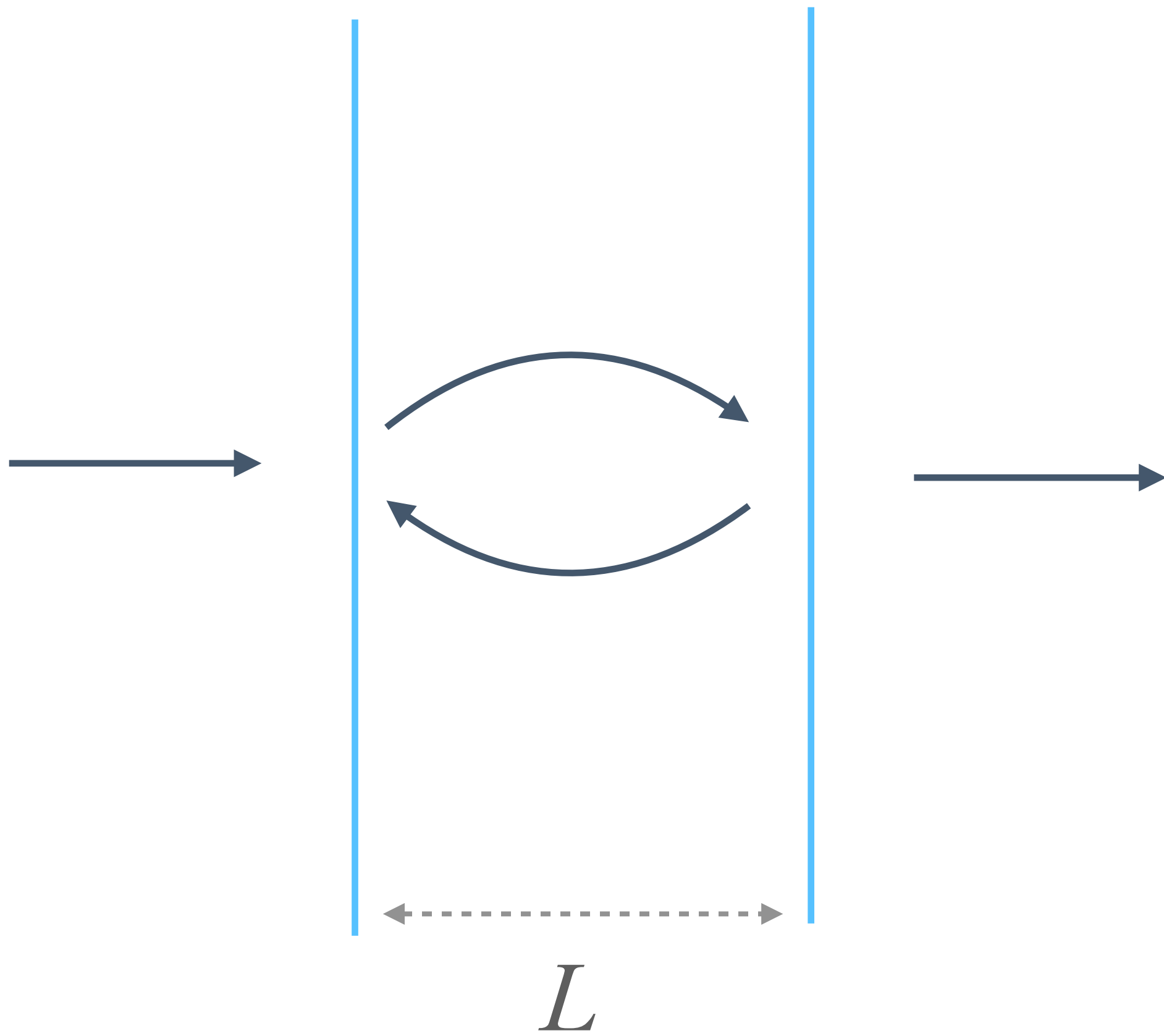
Dr. Shuichi Iwakiri



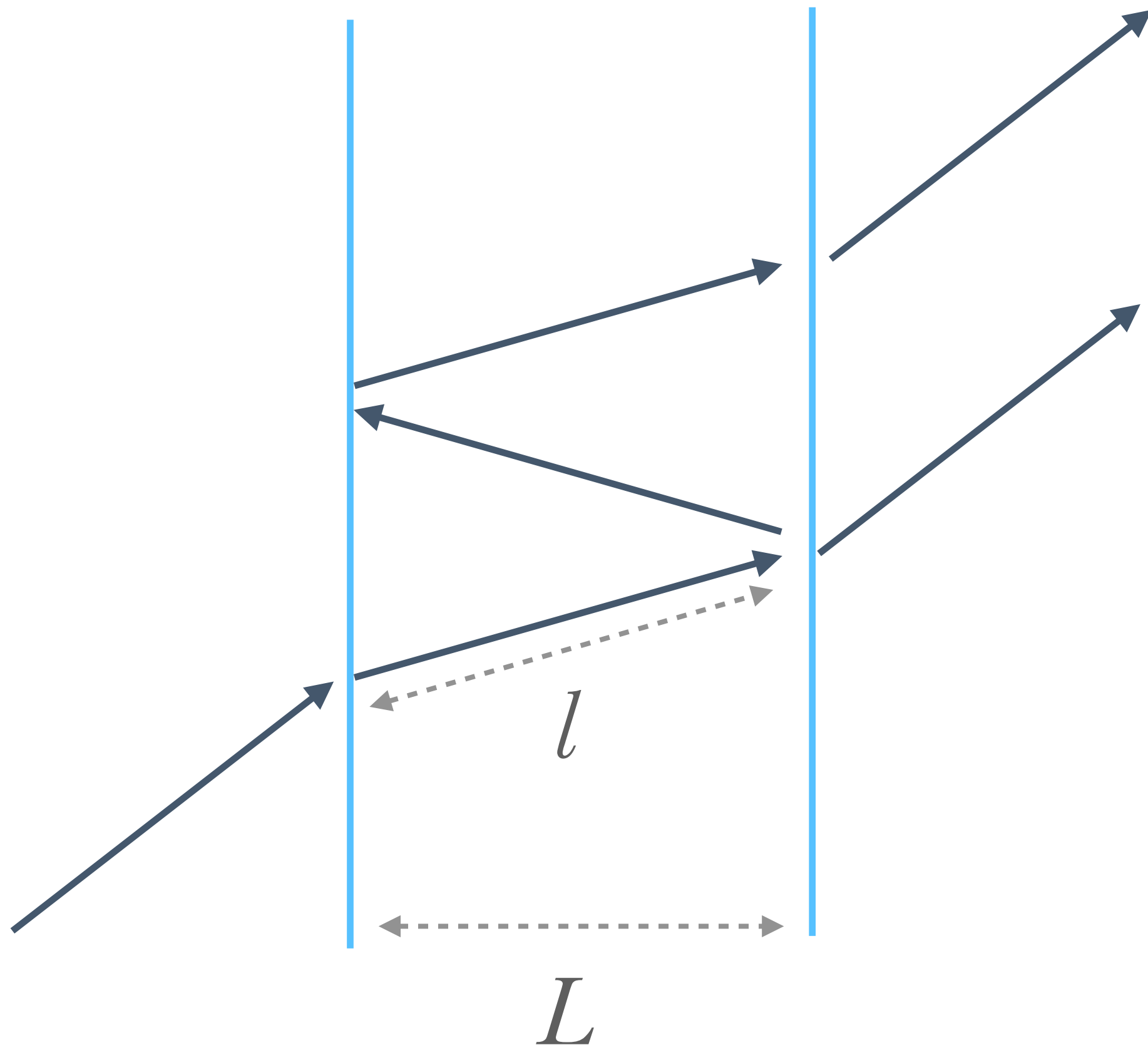
Petar Tómic

Nanophysics Group

Fabry-Pérot cavity $L = \frac{\lambda}{2}n$

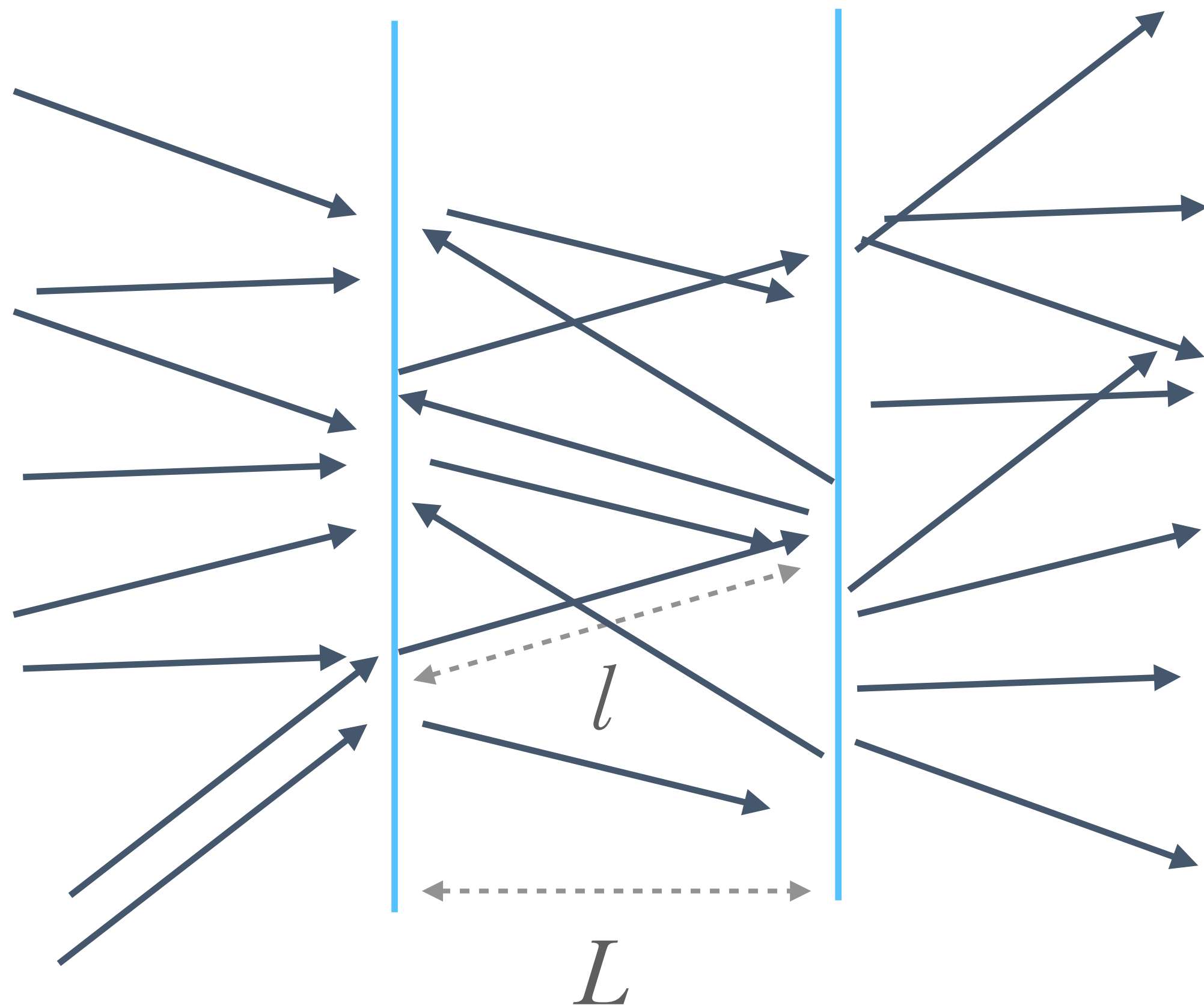


Fabry-Pérot cavity $l = \frac{\lambda}{2}n$



INTRODUCTION

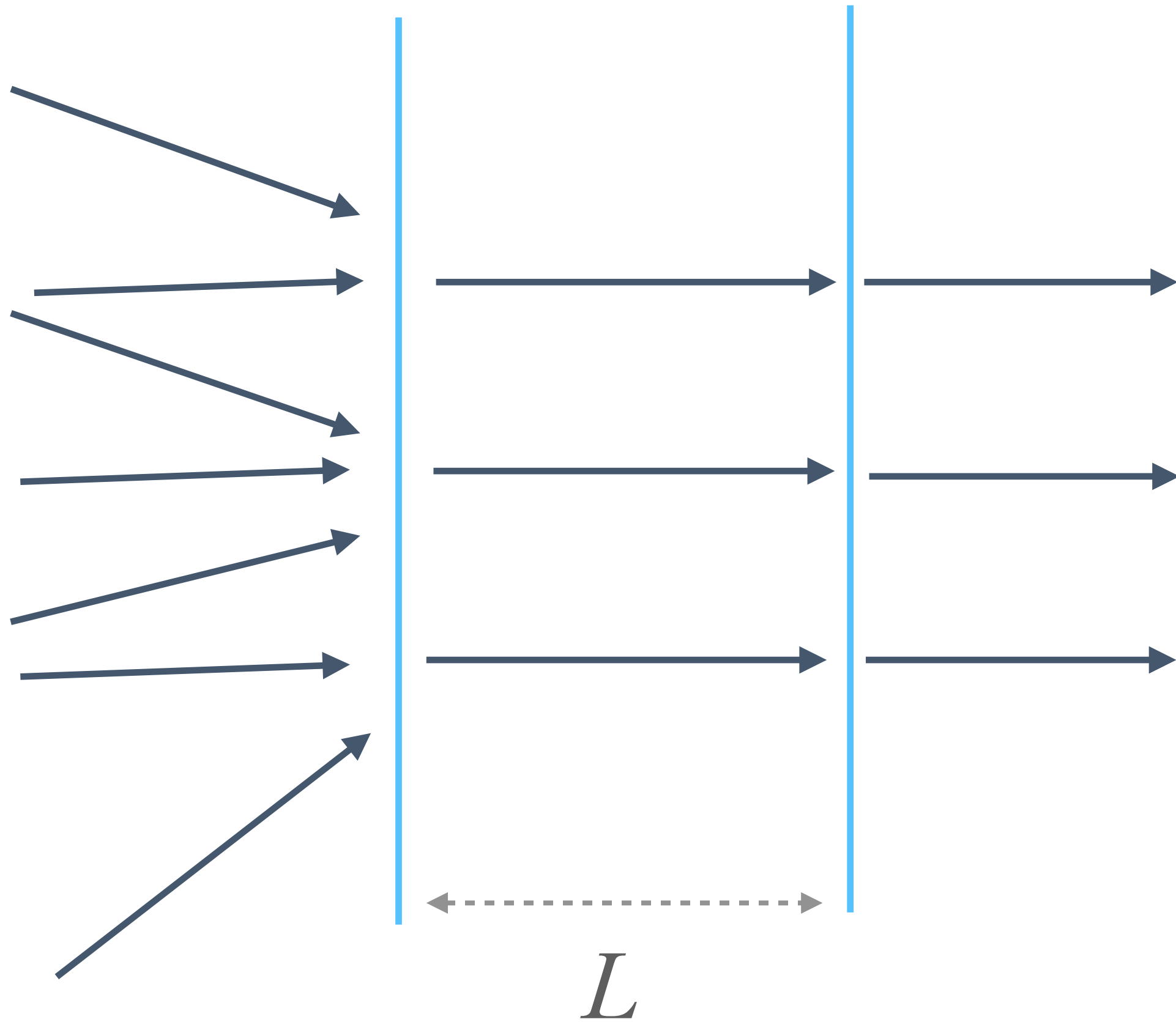
Fabry-Pérot cavity $l = \frac{\lambda}{2}n$



Fabry-Pérot cavity

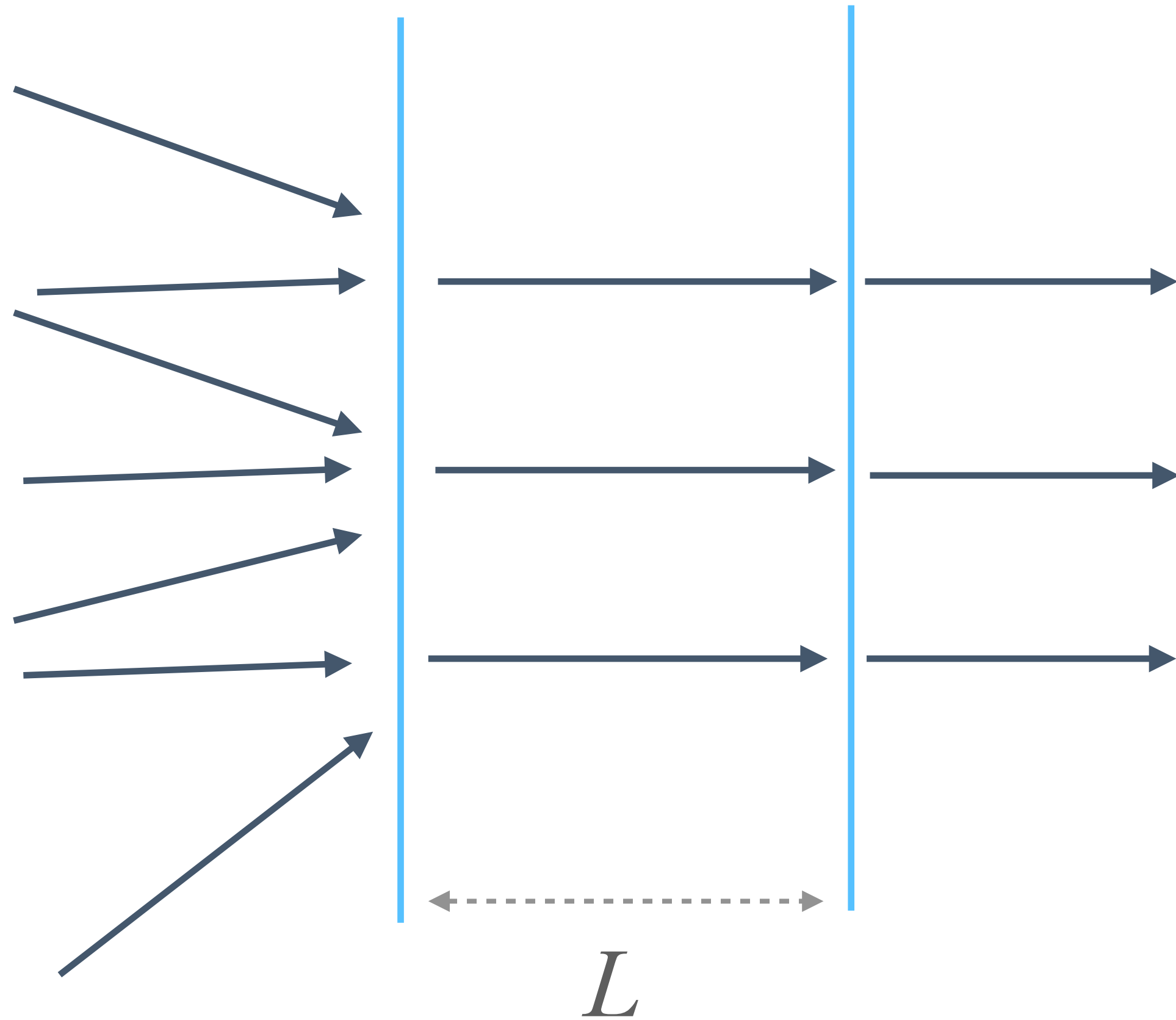
$$l = \frac{\lambda}{2}n$$

Angle selectivity



Fabry-Pérot cavity

$$l = \frac{\lambda}{2}n$$



Angle selectivity

graphene

bilayer
graphene

InAs/GaSb

Klein
Tunneling

Anti-klein
Tunneling
Suppression

Band
inversion

Young & Kim,
Nat. Phys
(2009)

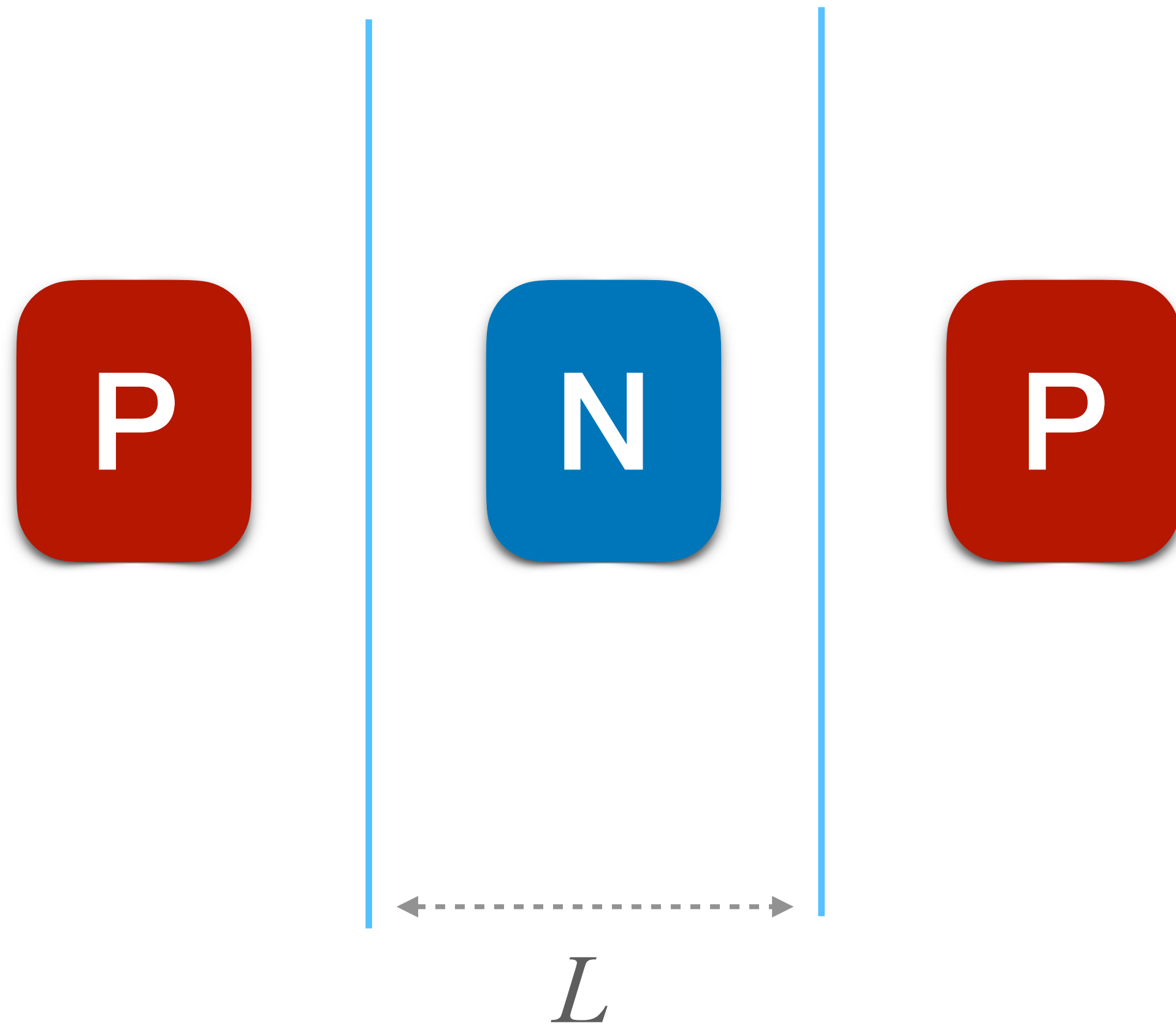
Varlet et al.,
PRL (2014)

Karalic et al.,
PRX (2020)

Fabry-Pérot cavity

$$l = \frac{\lambda}{2}n$$

Angle selectivity



graphene

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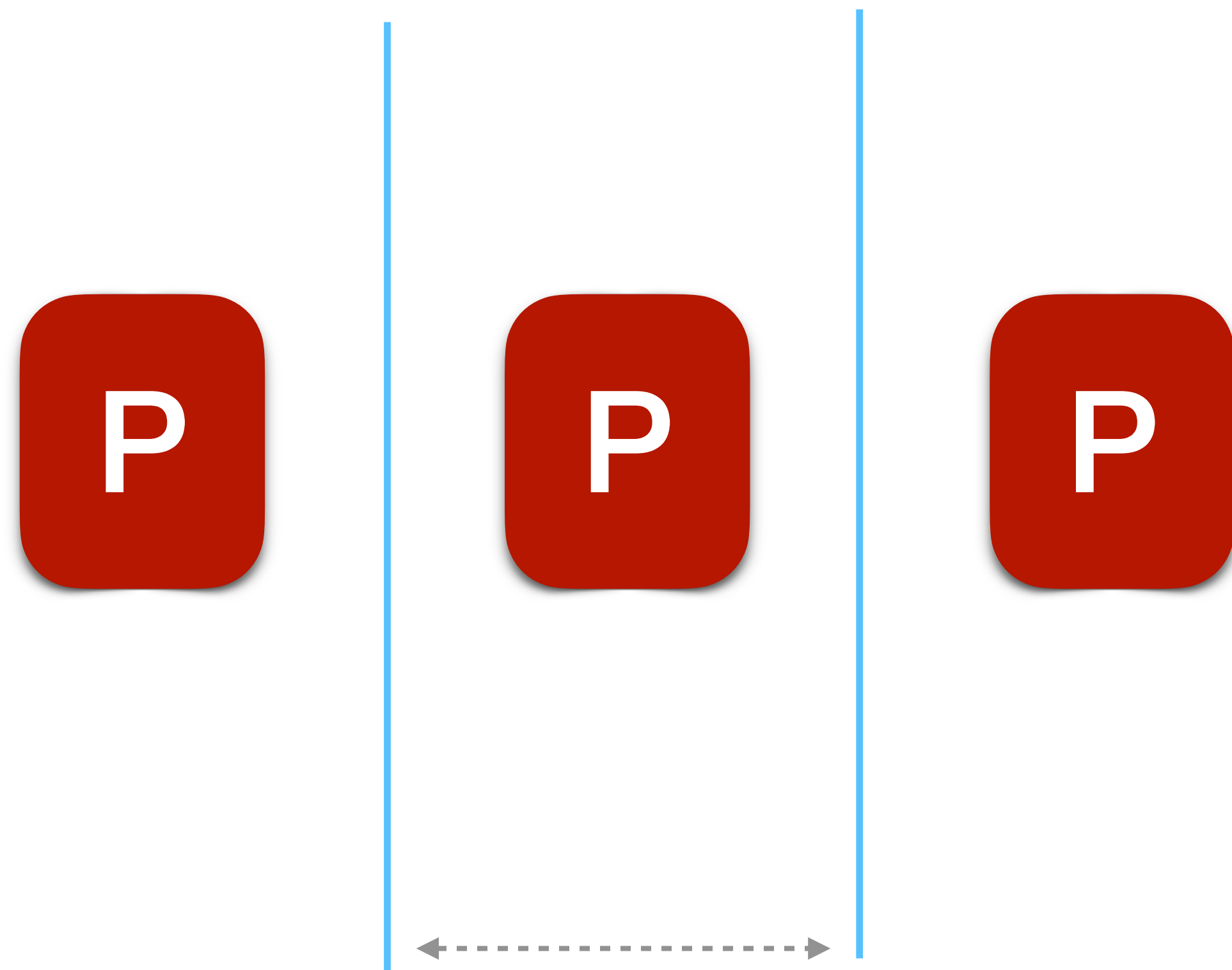
Band
inversion

Young & Kim,
Nat. Phys
(2009)

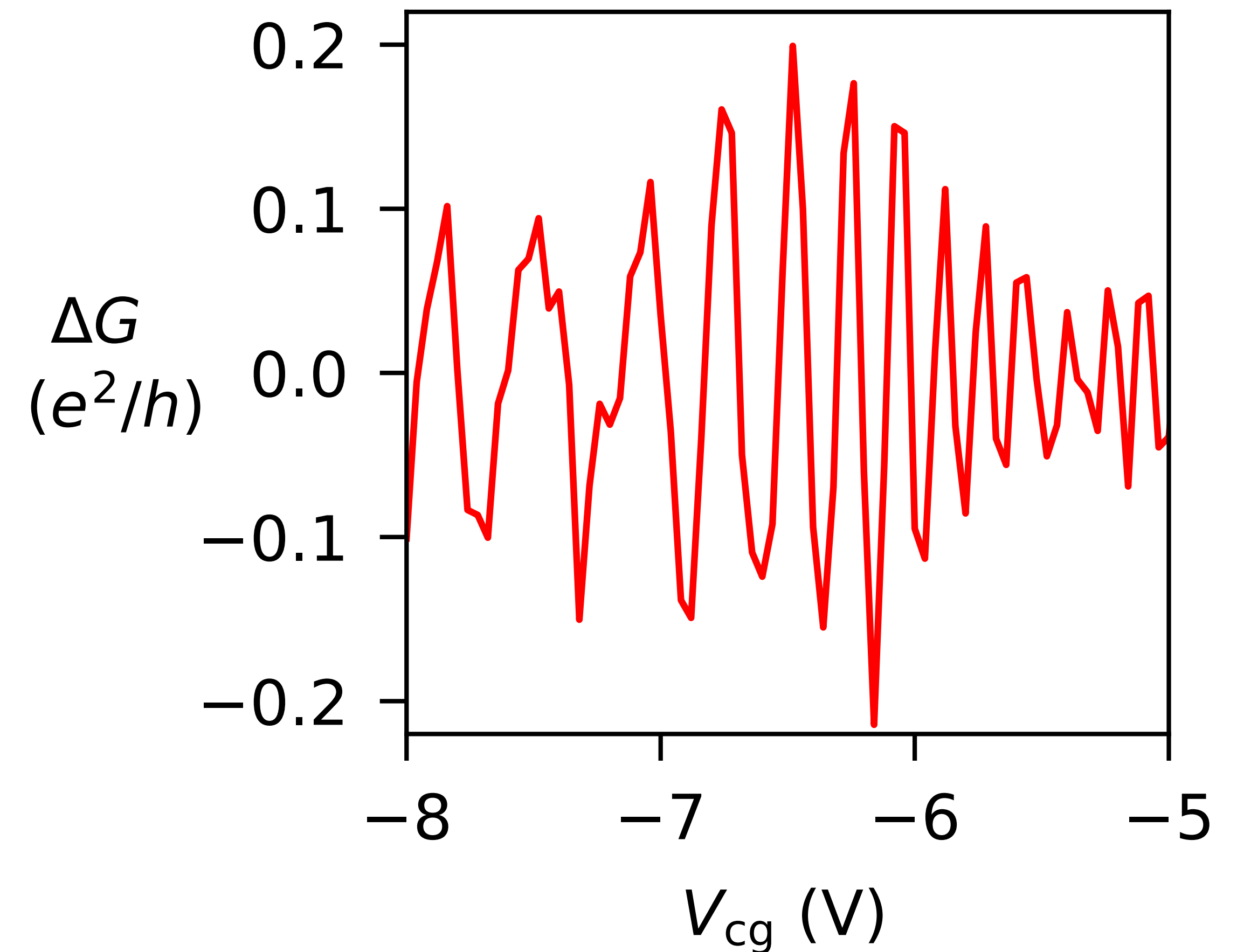
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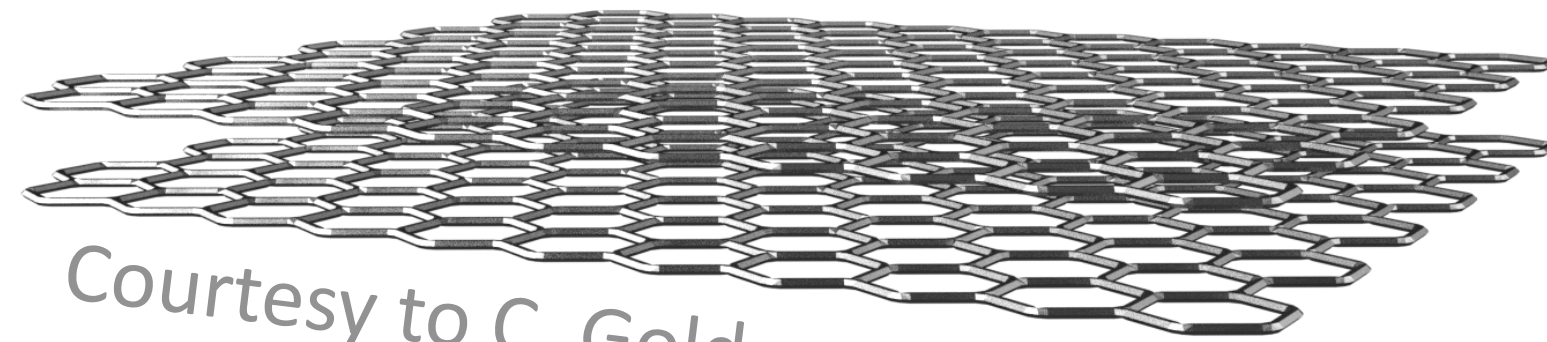
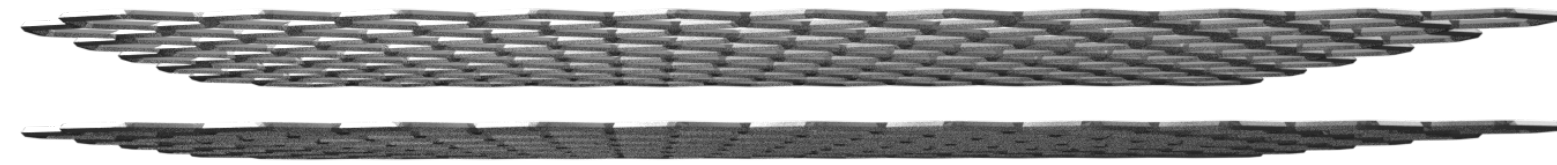
Fabry-Pérot cavity



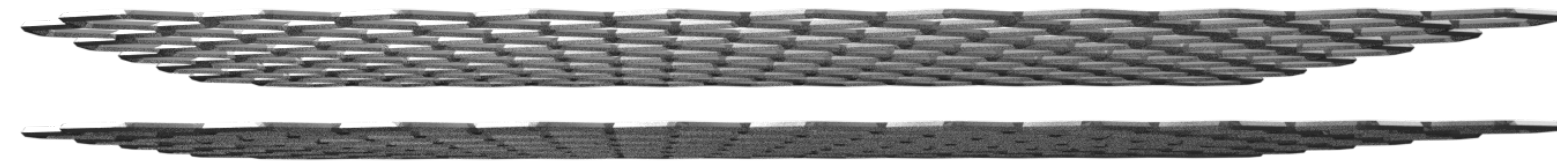
Monopolar Fabry-Pérot oscillations



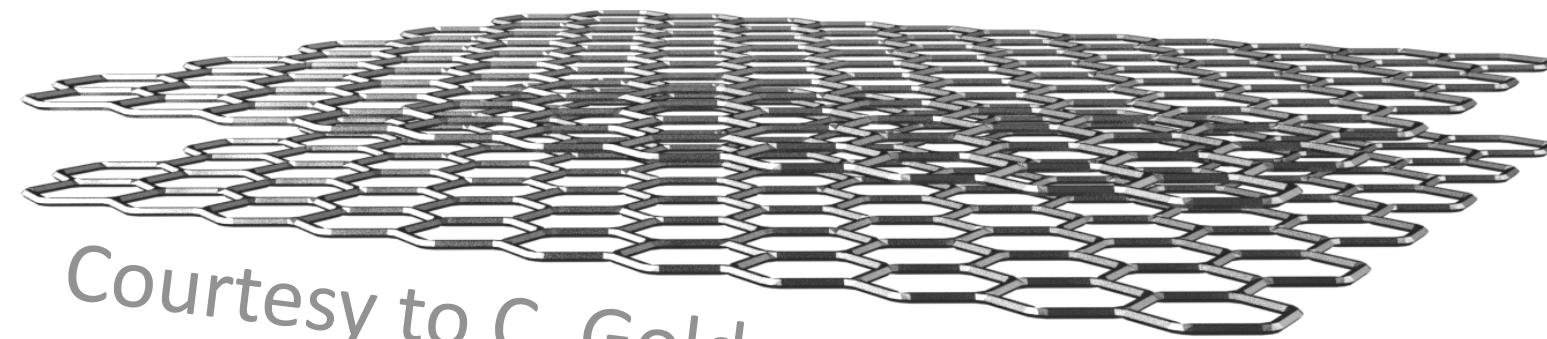
Twisted **Double Bilayer** Graphene



Twisted **Double Bilayer** Graphene

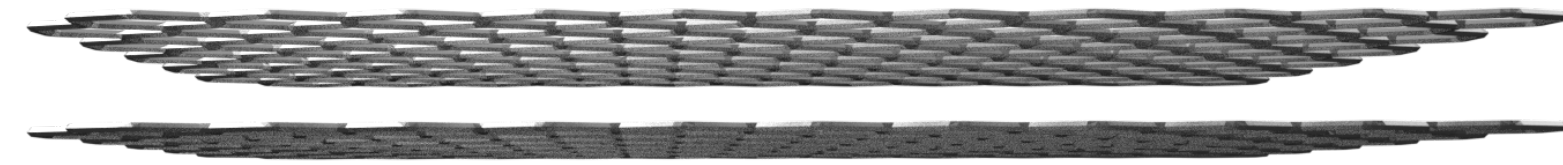


$$\theta = 1.07^\circ$$

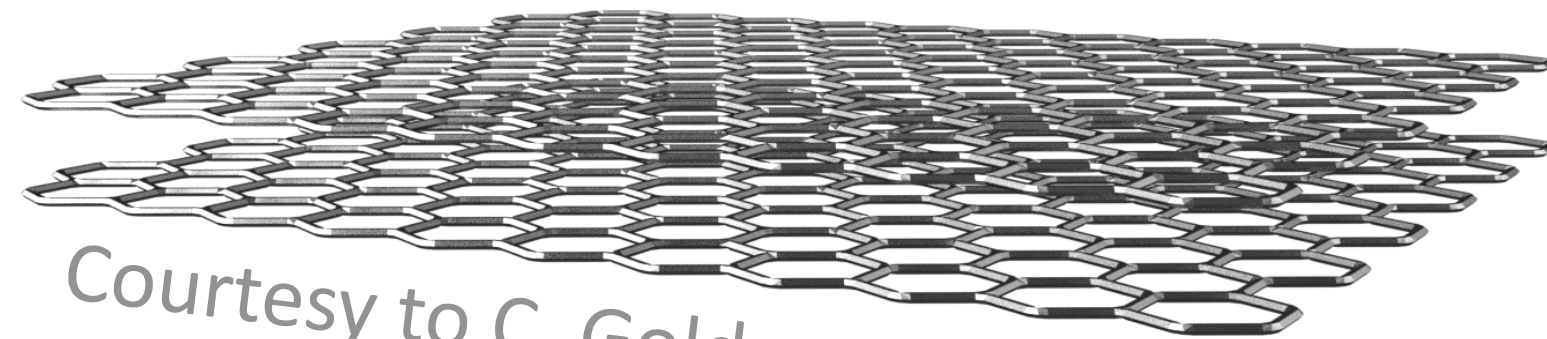


Courtesy to C. Gold

Twisted Double Bilayer Graphene

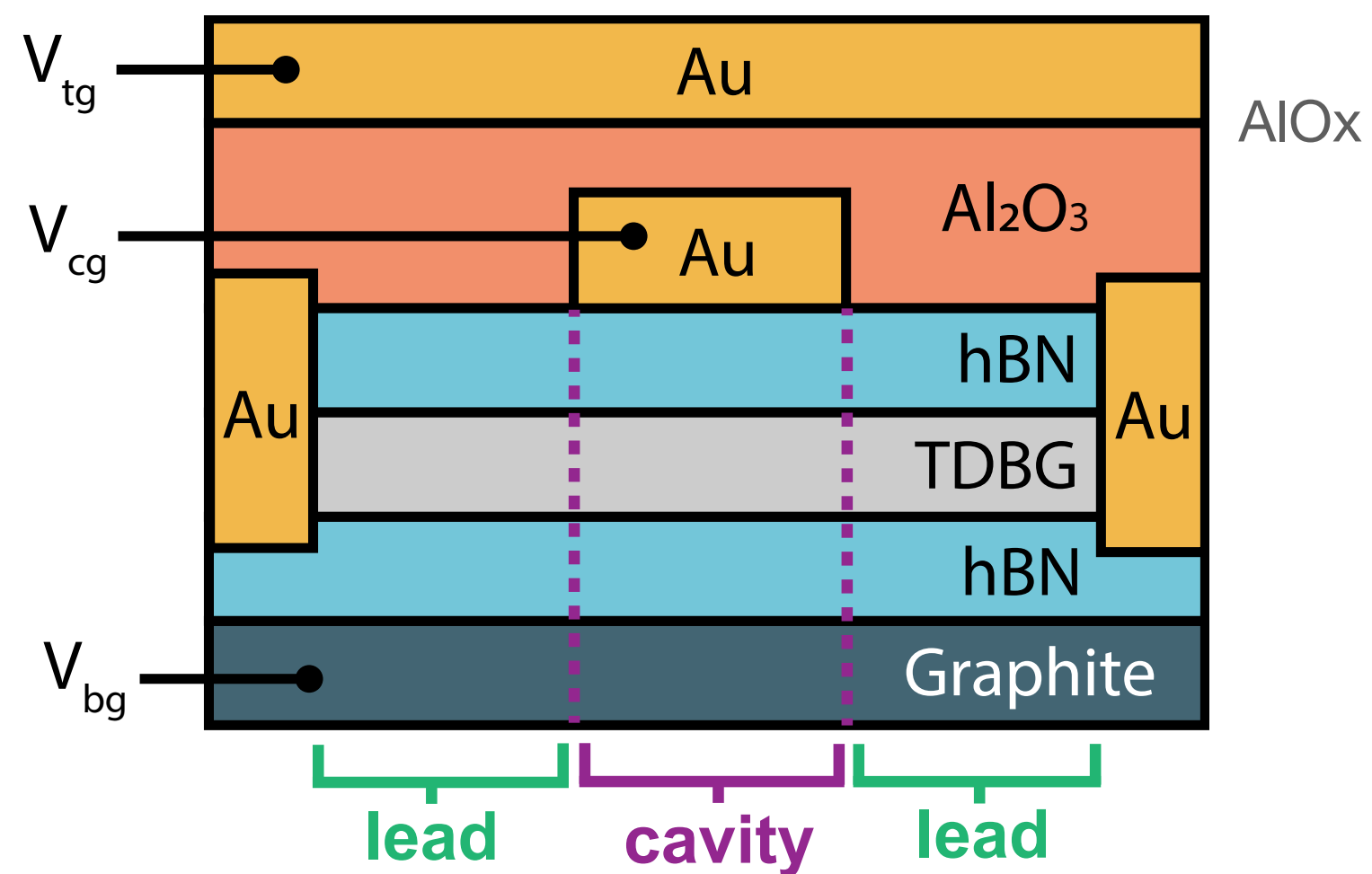


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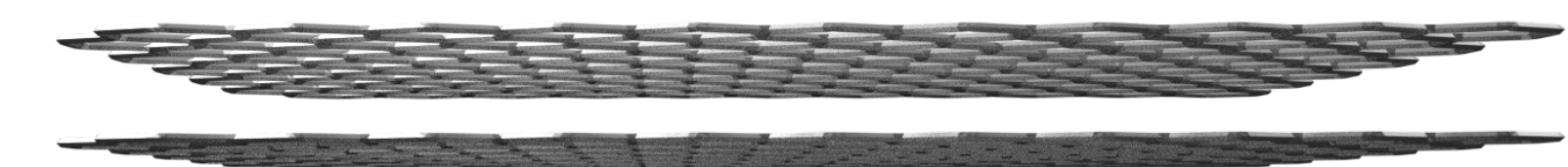


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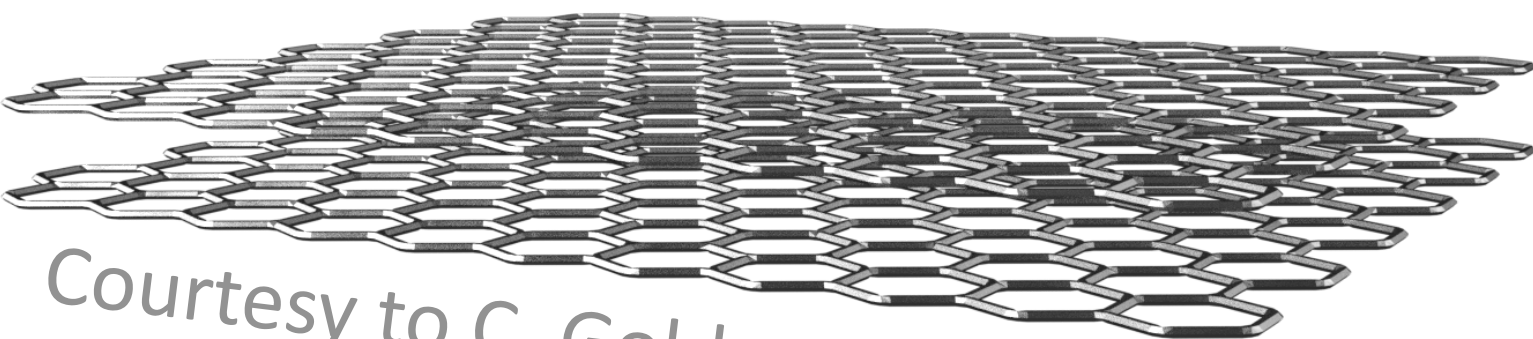
Device structure



Twisted Double Bilayer Graphene

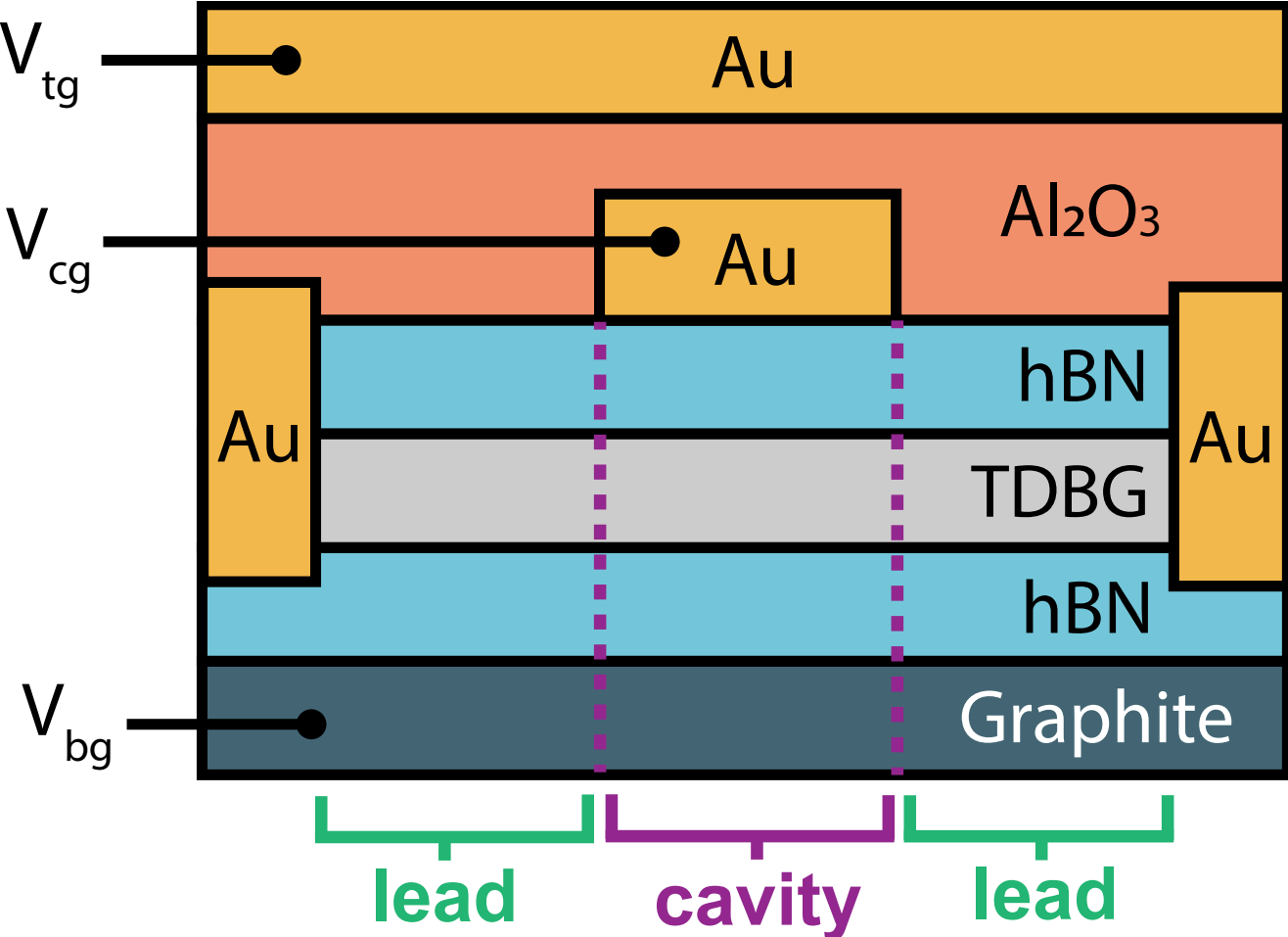


$\theta = 1.07^\circ$

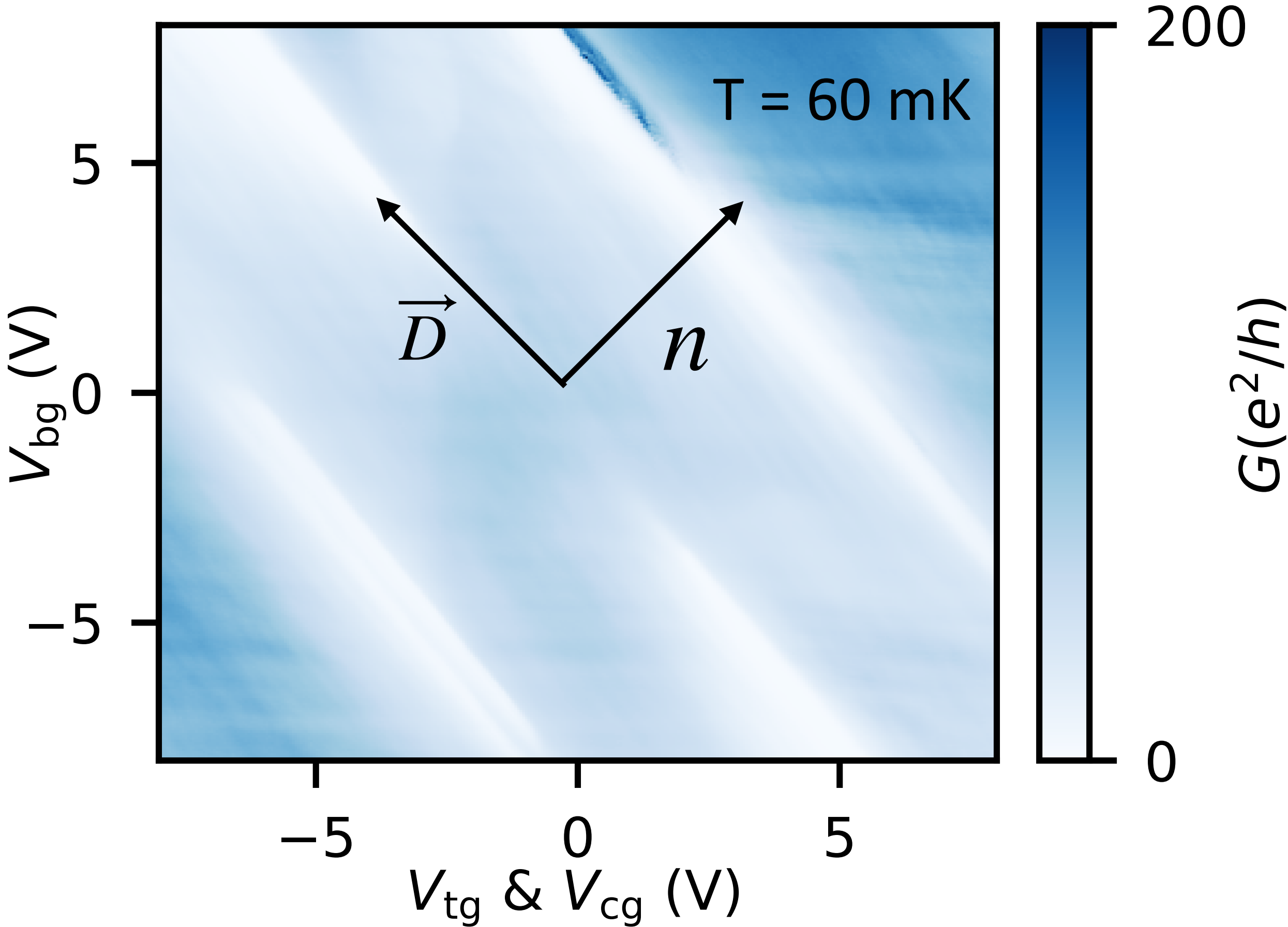


Courtesy to C. Gold

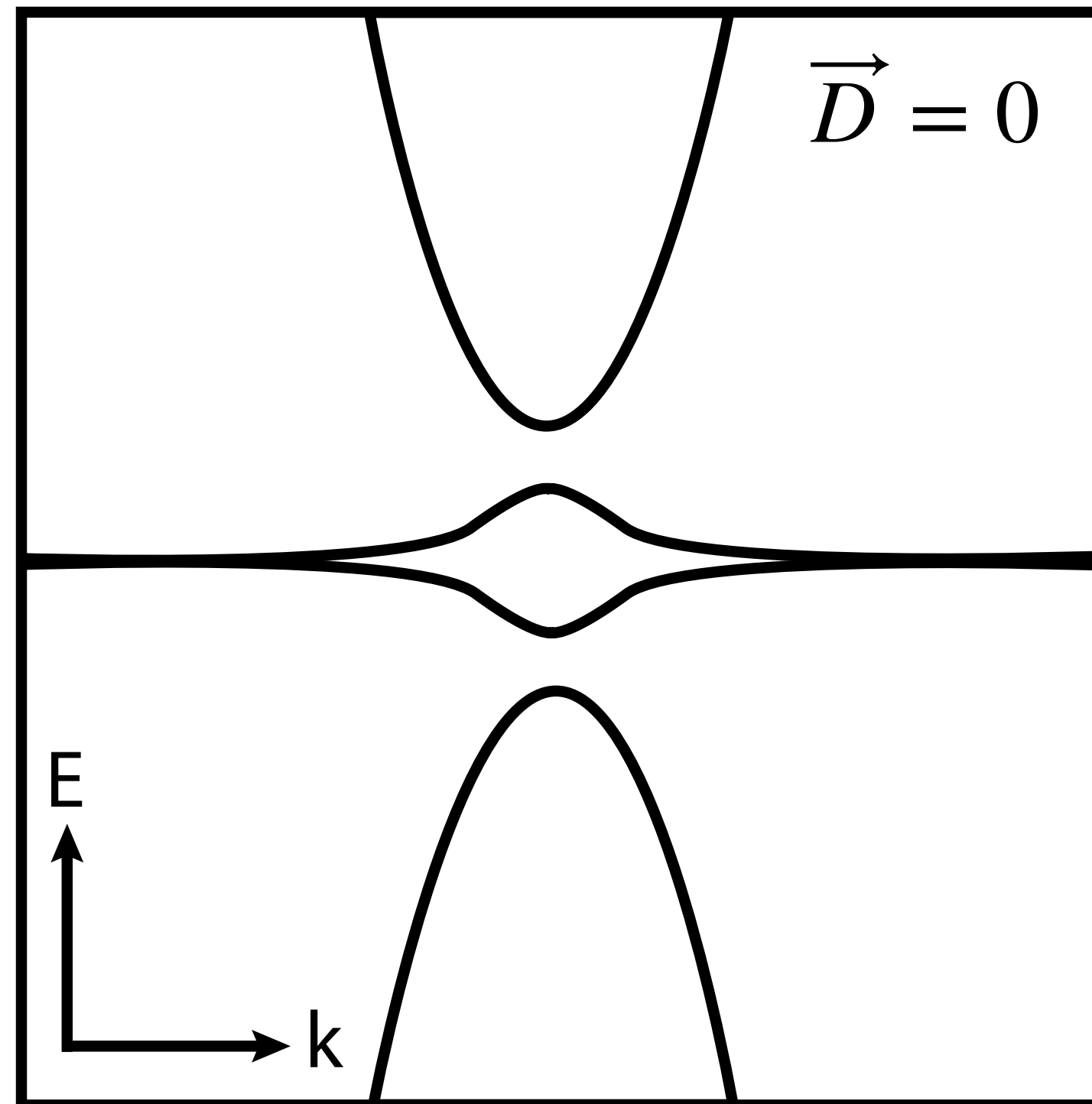
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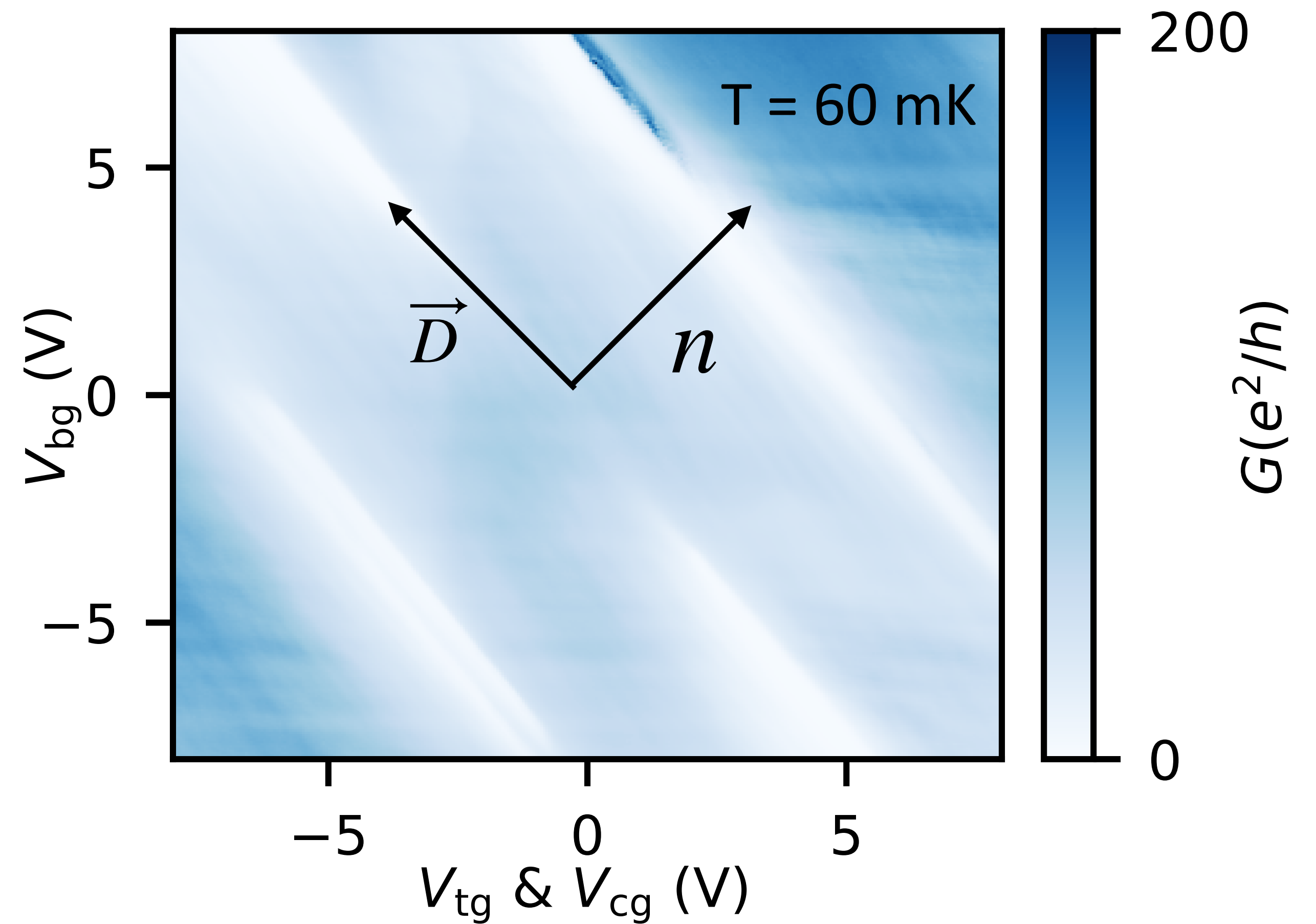
Gate-gate map



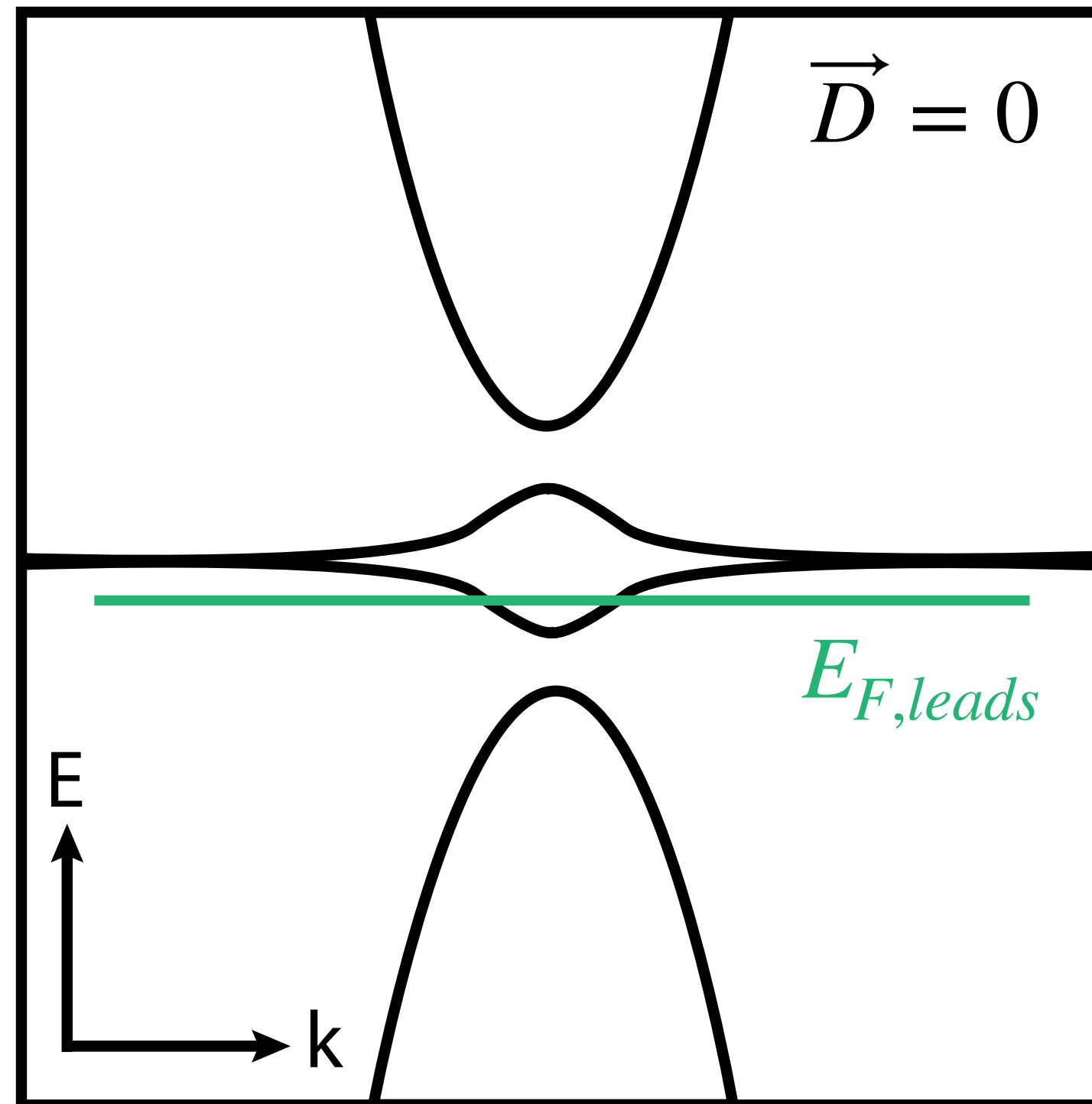
Band structure



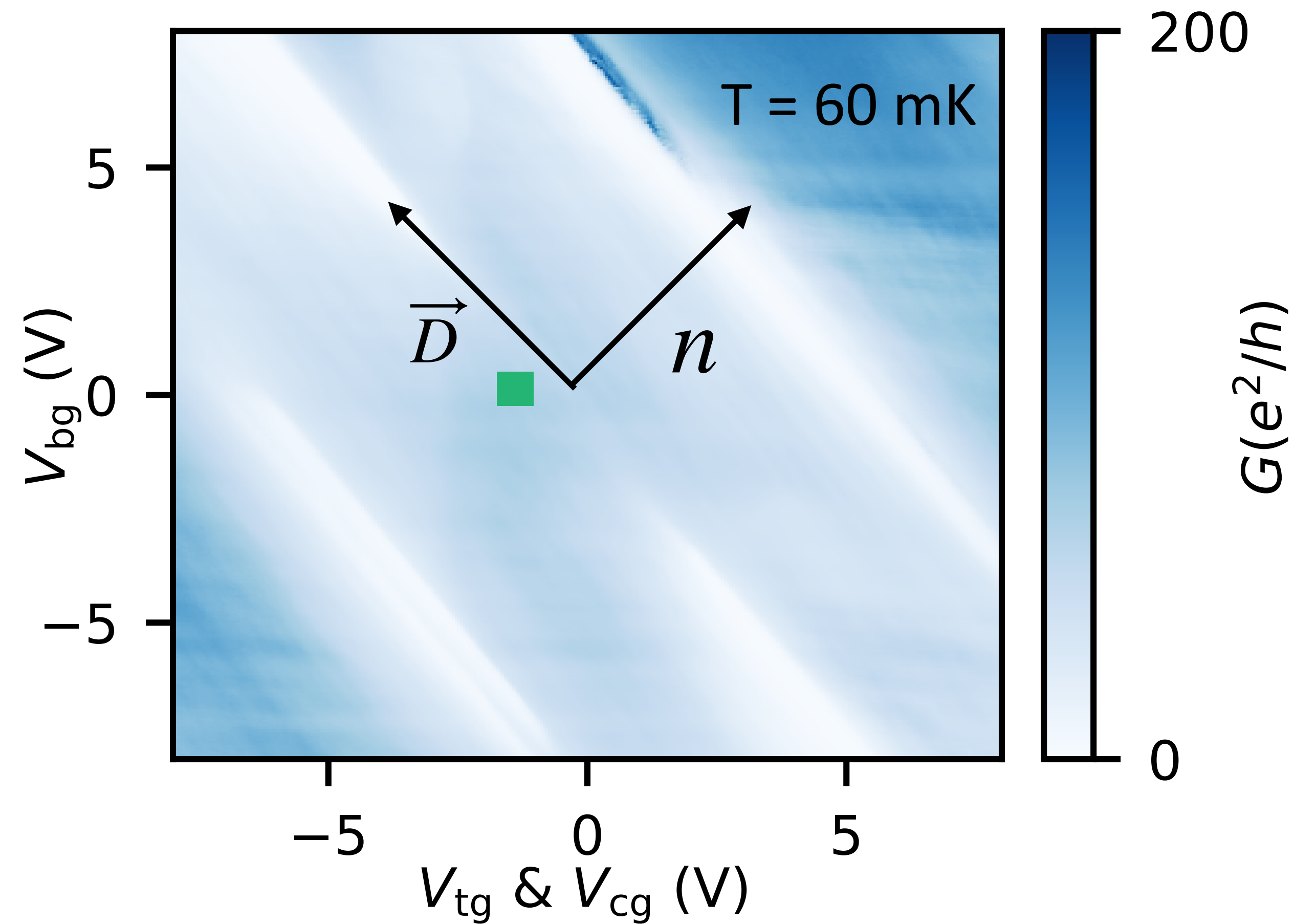
Gate-gate map



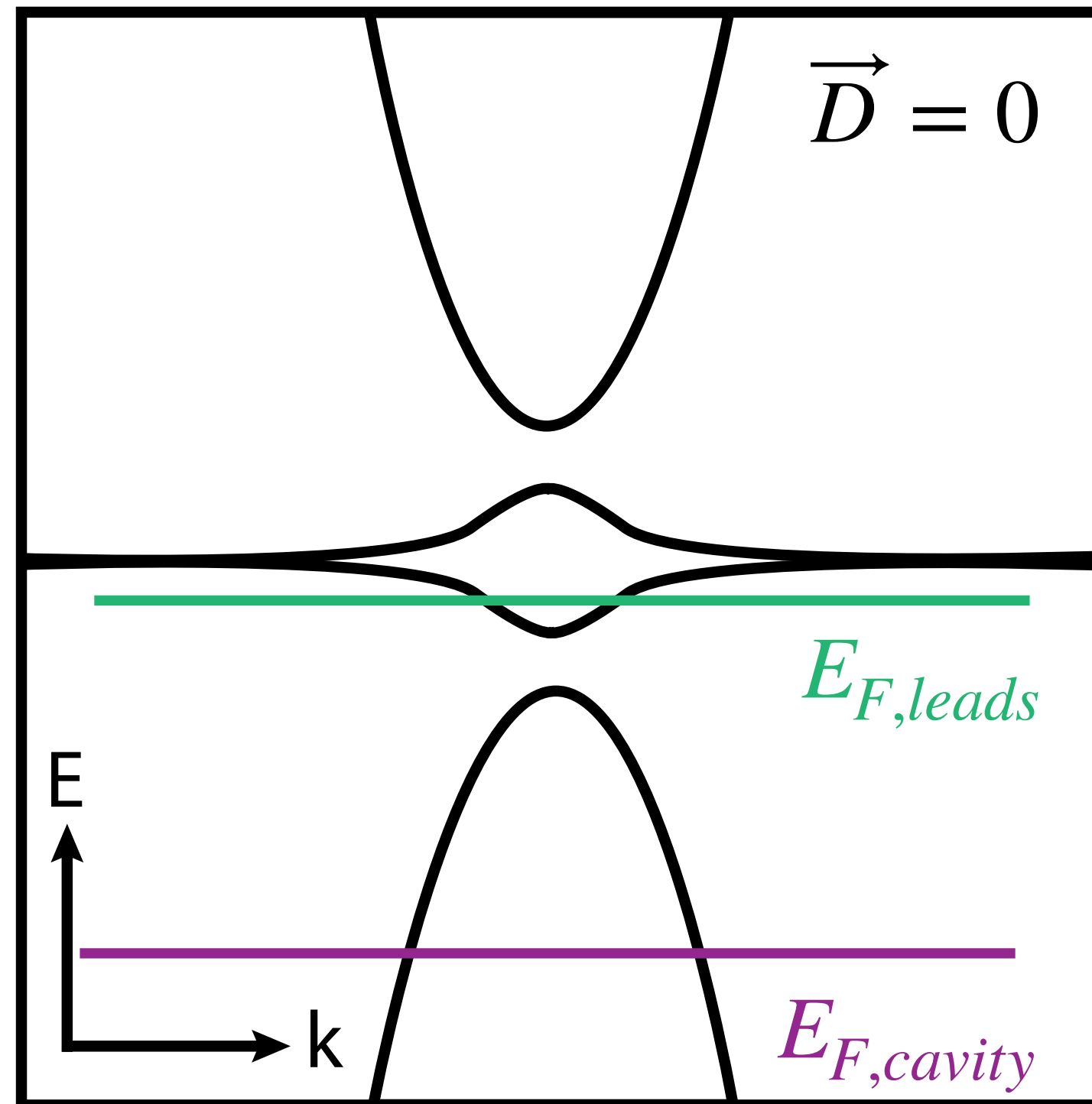
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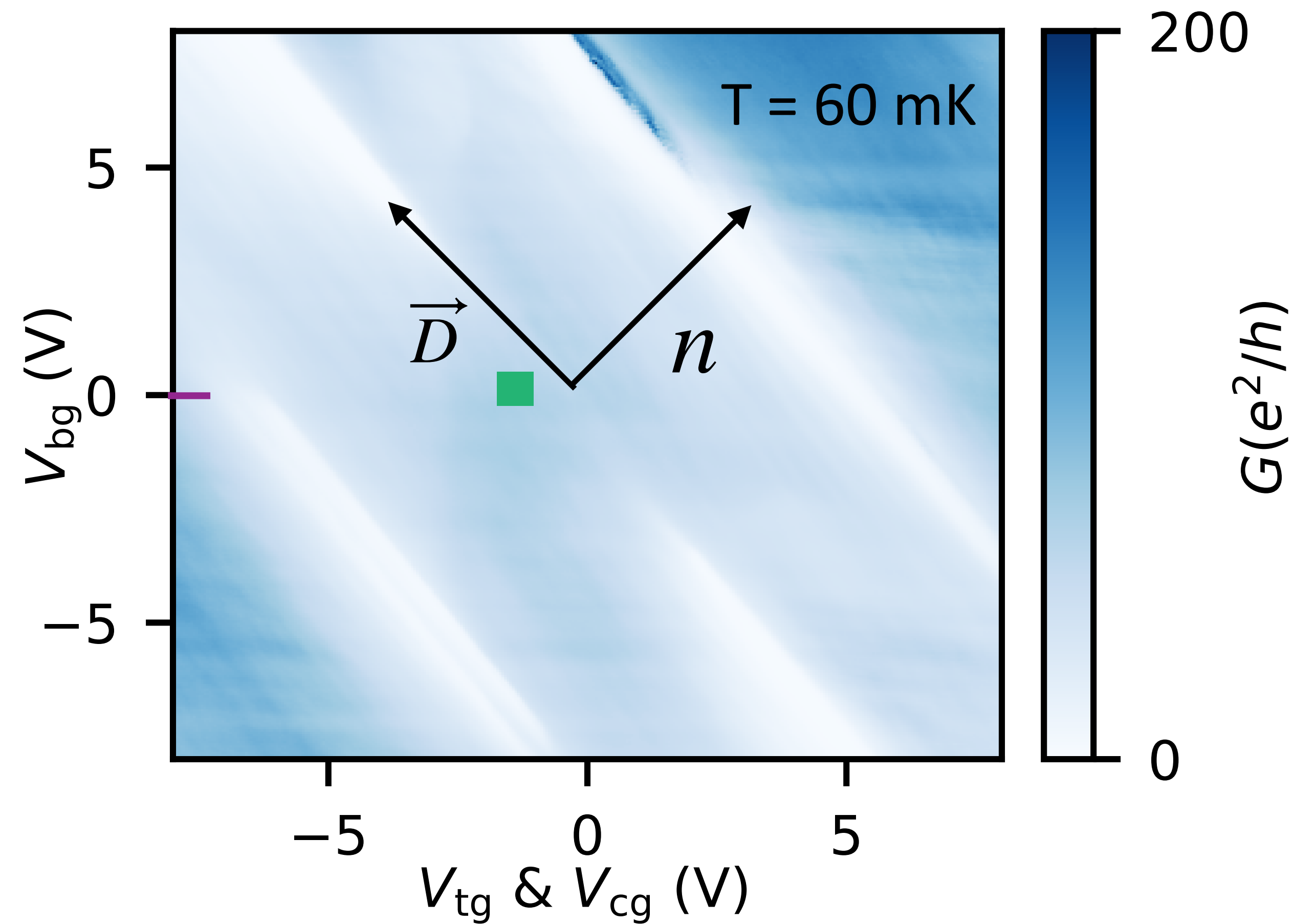
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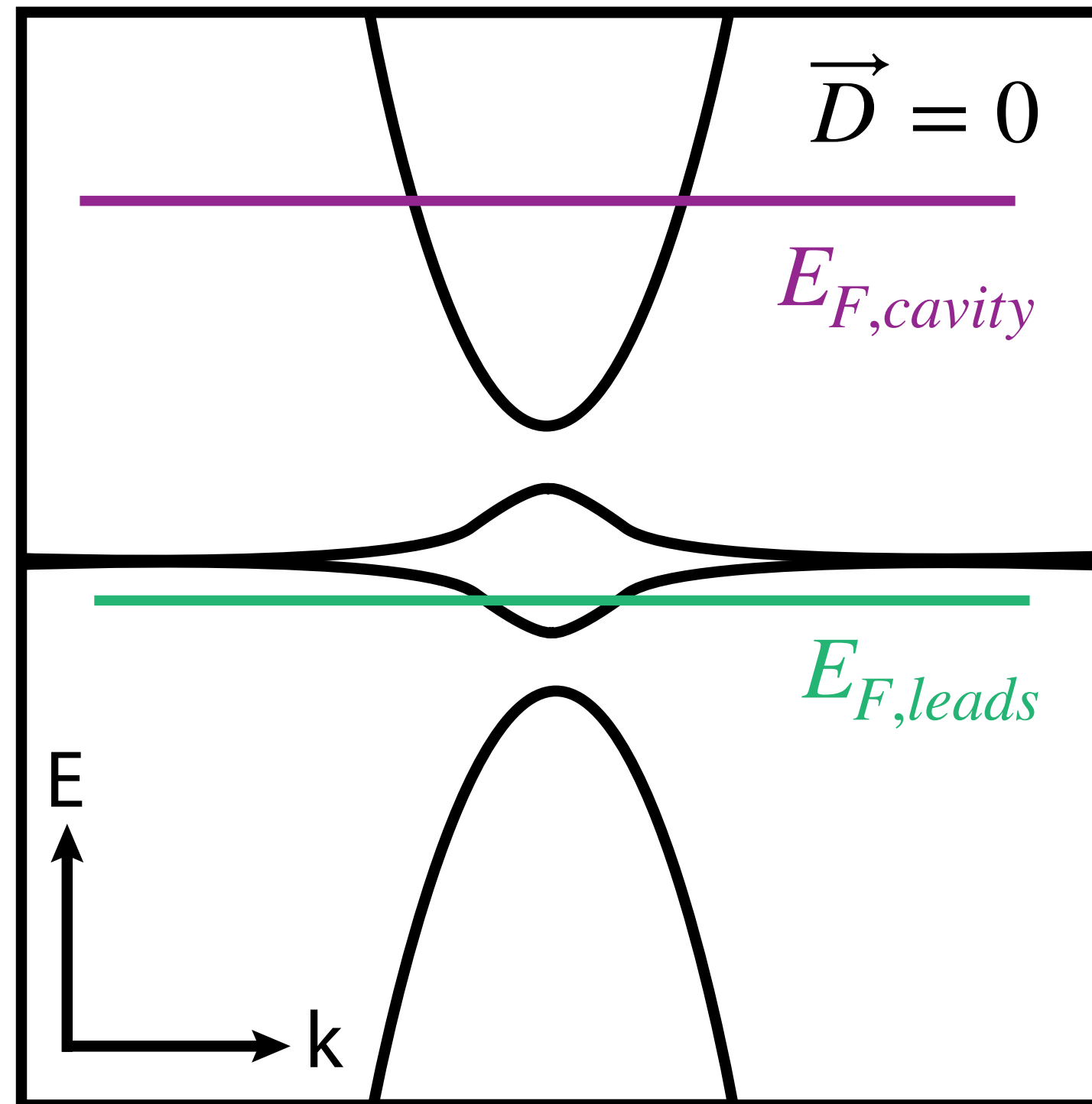
Band structure



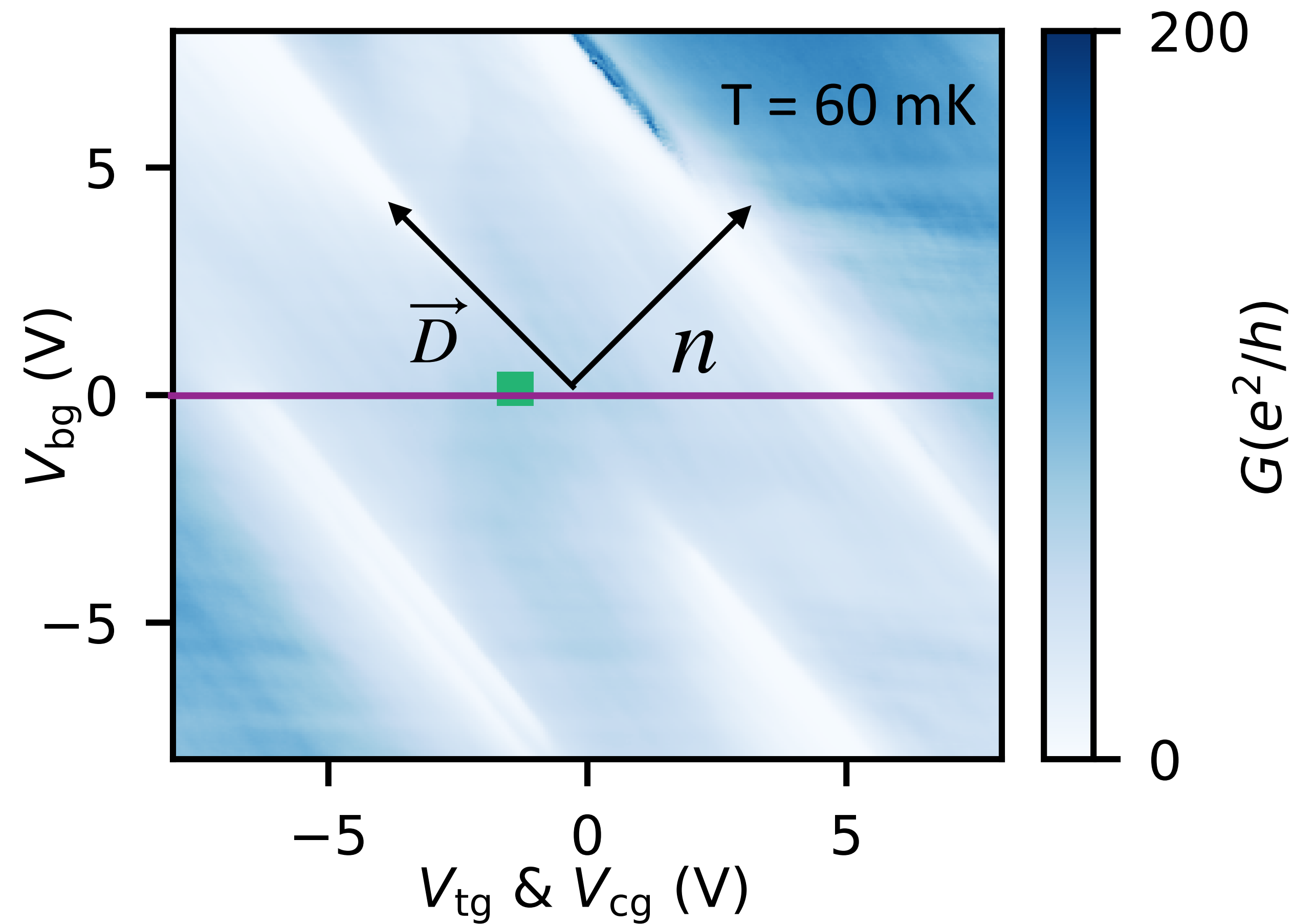
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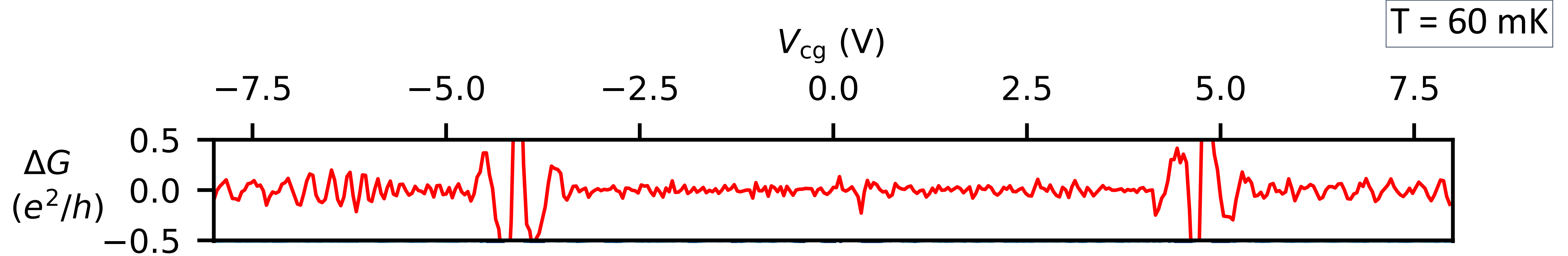
Band structure



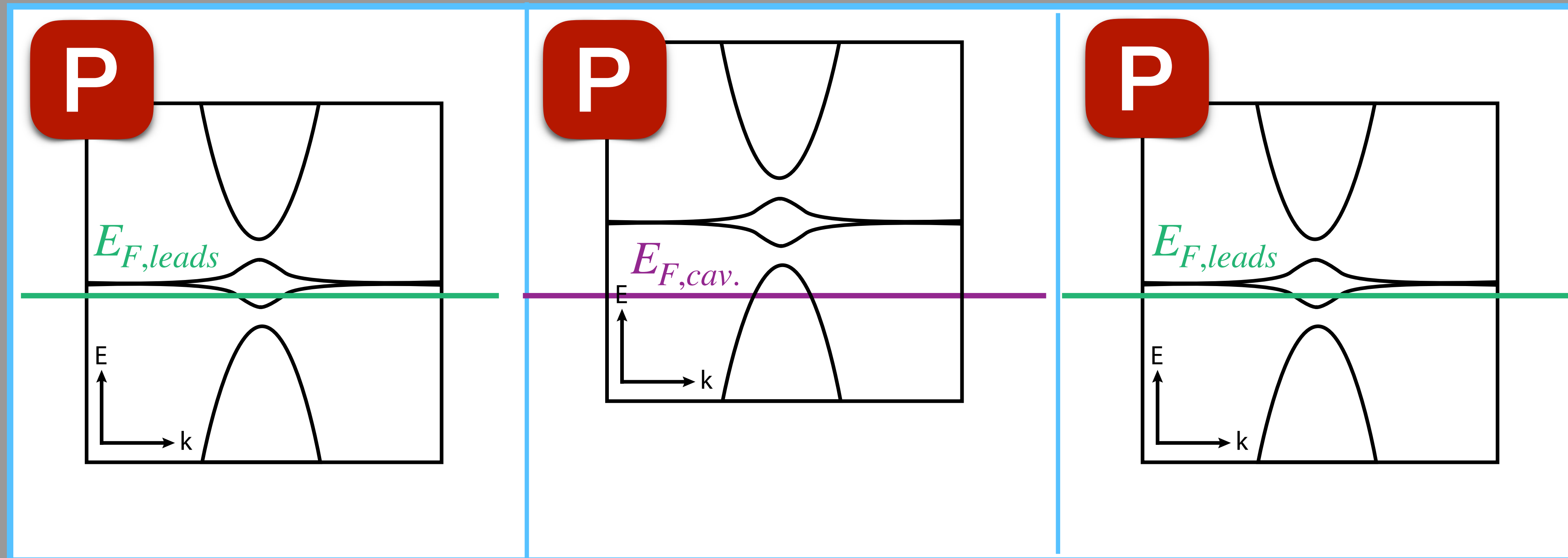
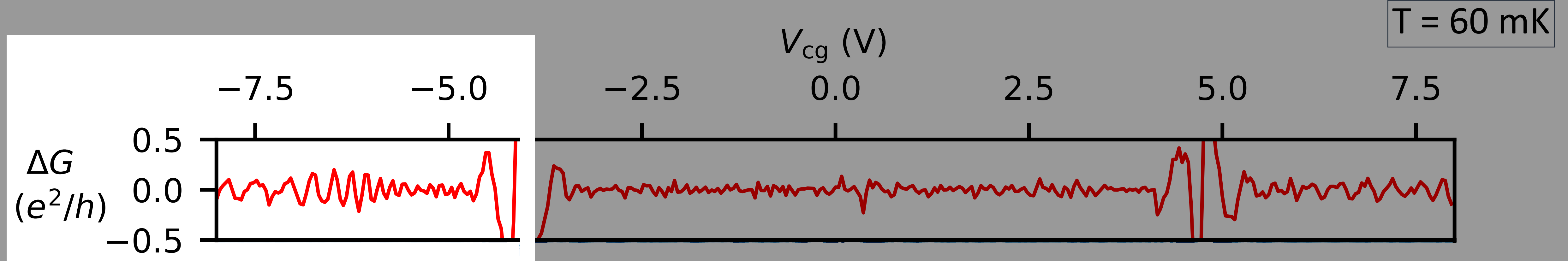
Gate-gate map



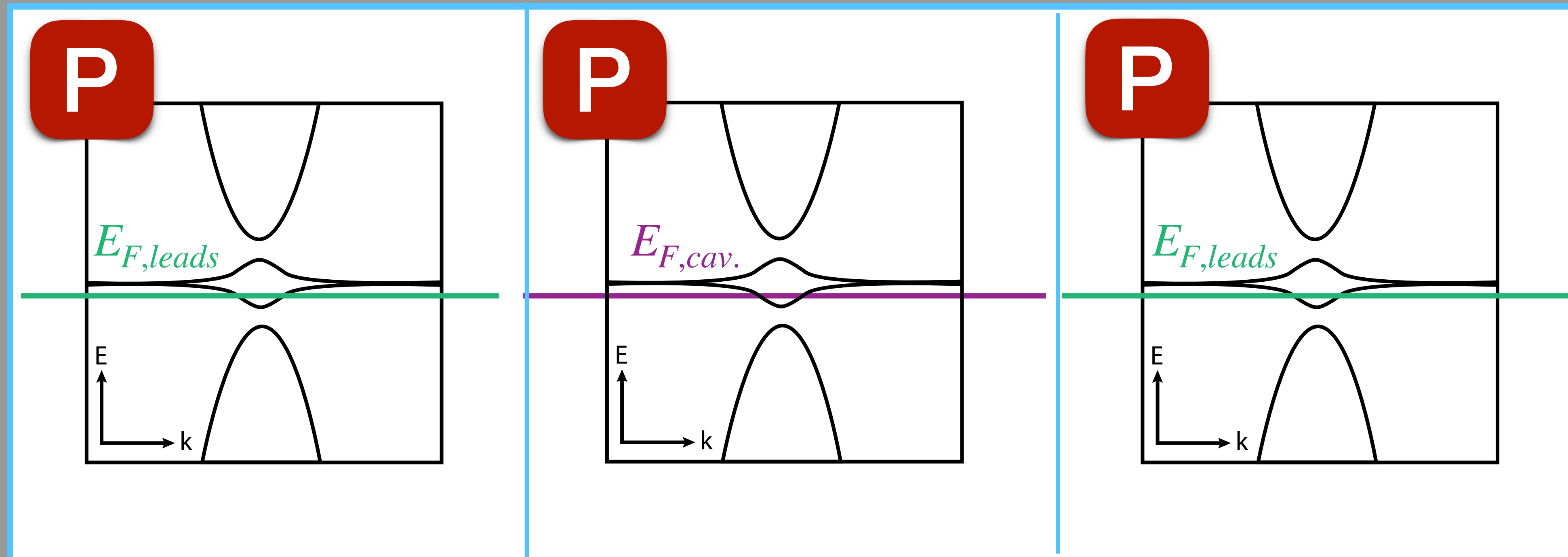
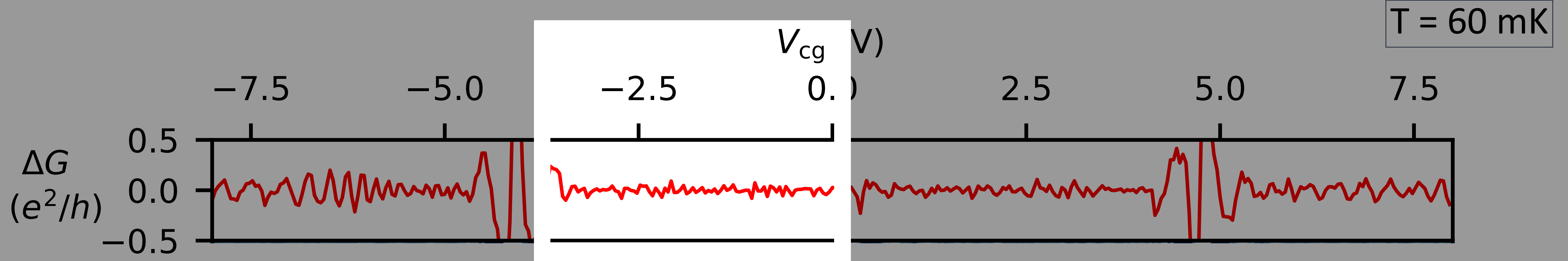
FABRY PEROT OSCILLATIONS



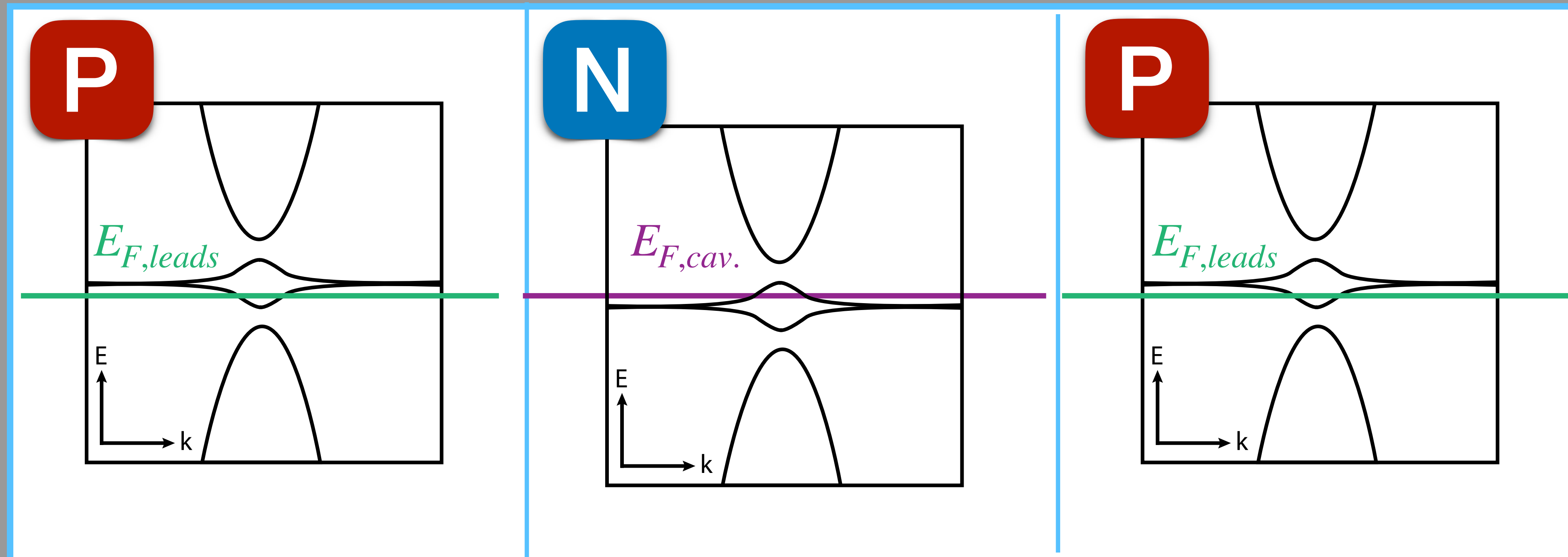
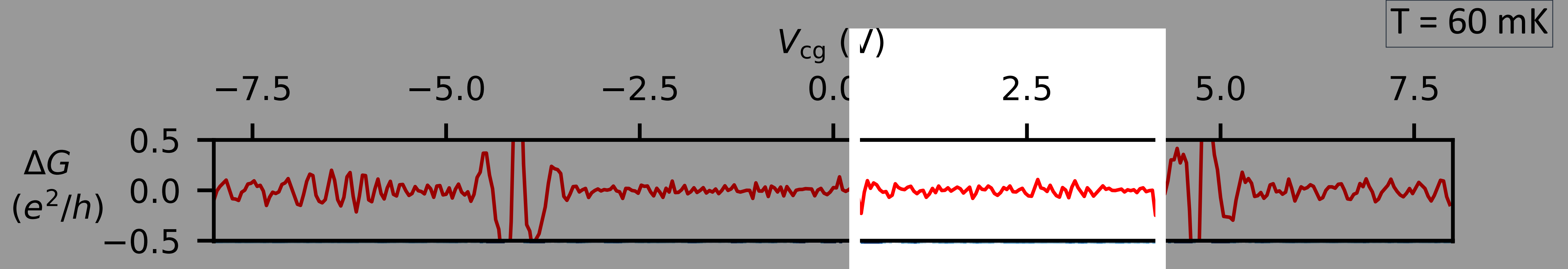
FABRY PEROT OSCILLATIONS



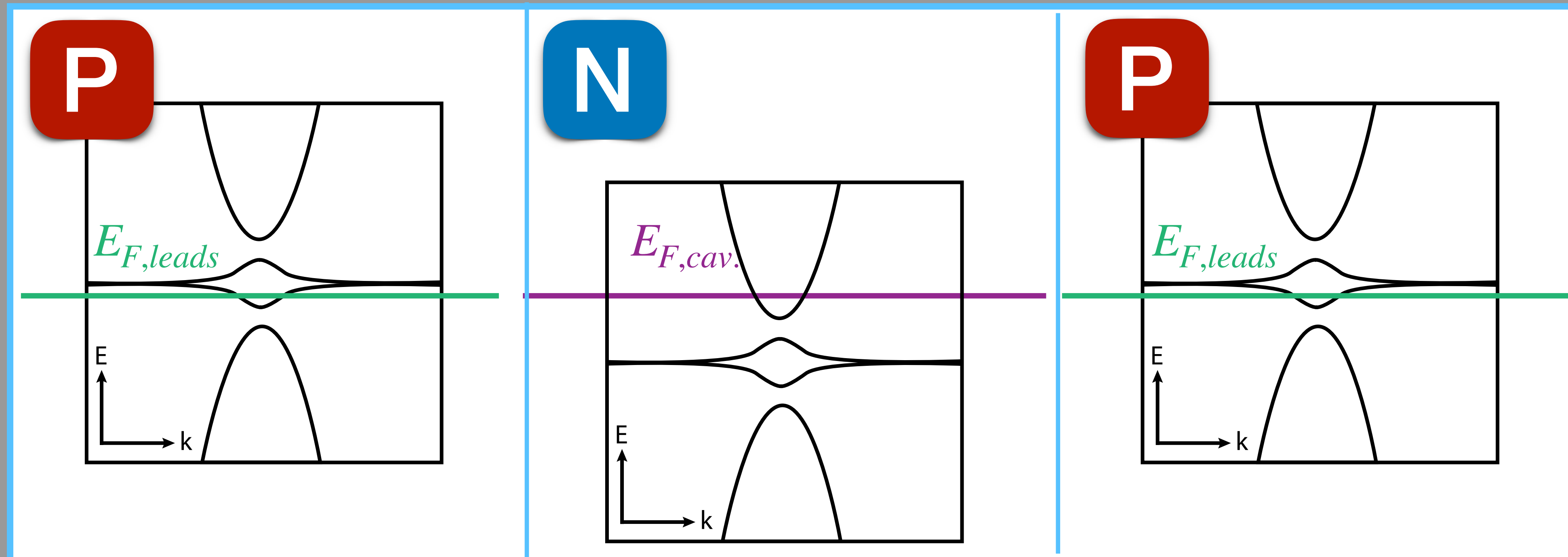
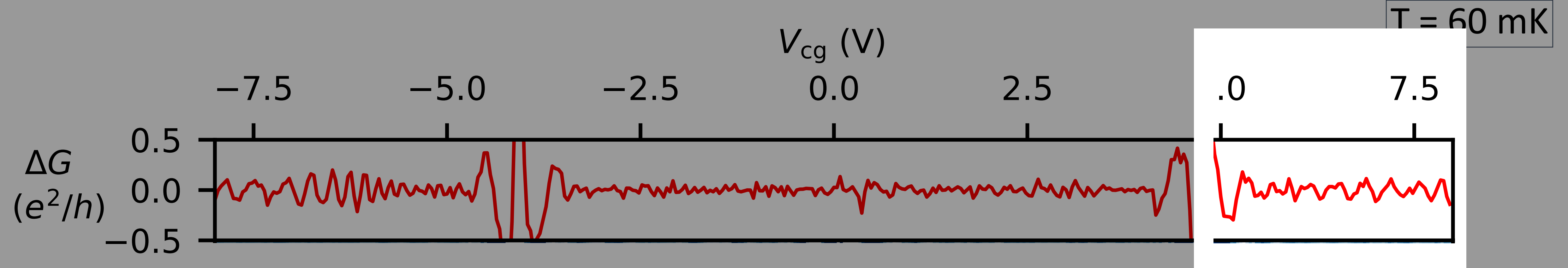
FABRY PEROT OSCILLATIONS



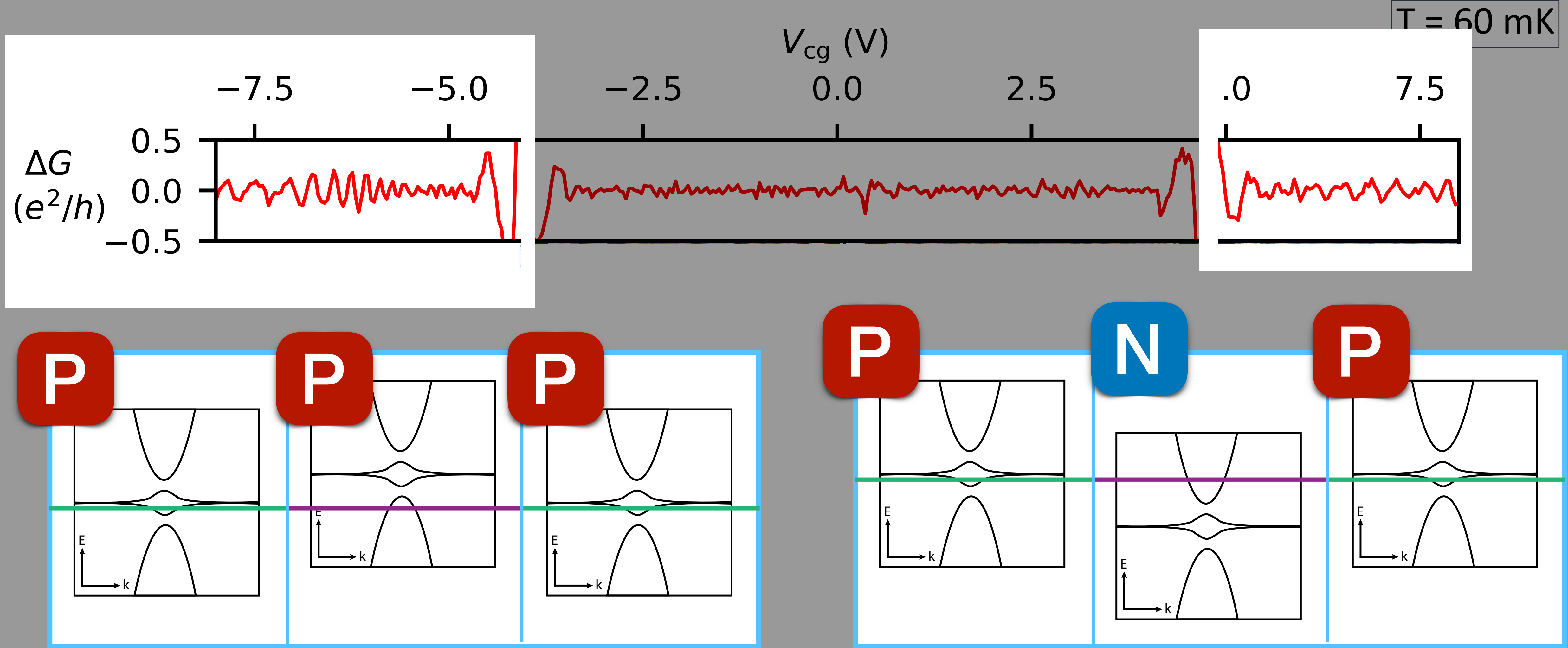
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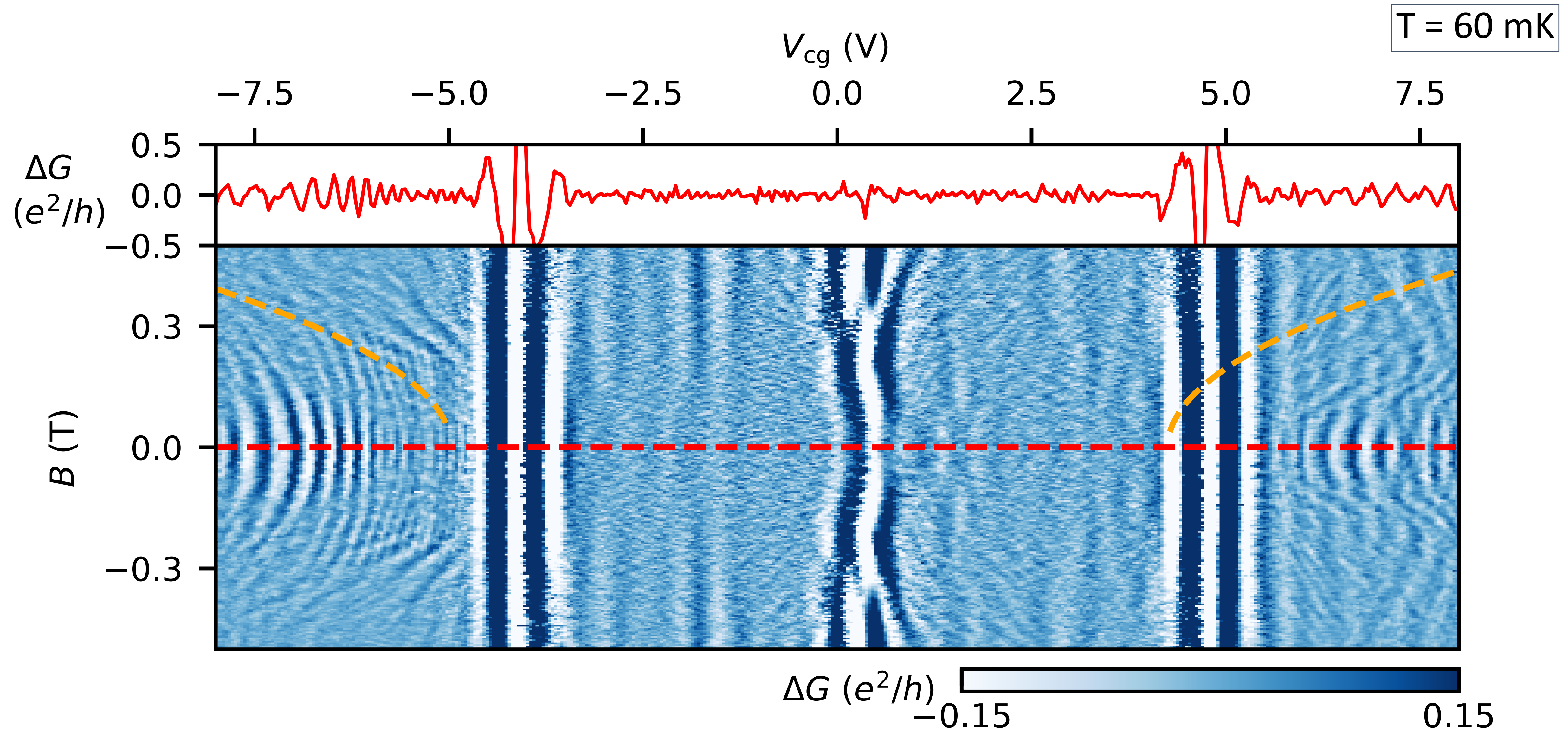
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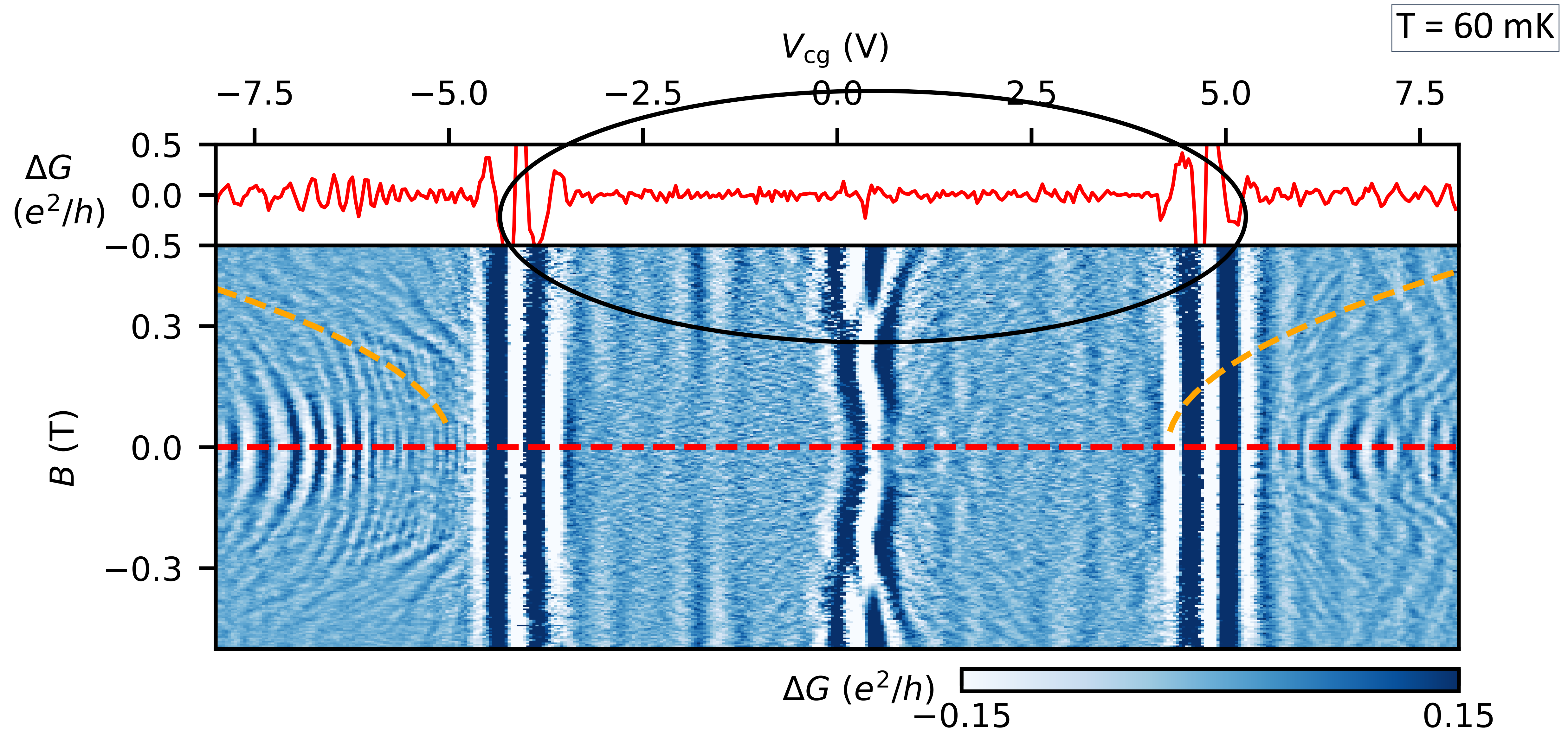
FABRY PEROT OSCILLATIONS



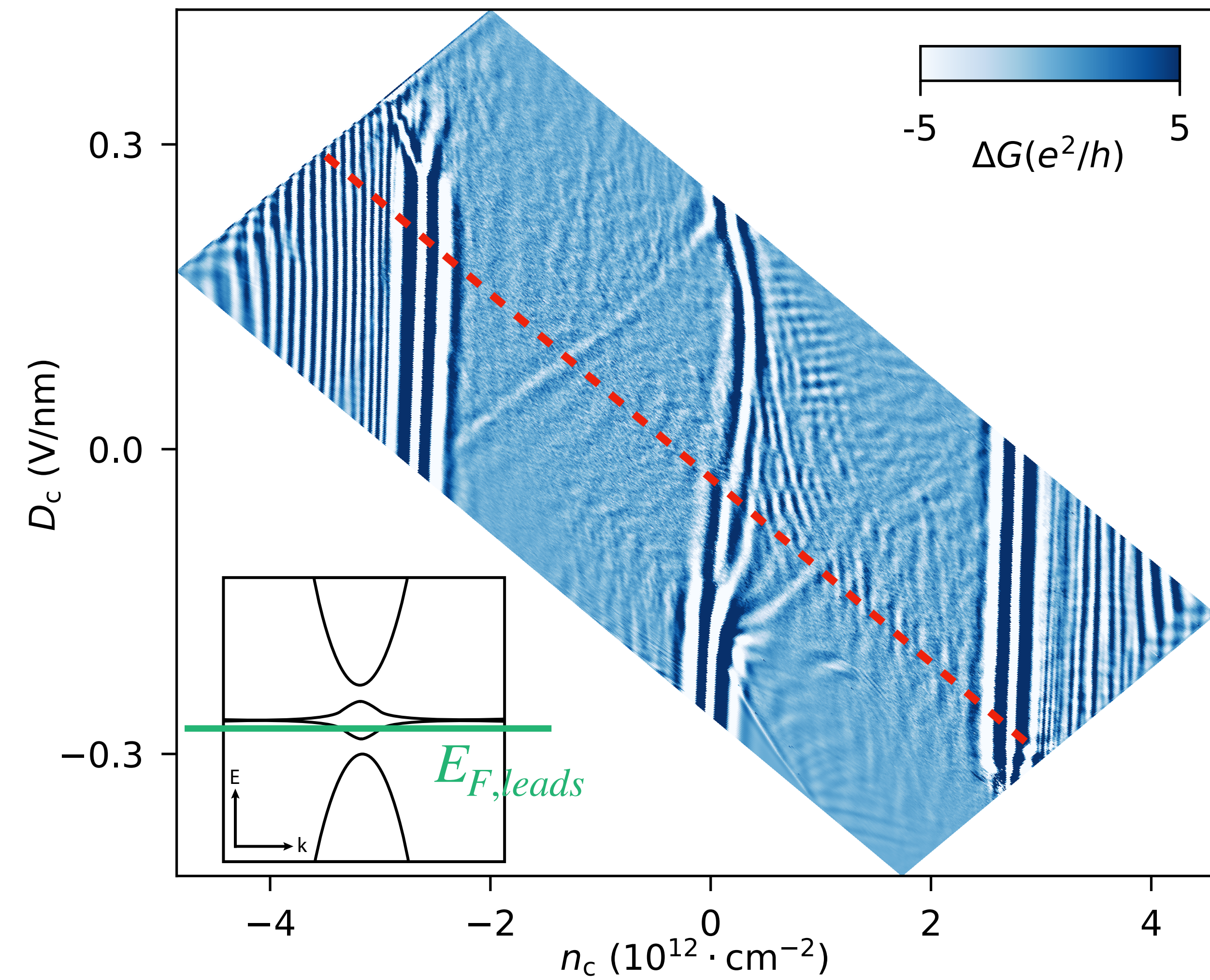
MAGNETIC FIELD DEPENDENCE



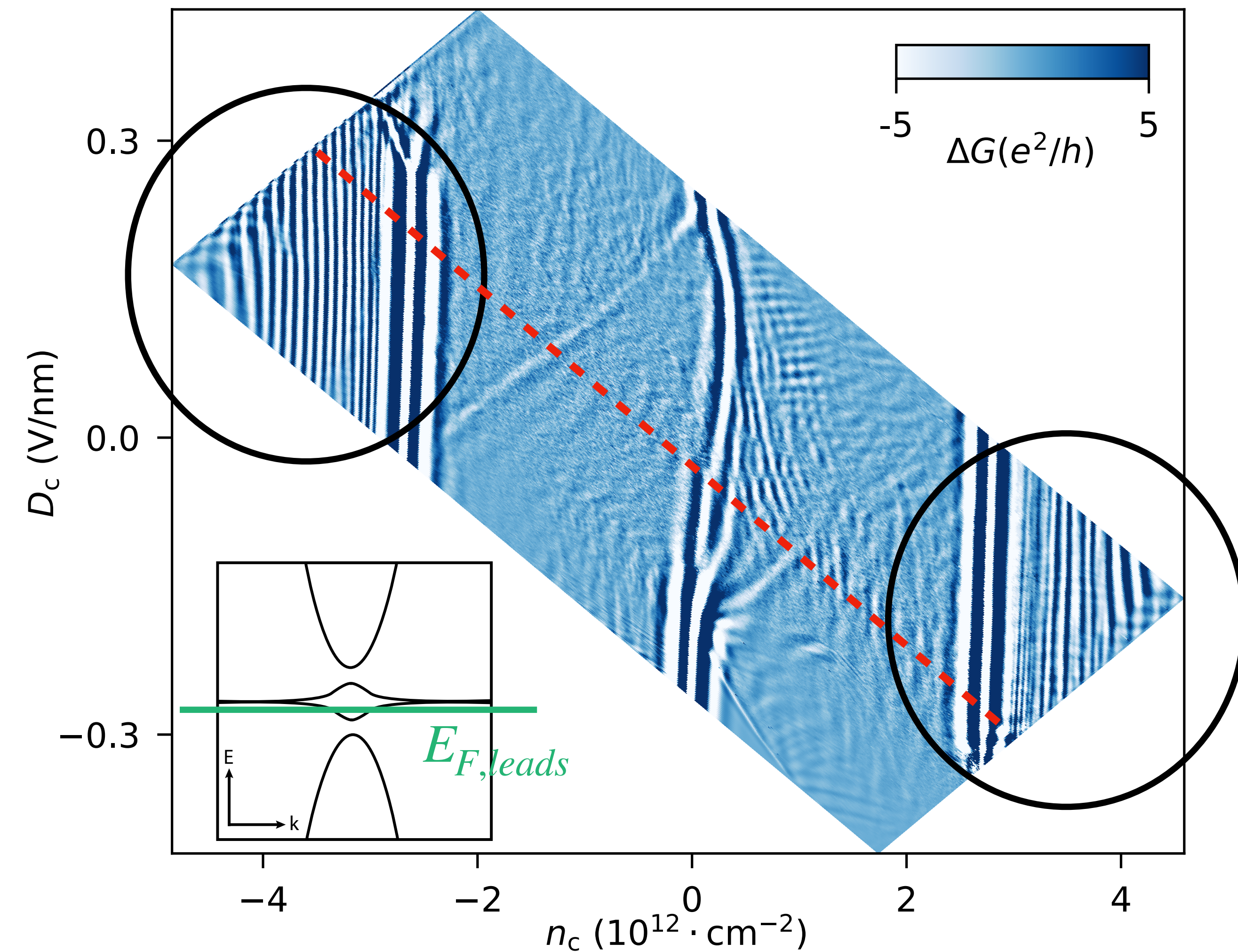
MAGNETIC FIELD DEPENDENCE



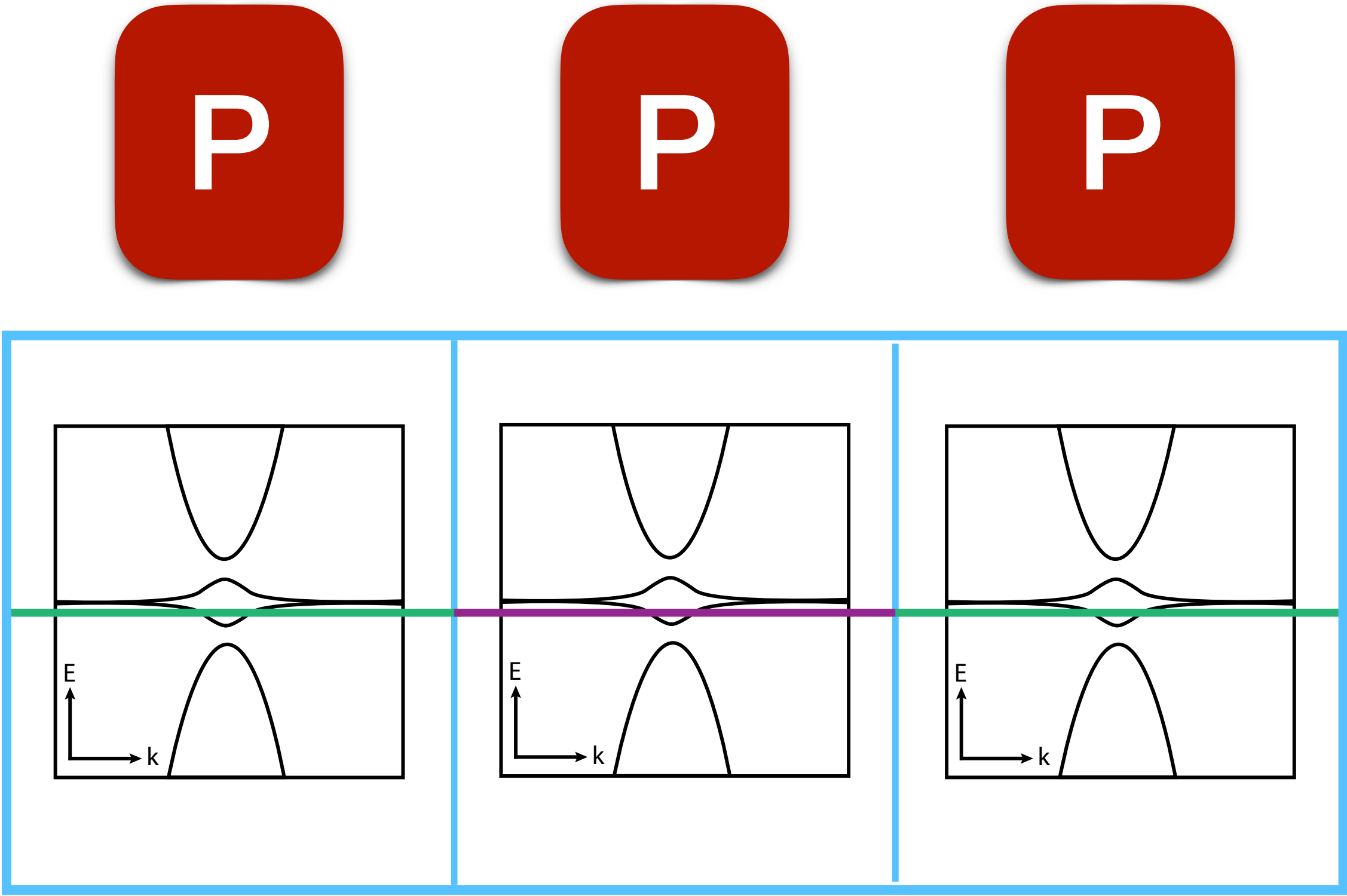
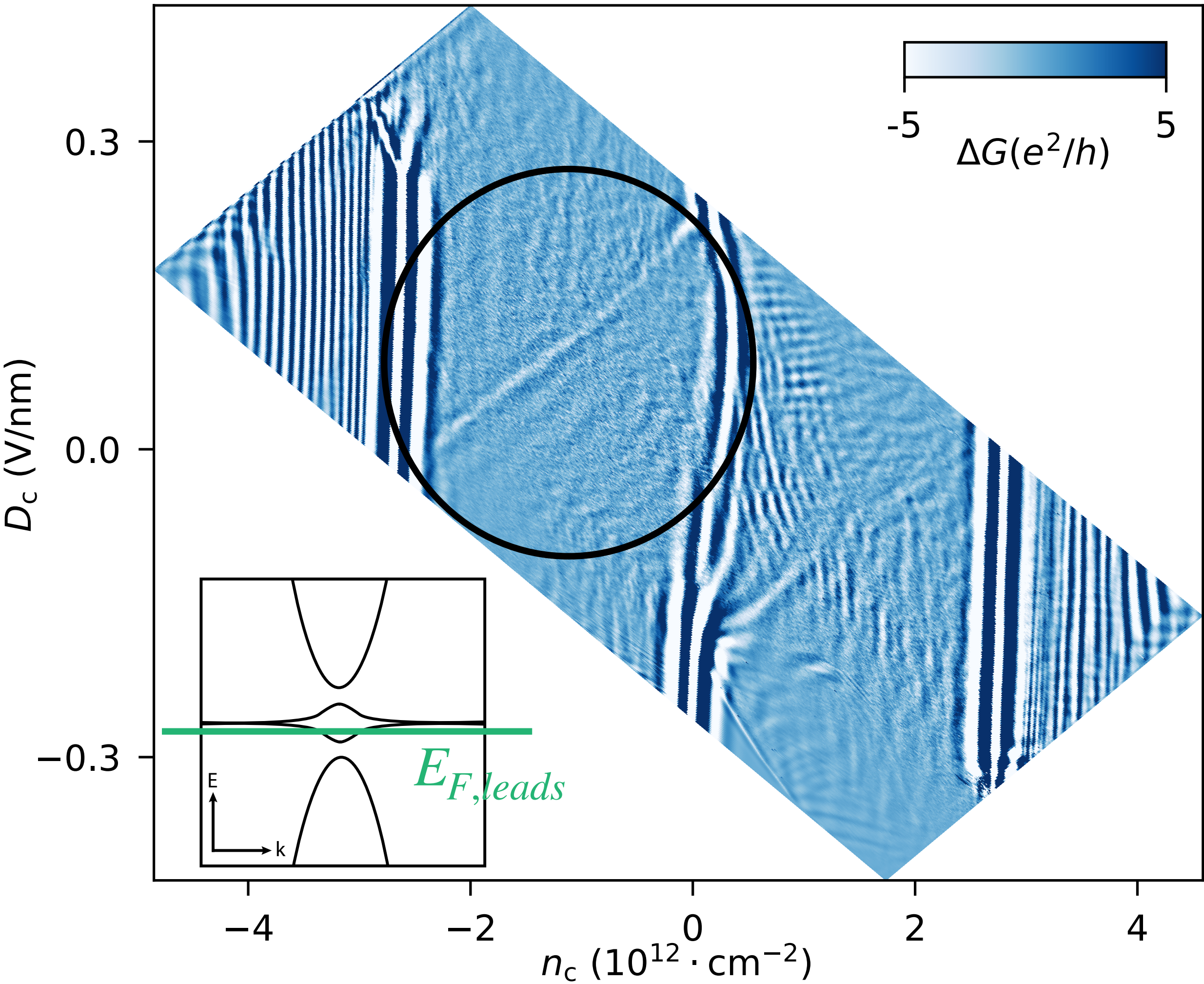
DISPLACEMENT FIELD - DENSITY MAP



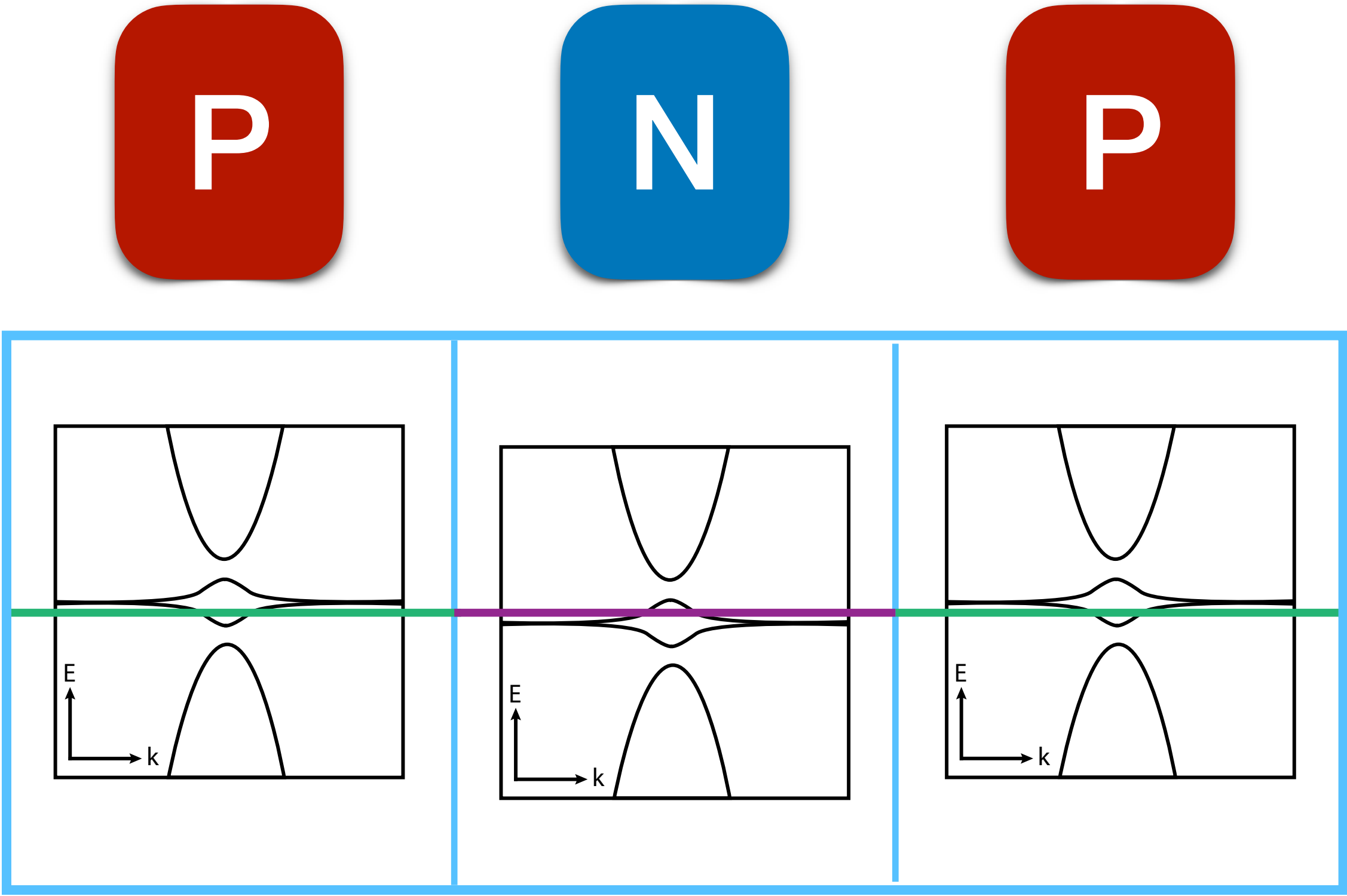
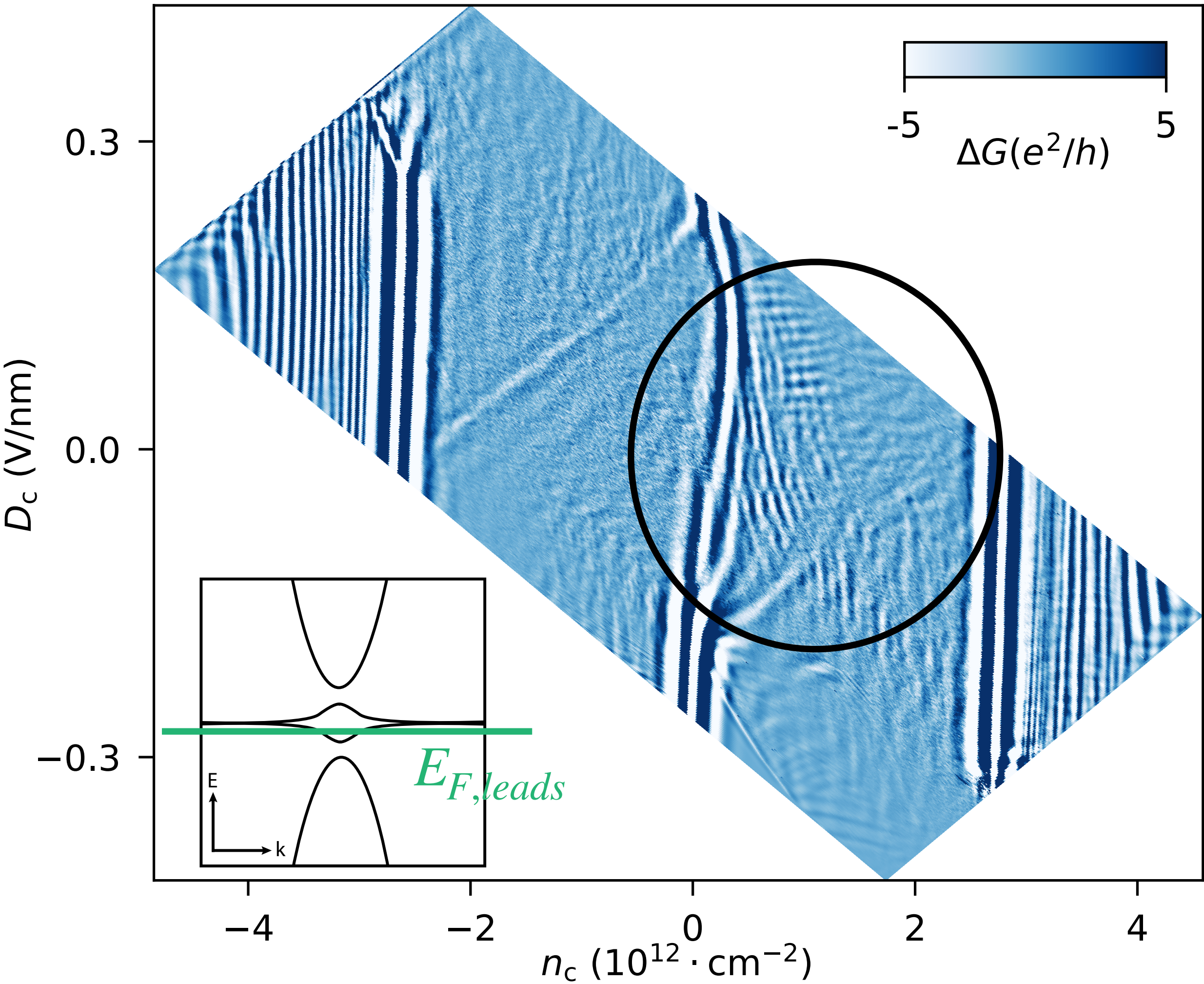
DISPLACEMENT FIELD - DENSITY MAP



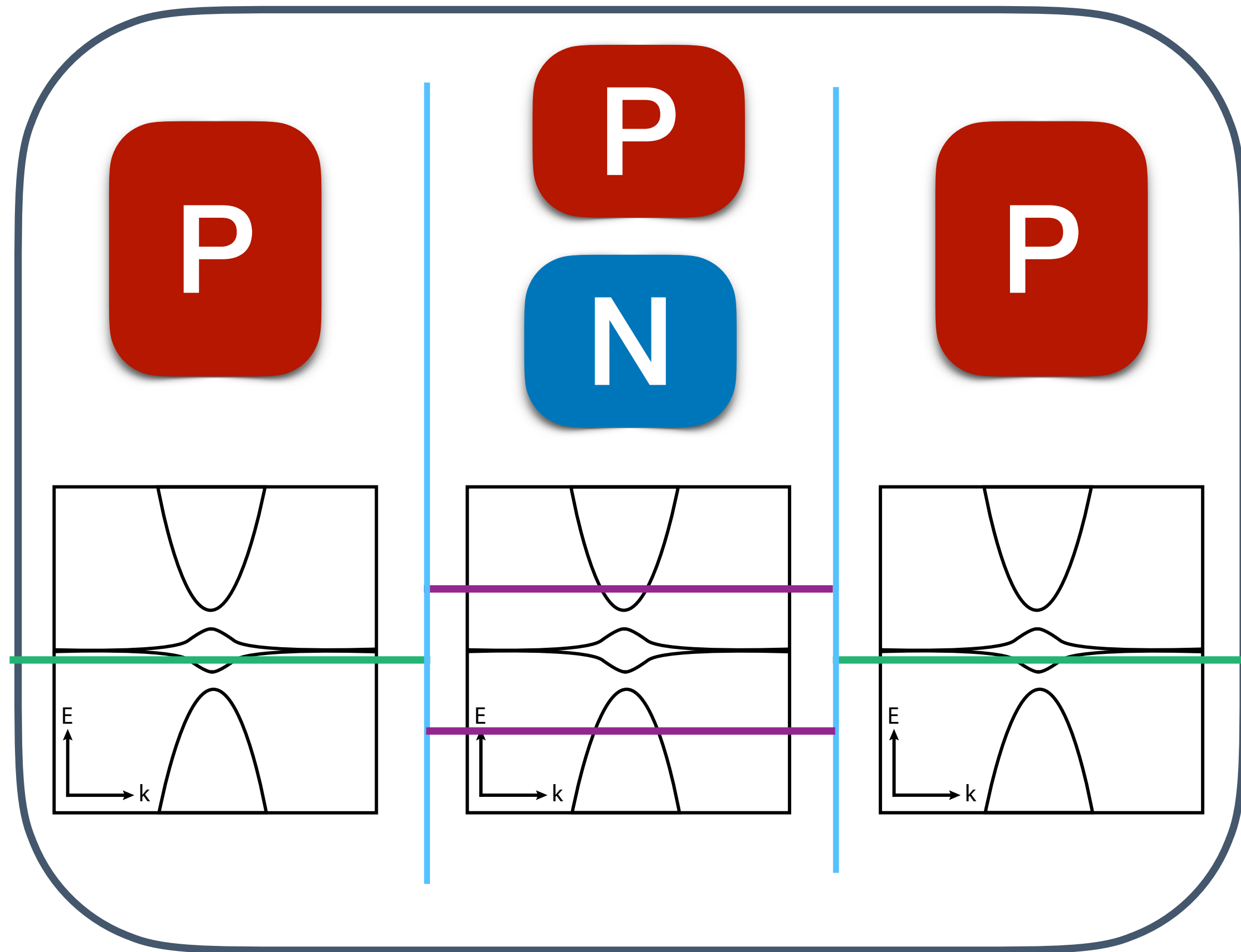
DISPLACEMENT FIELD - DENSITY MAP



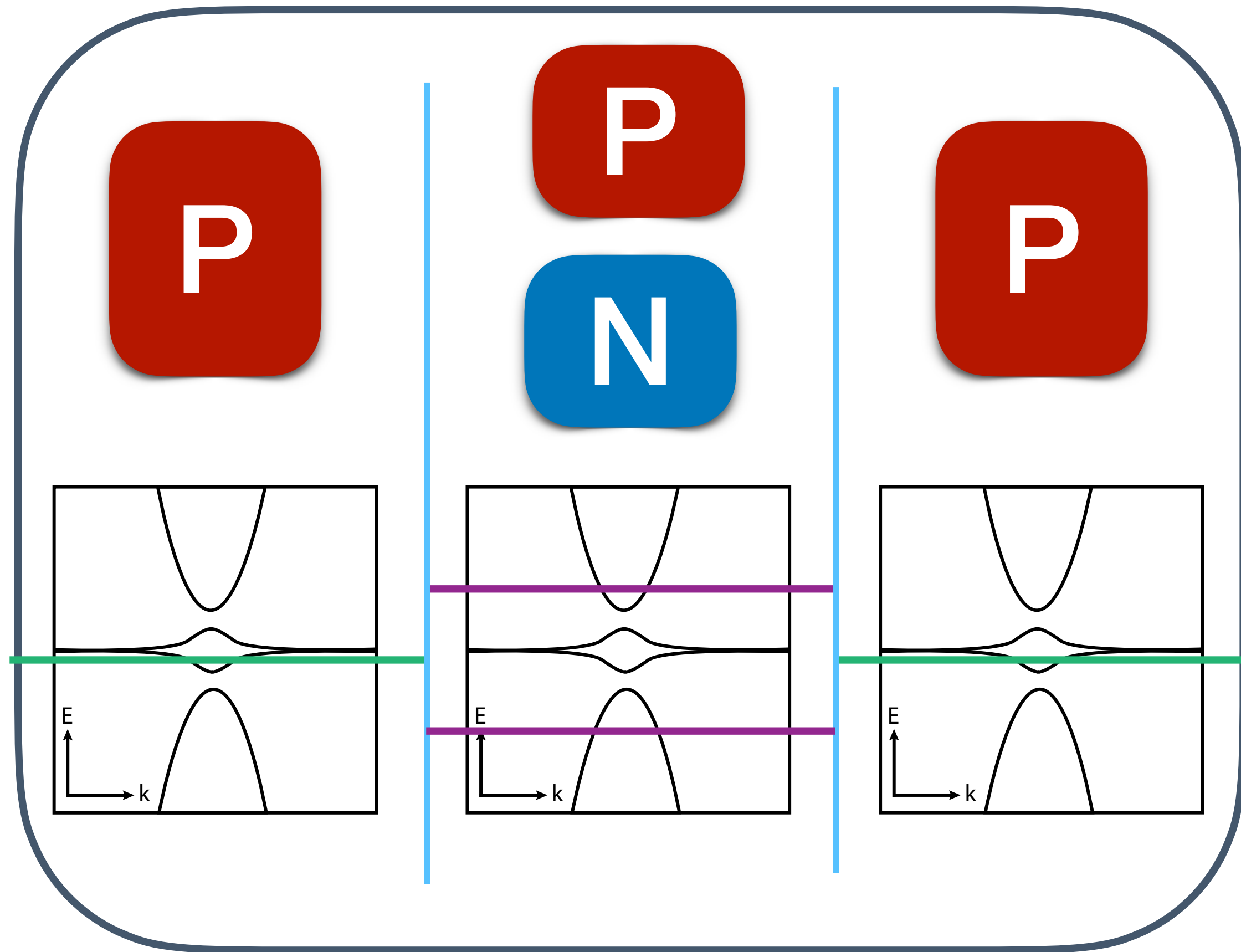
DISPLACEMENT FIELD - DENSITY MAP



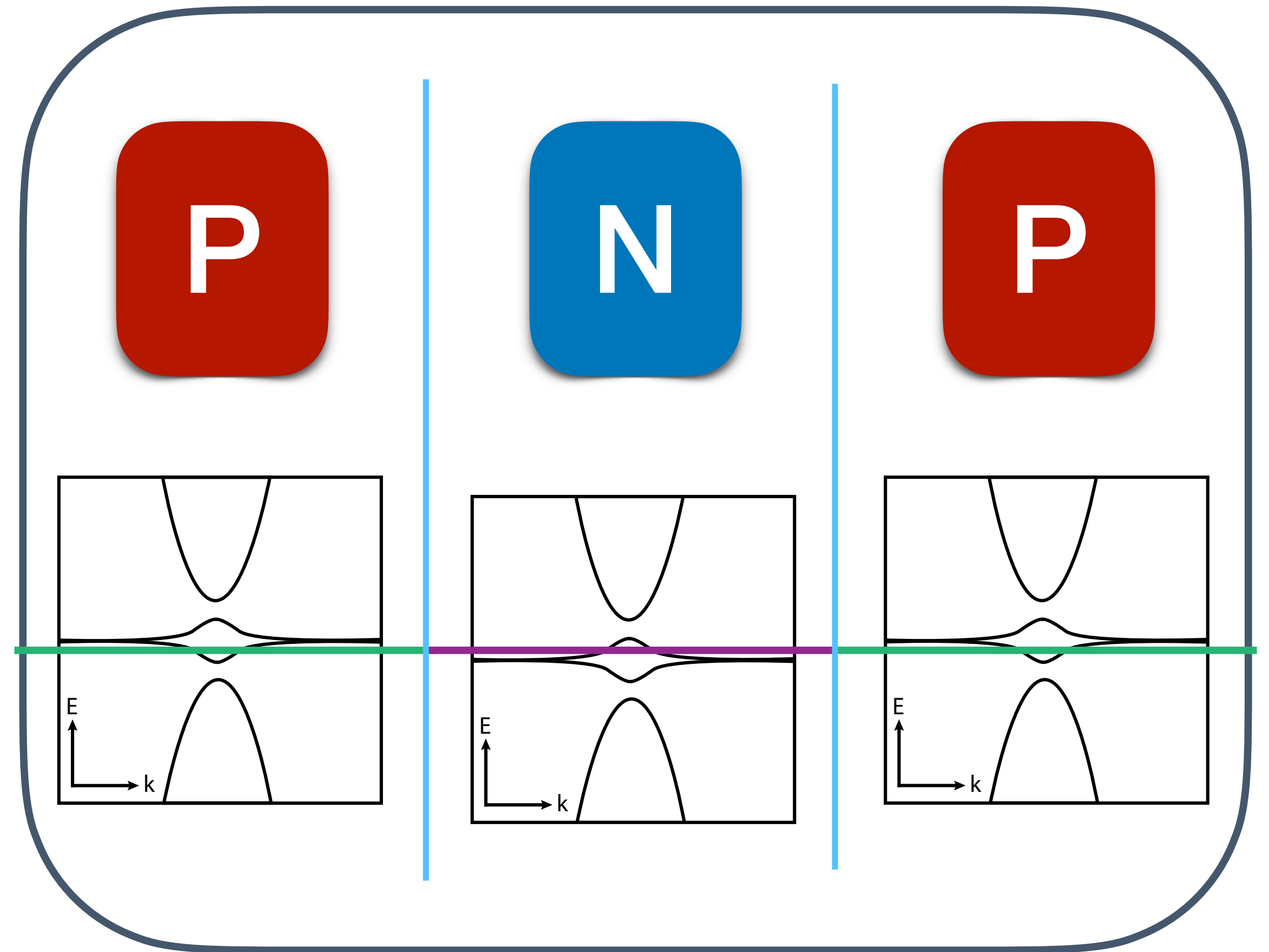
FABRY PEROT CAVITIES BETWEEN FLAT BAND/DISPERSIVE BAND BARRIERS



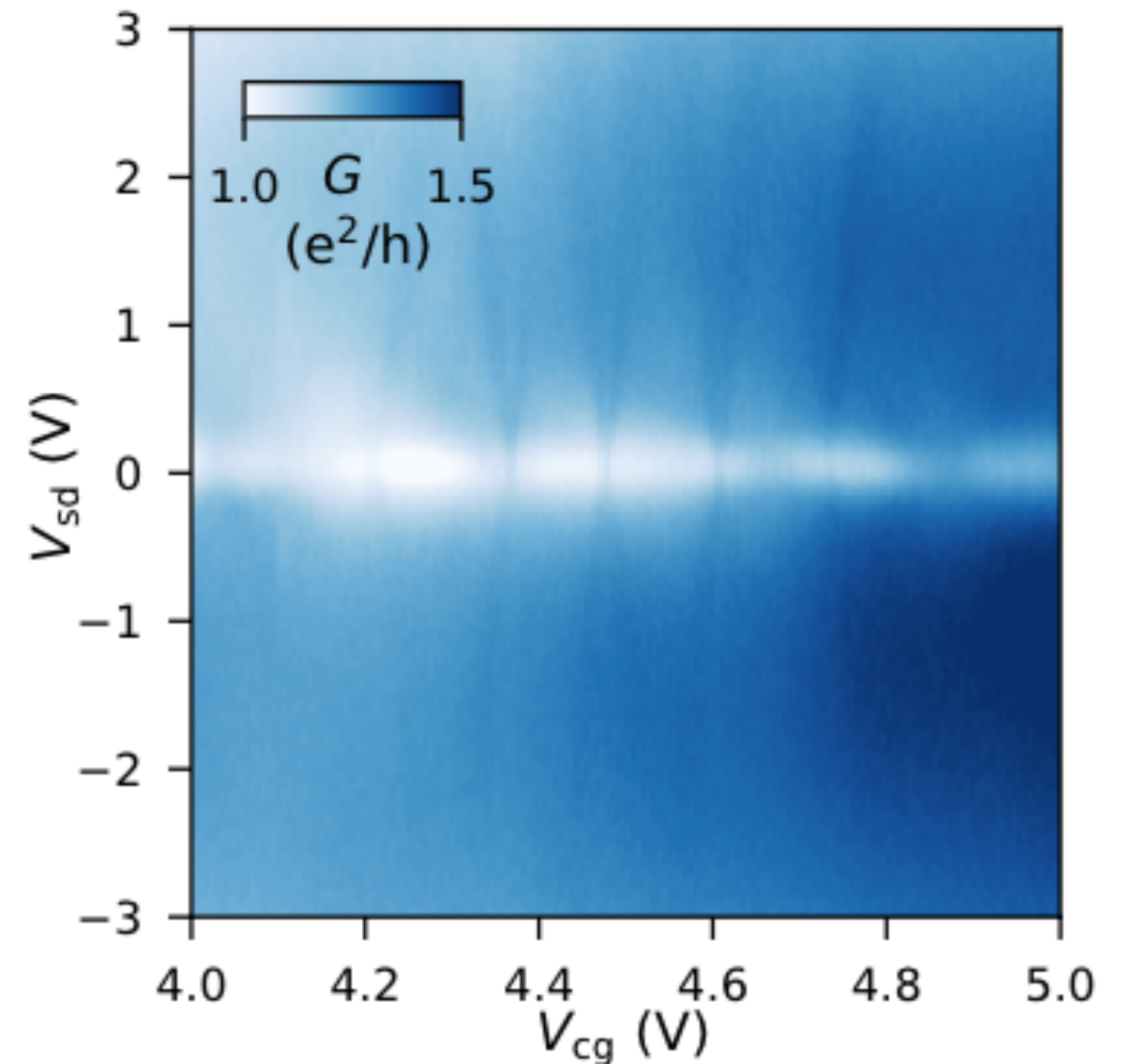
FABRY PEROT CAVITIES BETWEEN FLAT BAND/DISPERSIVE BAND BARRIERS

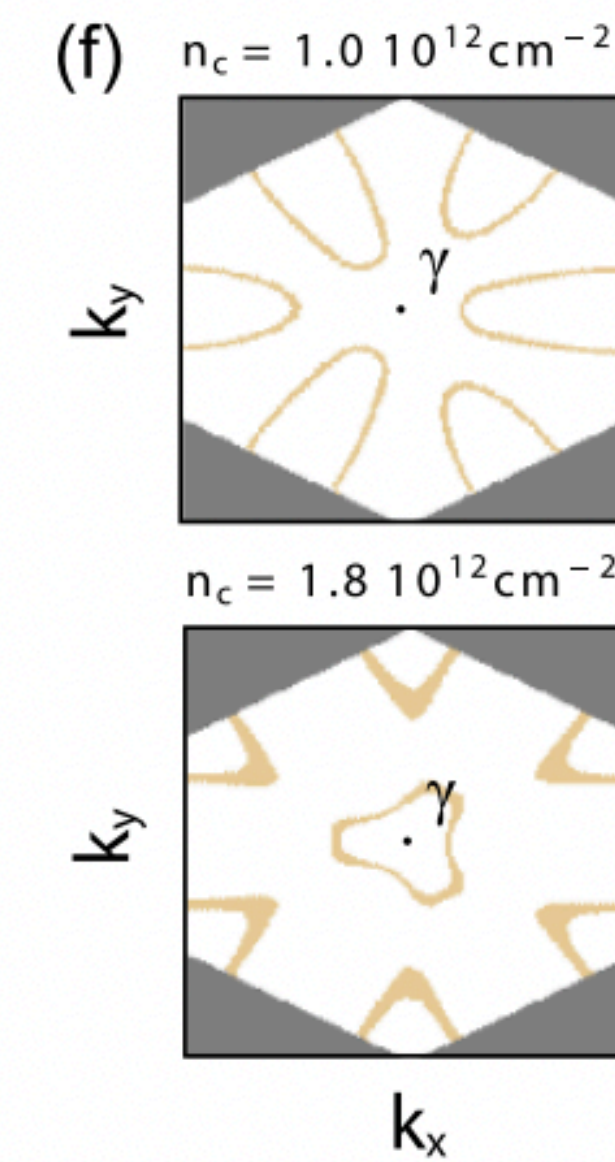
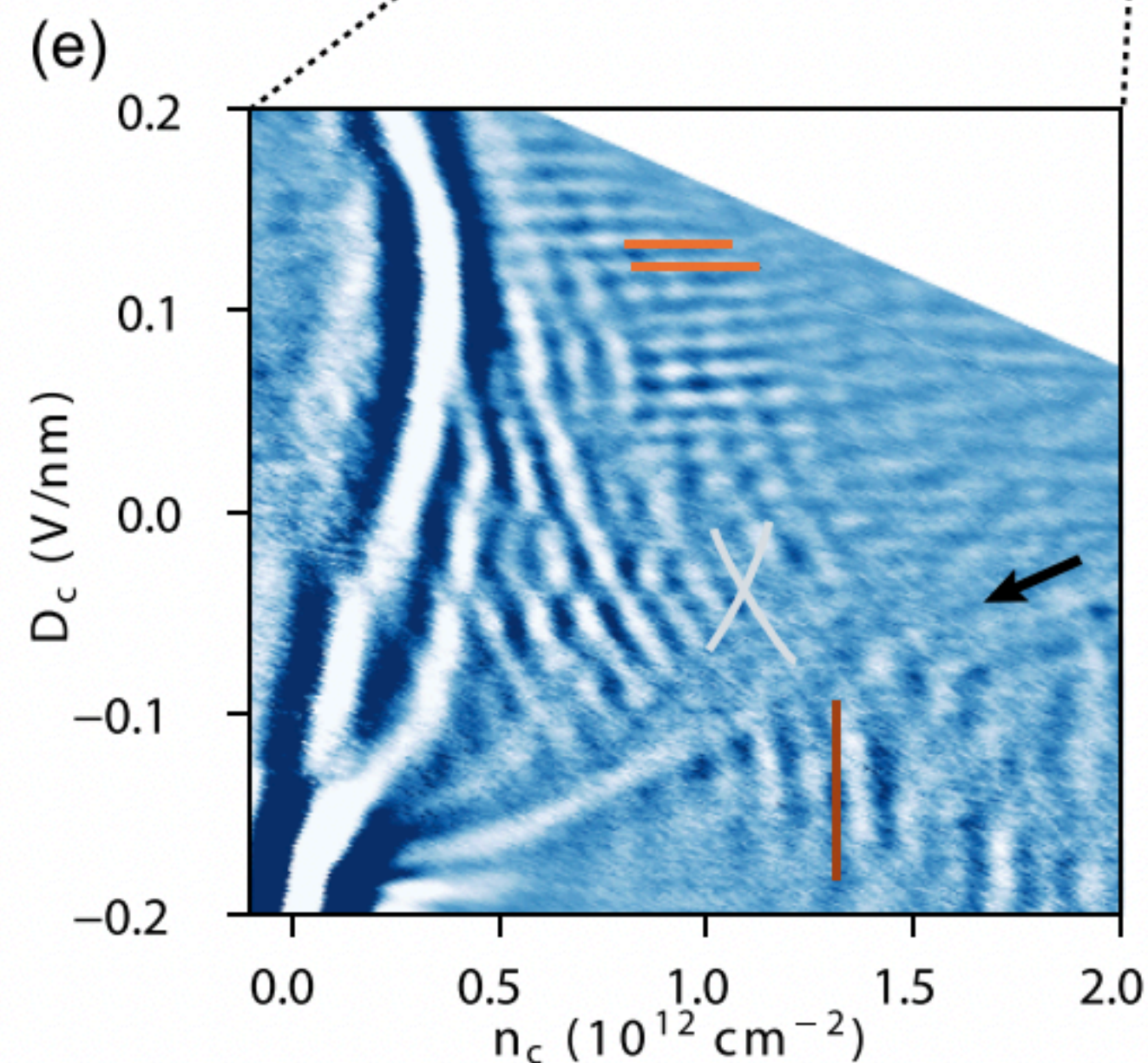
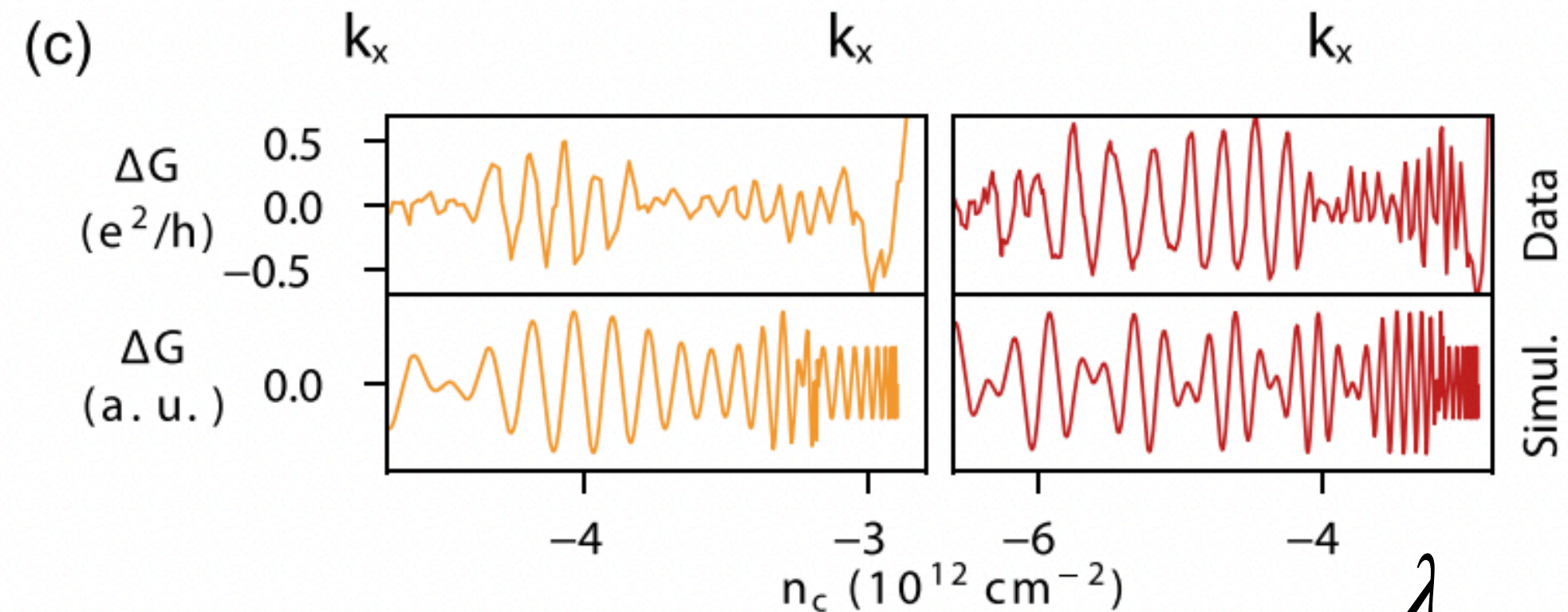
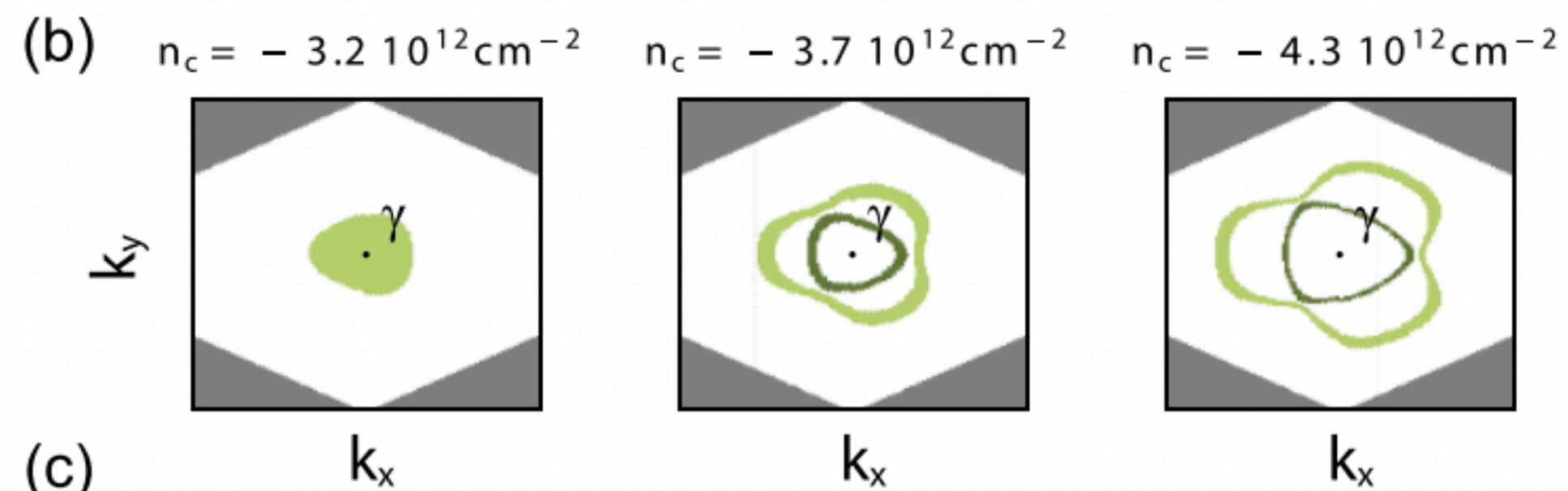
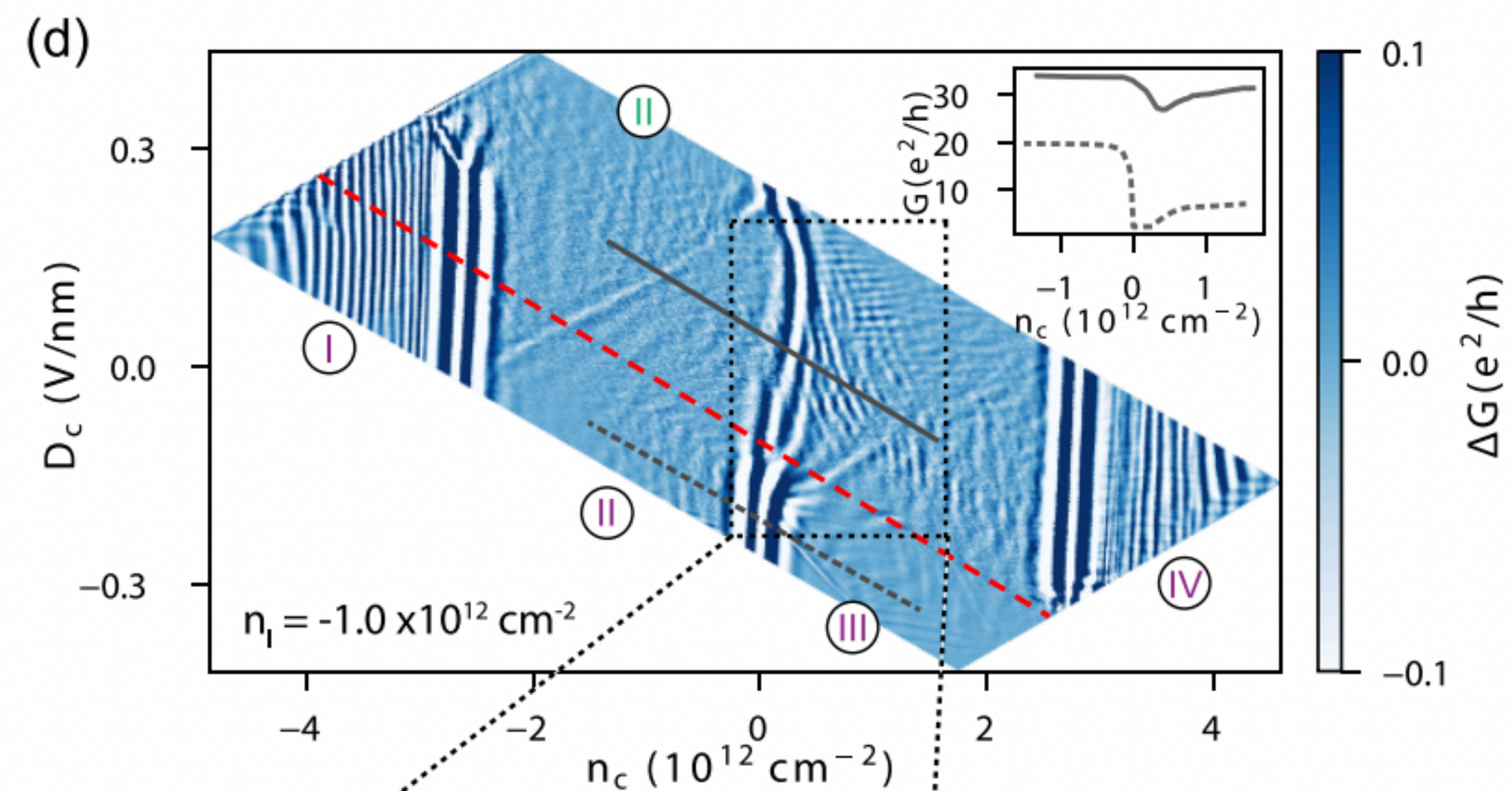
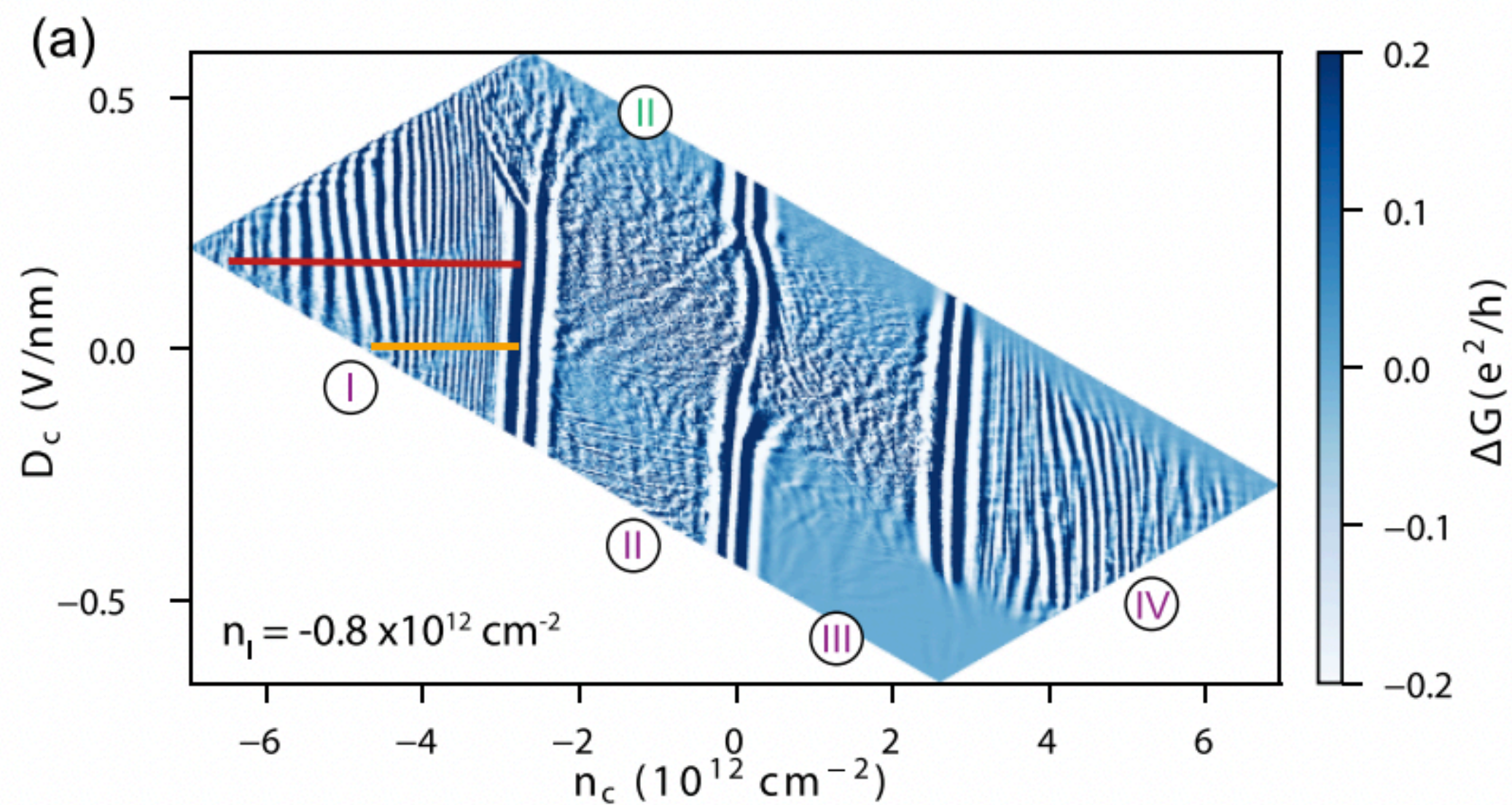


FABRY PEROT CAVITIES BETWEEN PN JUNCTIONS FORMED IN THE FLAT BANDS



QUANTUM DOTS AT THE INTERFACE BETWEEN LEADS AND CAVITY





$$L = \frac{\lambda}{2} n = \frac{\pi}{k} n$$