



能谷光子晶体初探

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稀里糊涂的理论分析

RESEARCH BACKGROUNDS

名词解释

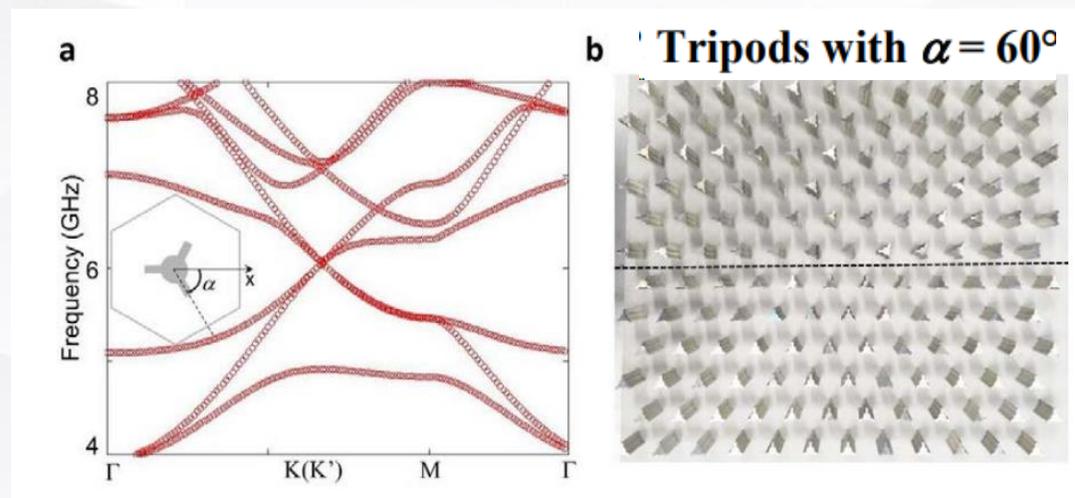
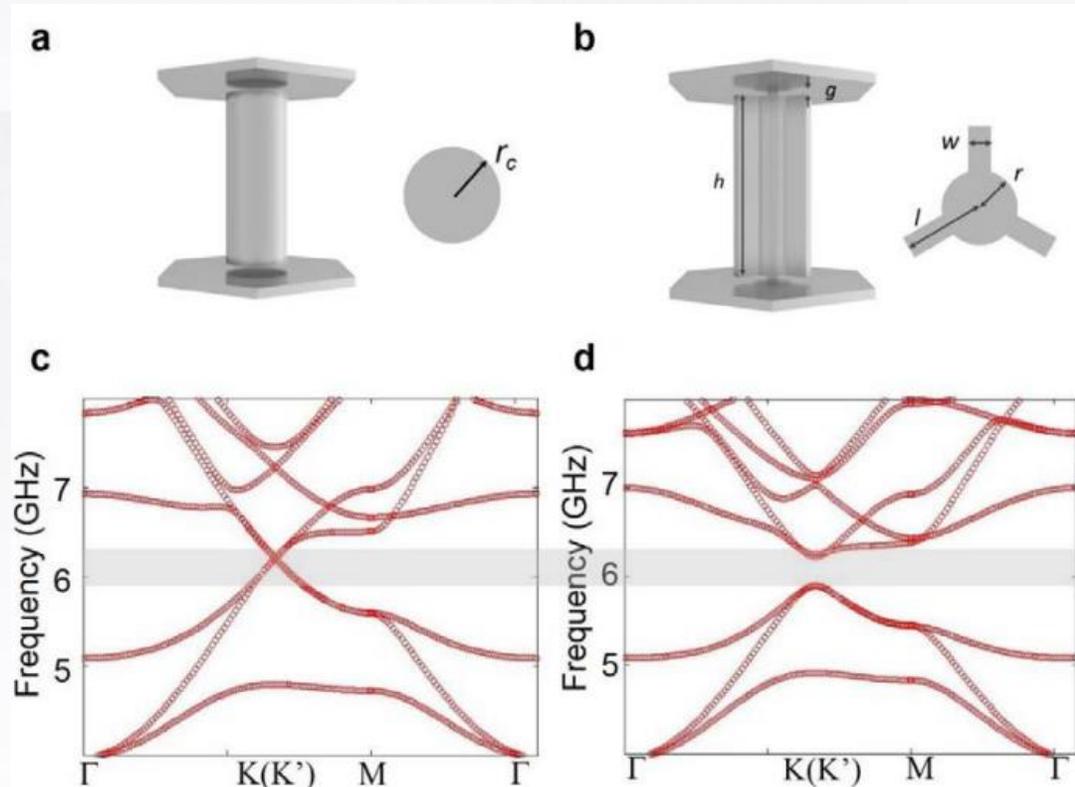
- 能谷：布里渊区边界上能带的极值点K, K'
- 光子晶体：周期性结构
- **破坏空间反演对称性**
- 能谷霍尔效应：不同赝自旋只沿着不同方向传输

能隙打开

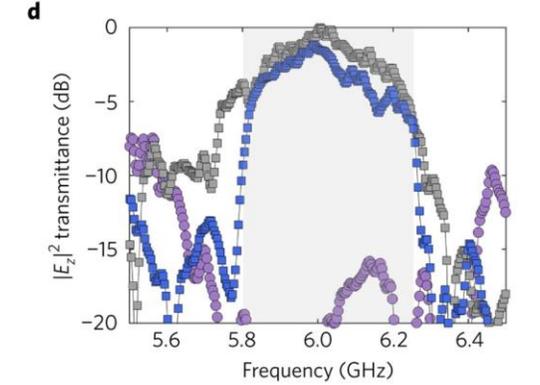
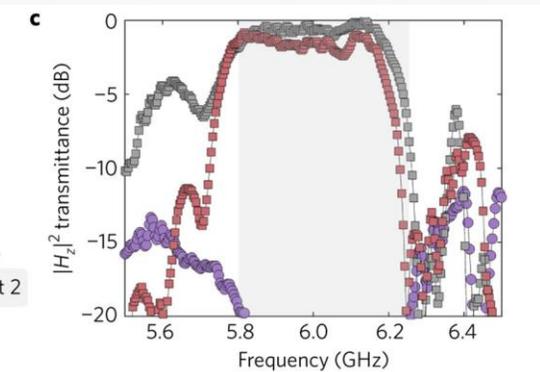
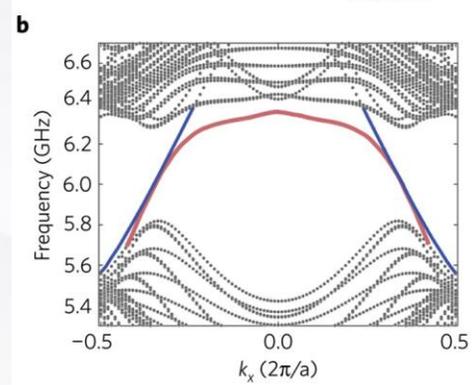
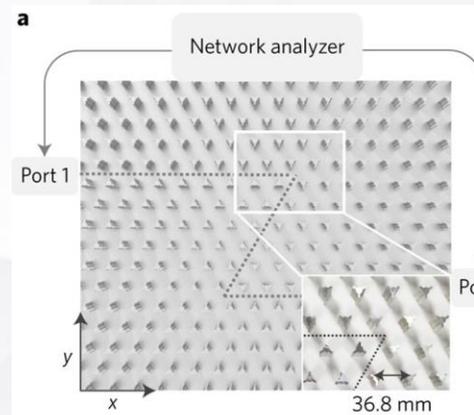
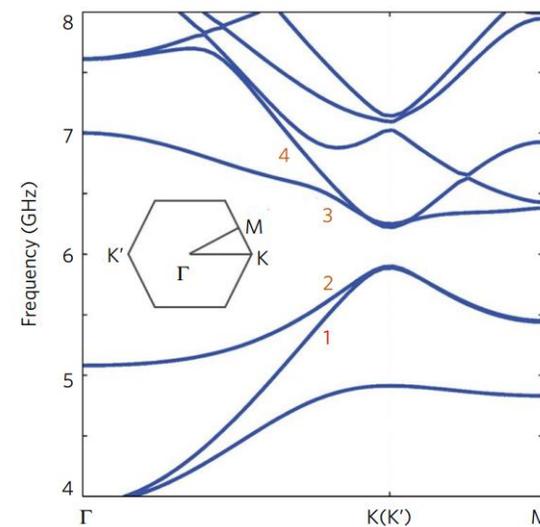
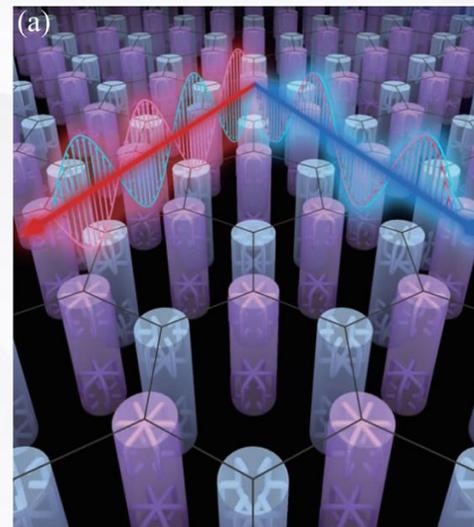
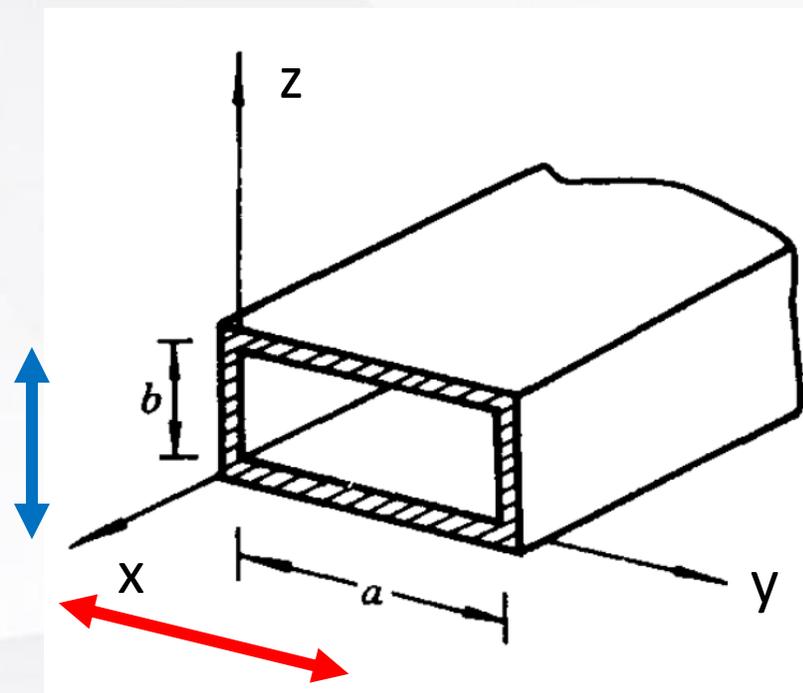
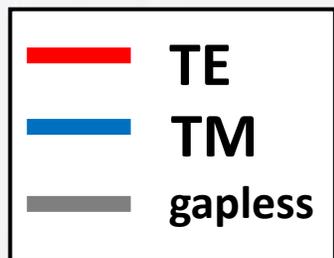
$$H_0 = v_D(\delta k_x \tau_z s_0 \sigma_x + \delta k_y \tau_0 s_0 \sigma_y).$$

$$H_P = m \tau_0 s_0 \sigma_z. \quad \text{微扰项}$$

- 轨道自由度： $\sigma_{x,y,z}$
- 能谷自由度： $\tau_{x,y,z}$
- 极化自由度： $s_{x,y,z}$



能谷锁定的拓扑保护 无散射运输



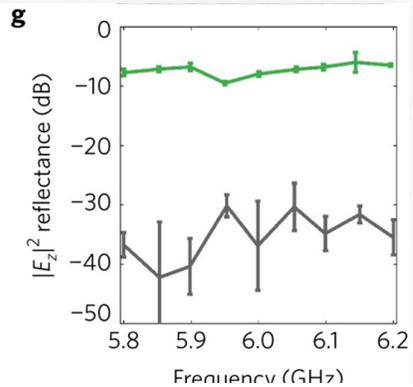
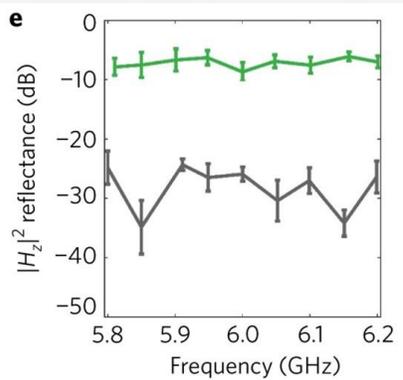
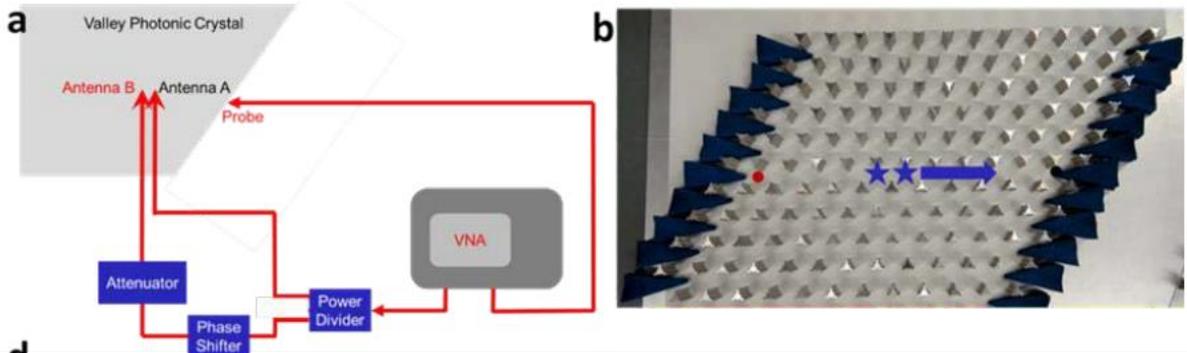


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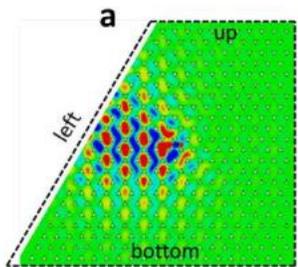
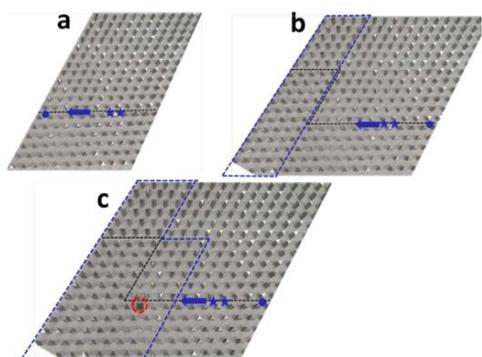
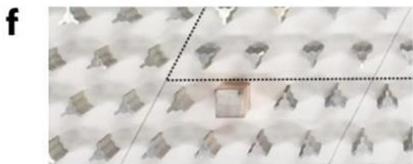
不明觉厉的实验结果

RESEARCH BACKGROUNDS

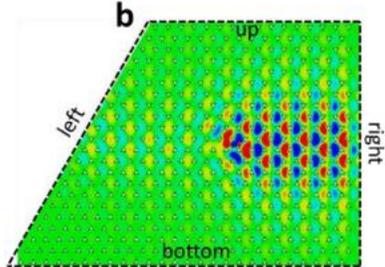
验证单向激励



反射A



$P_{left} = 98.94\%$

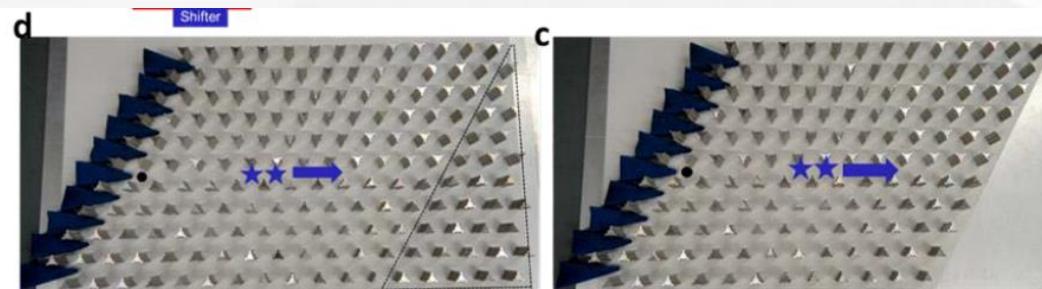
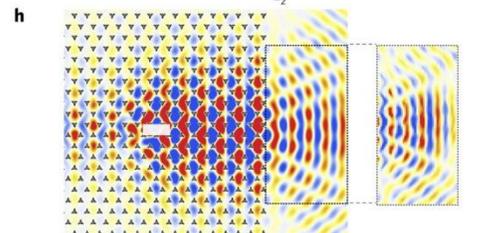
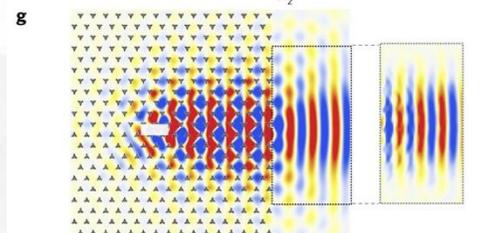
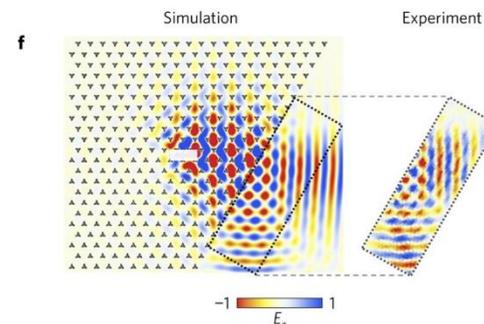
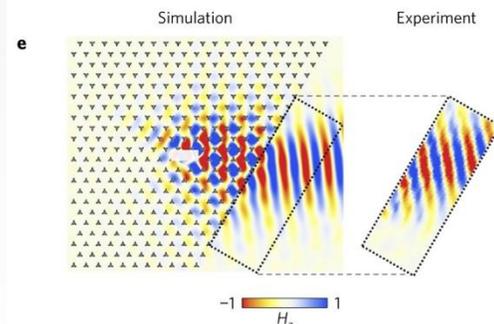
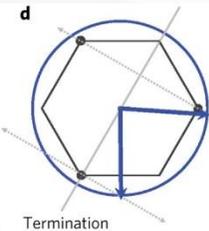
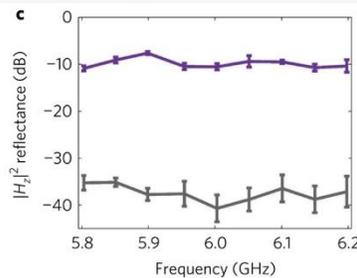
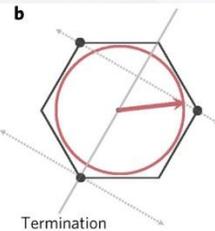
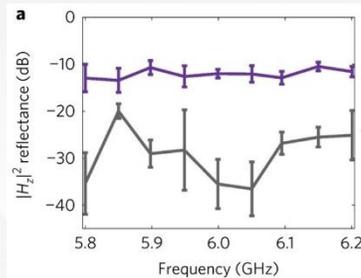


$P_{right} = 79.98\%$, and $P_{left} = 18.8\%$
 $P_{right} + P_{left} = 98.78\%$

反射B

$$\mathbf{k} \cdot \mathbf{e}_{zig} = \mathbf{K}_i' \cdot \mathbf{e}_{zig} \quad k_{TM} = \omega/c$$

$$|\mathbf{k}| = k_{TE, TM} \quad k_{TE} = \sqrt{(\omega/c)^2 - (\pi/d)^2}$$



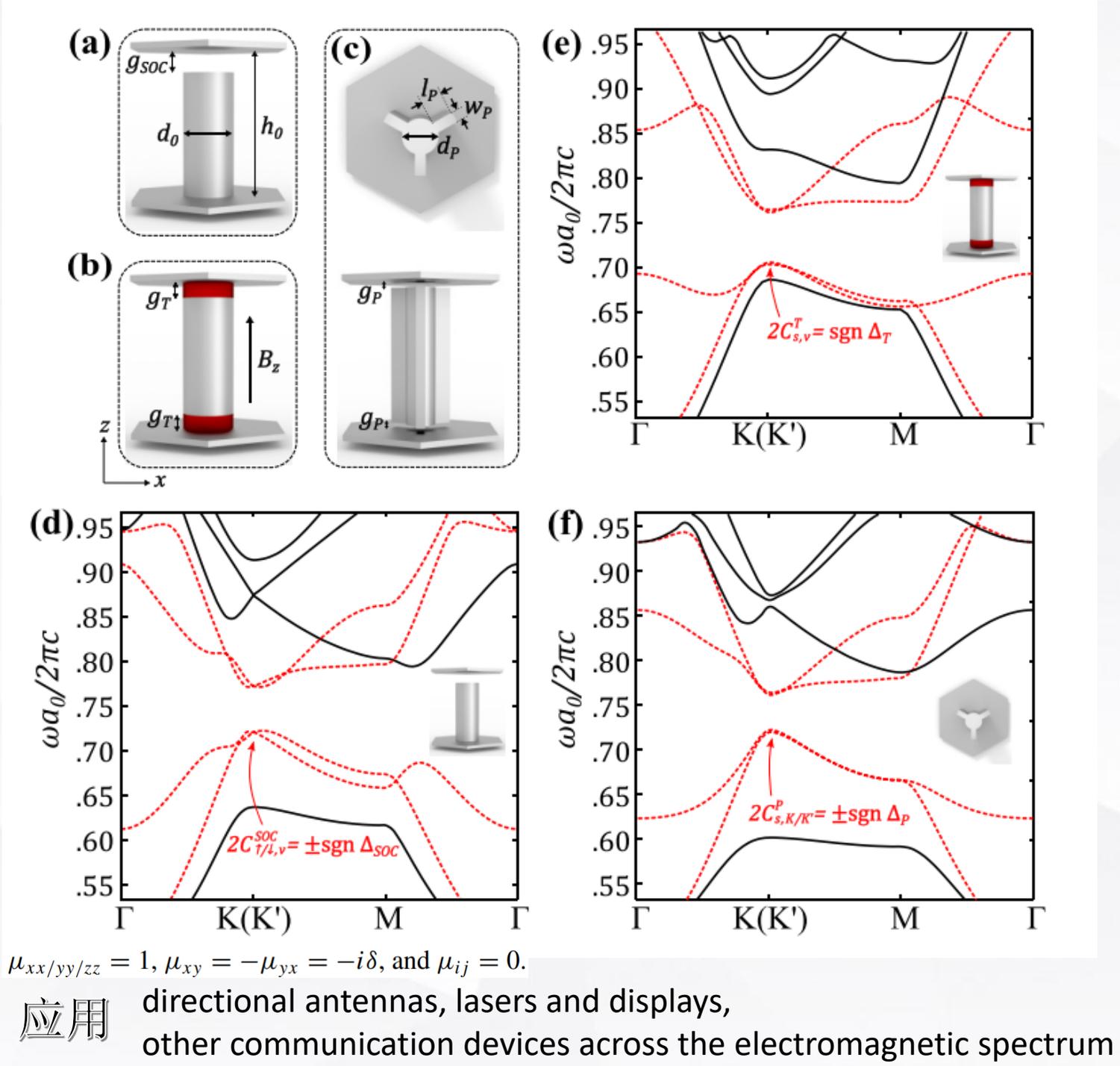
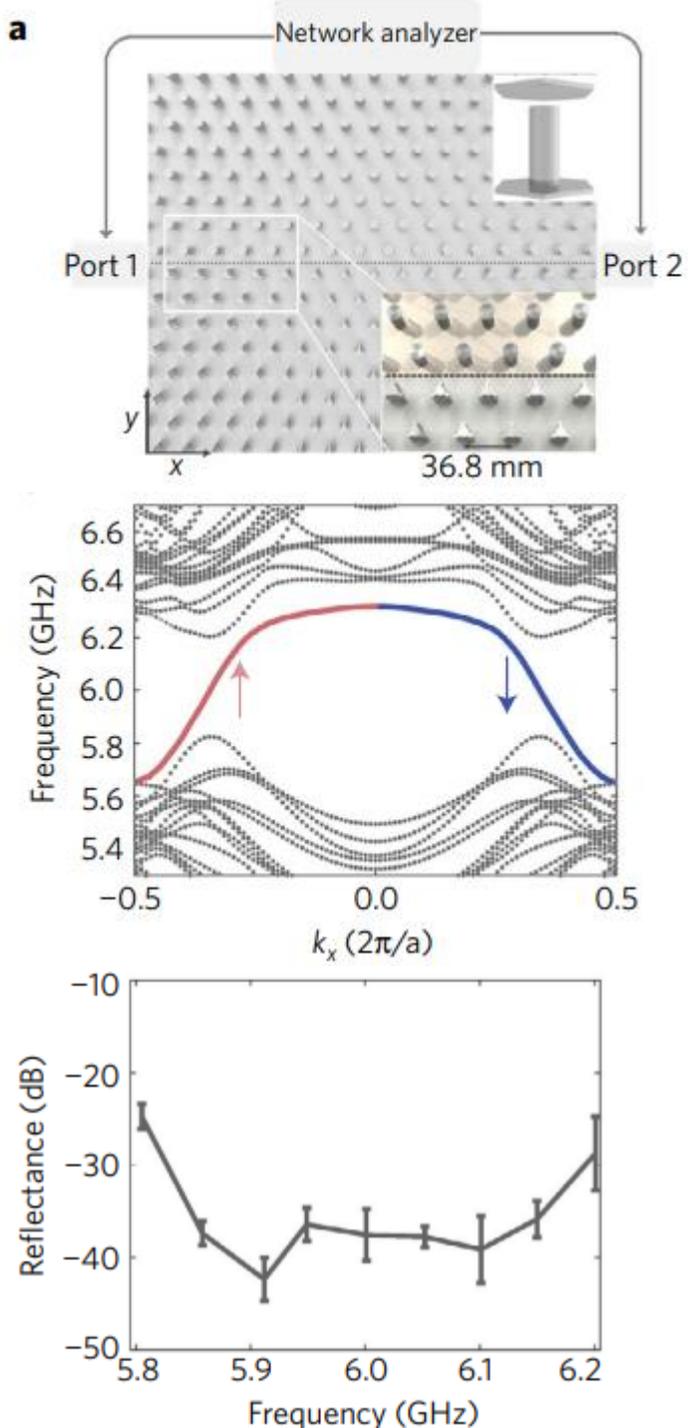


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我也不懂的课后思考

RESEARCH BACKGROUNDS





感谢