非线性空间光学
Nonlinear Spatial Optics

非线性空间光学研究通过光和非线性光学材料相互作用的手段，实现对光的空间行为的控制，包括光束的尺寸、光斑的形态、光的传播方向、光与光之间的相互作用等。

光和非线性材料相互作用的一个重要的后果是空间光孤子的形成。空间光孤子是指由于非线性效应平衡了光的自然衍射，从而在传输过程中光的波形保持不变的光束。非线性光学和空间光孤子被认为在未来的全光器件和全光网络中将扮演越来越重要的角色。

Nonlinear Spatial Optics studies the control of spatial behaviors of light with the help of interactions of light with nonlinear optical materials. Spatial behaviors of light include (but not limited to) the beam sizes/profiles/propagations and light-light interactions.

One important consequence of the nonlinear light-matter interaction is the formation of the Spatial Optical Solitons. Spatial soliton is a light beam whose waveform remains unchanged during propagation, due to the balance between nonlinear effect and diffraction. Nonlinear spatial optics and solitons are expected to become more and more important in the future for the all-optical devices and circuitry.

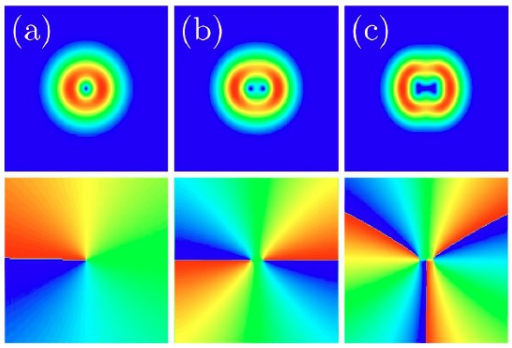

Figure 1 | Field modulus (top panel) and phase (bottom panel) distributions for vortex solitons in thermal medium with a rectangular cross section, with a topological charge 1(a), 2(b) and 3(c), respectively.

图1 | 在一个横截面是长方形的热非线性材料里面的涡流孤子。 第一行是涡流孤子的振幅分布，第二行则是其位相分布.(a),(b)和(c)图分别表示涡流 孤子的拓扑数为1、2和3。

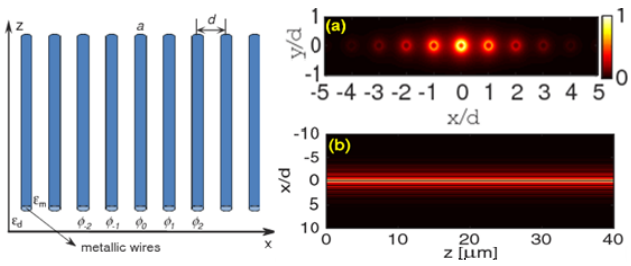

Figure 2 | Schematics of a plasmonic array (left) and the field profiles of a subwavelength plasmonic lattice solitons(a) and its diffraction-free popagation(b).

图2 | (左）等离子体波导阵列。 (a)图为一典型的亚波长表面等离子体格子孤子的场分布,而(b)图则是其无衍射传输的图像.

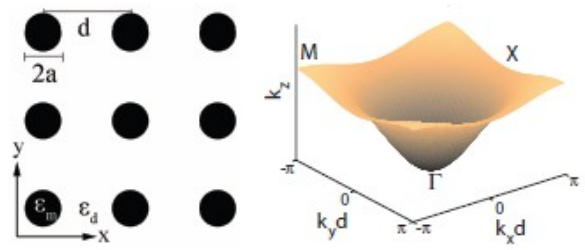

Figure 3 | a 2D array of nanowires(left) and the band structures(right).

图3 | (左)二维纳米线波导阵列。(右) 能带图。

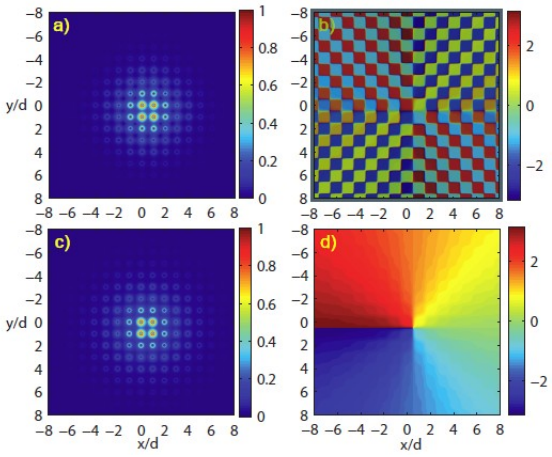

Figure 4 | The field amplitude (a,c) and phase (b,d) of vortical Plasmonic Lattice Solitons in focusing (top panel) and defocusing(bottom panel) nonlinear media, into which a 2D array of nanowires is embedded(Fig.3).

图4 | 在嵌入有二维纳米线波导阵列(图3)的自聚焦(第一行)和自散焦(第二行) 非线性材料中的涡流等离子体格子孤子的电场强度(a,c)和位相(b,d)分布。