

Wavelength-Dispersive Optical axes in Natural and Artificial Anisotropic Materials

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Anisotropic materials play a pivotal role in contemporary nanophotonics applications, such as polaritonic physics [1], subdiffractional guiding [2], and strong light-matter coupling [3]. However, anisotropic materials have static optical axes, which prevent their complete manipulation of light in anisotropic devices. Here, we found that natural van der Waals crystals rhenium disulfide and diselenide demonstrate wavelength-dispersive optical axes owing to noncollinear excitons. It results in unusual far-field and near-field responses with the opportunity to control light propagation with even a slight wavelength shift. Moreover, we developed a technology for engineering systems with wavelength-dispersive optical axes via carbon and transition metal dichalcogenide nanotubes. It allows us to design almost any rotation of optical axes. Thus, the discovered phenomenon of wavelength-dispersive optical axes offers a novel route for light manipulation without nanostructuring.

References

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Figures

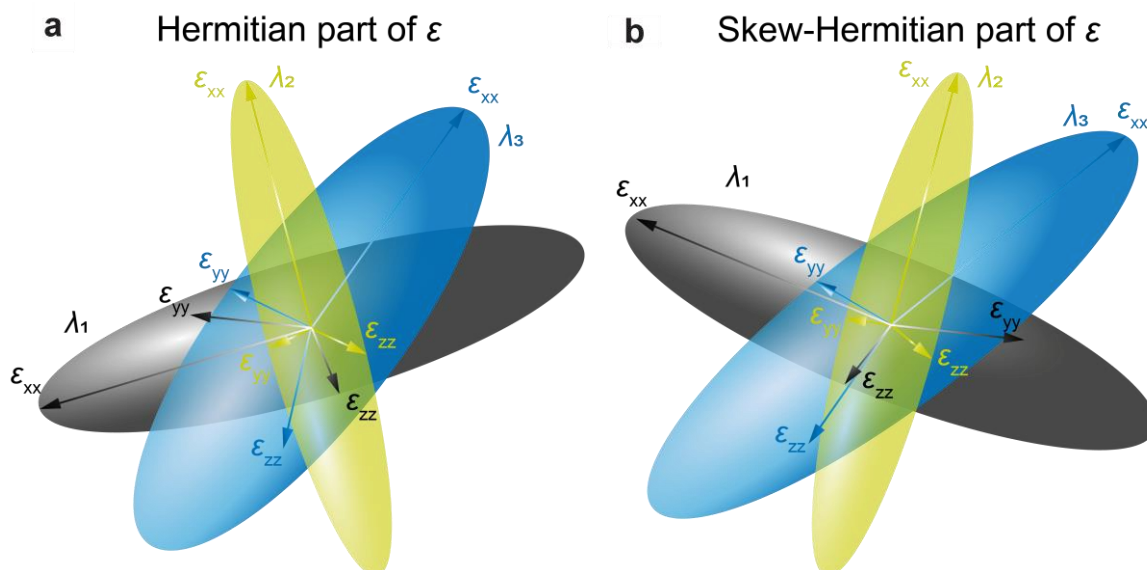


Figure 1: Schematic illustration of principal optical axes rotation.