# Exploiting orientation of anisotropic nanoparticles in topological plasmonic arrays

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Abstract

In the limit of small size, single metallic nanoparticles behave like electric dipoles. An array of metallic nanospheres with alternate distances is then a plasmonic analogue of the SSH model [1]. However, nanoparticles have features that fundamental particles lack, e.g. dimensions or geometrical form, which can be exploited in plasmonics to explore topology beyond condensed matter. When particles are anisotropic, surface plasmon resonances occur at different frequencies depending on the axis. Then, if the anisotropy is significant, near the plasmonic resonance in one axis, the dipole is projected along that same direction [2]. Here we show that this projection can be used to tune the coupling between the nanoparticles in an array, allowing to open topological gaps without alternating distances. As an example of the potential of the use of anisotropy for topology, we study 1D chains of prolate spheroidal silver nanoparticles.

## References

[1] Simon Pocock, Xiaofei Xiao, Paloma A. Huidobro and Vincenzo Giannini, ACS Photonics, 2018, 5,6, 2271-2279.

[2] Matthew Proctor, Xiaofei Xiao, Richard V. Craster, Stefan A. Maier, Vincenzo Giannini, and Paloma Arroyo Huidobro, Photonics 2020, 7(4), 81

## Figures

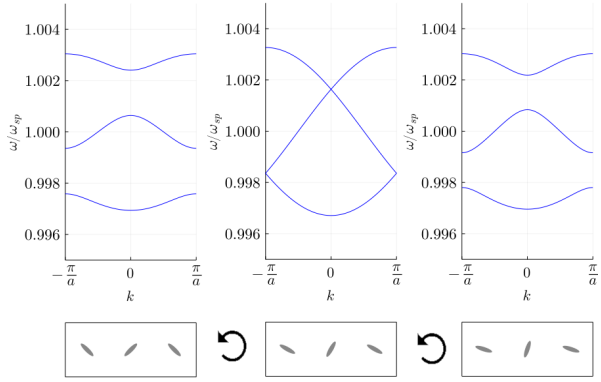


**Figure 1:** Bands for different orientations of the nanoparticles: By rotating nanoparticles in the unit cell, we can open topological gaps.