Singular dispersion equation: breaking diffraction limit in dielectrics

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Plasmonic effects have demonstrated the remarkable ability to surpass the optical diffraction limit, achieving extreme spatial localization of light fields. This capability has attracted widespread interest and has been widely applied in fields such as physics, chemistry, engineering, and biology. In contrast, dielectric systems have long been considered incapable of achieving similar breakthroughs. In this presentation, we will reveal a novel approach based on the singularity dispersion equation, demonstrating how dielectric systems can also overcome the diffraction limit. Building on this theoretical foundation, we have developed singularity dielectric nanolasers that achieve light localization at the atomic scale. Additionally, we will explore strategies for creating optical nanocavities with ultra-high quality factors and discuss the integration of nanolasers into phased arrays for applications in the optical frequency domain.

References

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