

# Generation of Non-Rayleigh Non-Diffracting Speckles

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Optical speckle fields with both non-Rayleigh statistics and non-diffracting characteristics in propagation are an important light source for many applications. However, tailoring either non-Rayleigh statistical speckles or non-diffracting speckles are only investigated independently in previous studies. Here, we report the first observation of optical speckles that remain diffraction-free over a long axial distance while keeping non-Rayleigh statistics simultaneously. We further show the enhancement of Anderson localization of light with the non-Rayleigh non-diffracting speckles. The work presented here provides a versatile framework for customizing optical fields with desired speckle patterns for applications in the fields of solid-state physics, cold atoms, and optical imaging.

## References

- [1] R F Liu, B C Qing, S P Zhao, P Zhang, H Gao, S Q Chen and F L Li, Phys. Rev. Lett. **127**, 180601 (2021)