# Optimal Diffractive Focusing of Quantum Waves

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Following the familiar analogy between the optical paraxial wave equation and the Schrödinger equation, we derive the optimal, real-valued wave function for focusing in one and two space dimensions without the use of any phase component [1]. We compare and contrast the focusing parameters of the optimal waves with those of other diffractive focusing approaches, such as Fresnel zones. Moreover, we experimentally demonstrate these focusing properties on optical beams using both reflective and transmissive liquid crystal devices. Our results provide an alternative direction for focusing waves where phase elements are challenging to implement, such as for X-rays, THz radiation, as well as atomic and electron beams.

## References

[1] M.A. Efremov, F. Hufnagel, H. Larocque, W.P. Schleich, E. Karimi, Optimal Diffractive Focusing of Quantum Waves, arXiv:2406.13545 (2024)