

# Gouy Phase Shift of Bessel Gauss Laser Beams in Plasmas with Axial Temperature Ramp: Effect of Self Focusing

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This paper investigates the Gouy phase shift of Bessel-Gauss laser beams propagating through a plasma medium characterized by an axial temperature gradient. The interplay between the Bessel-Gauss beam profile and the self-focusing effect induced by the plasma is examined. The analytical expression for the Gouy phase shift is derived, incorporating the influence of both the beam's spatial structure and the plasma's temperature distribution.

Variational theory has been used to make predictions of the impact of self-focusing on the Gouy phase shift. The results demonstrate that the axial temperature ramp significantly modifies the Gouy phase shift, leading to deviations from the behavior observed in uniform plasma environments. The findings have implications for various applications involving laser-plasma interactions, including plasma diagnostics, laser-driven particle acceleration, and high-harmonic generation.

## Type of presence

Presence online

**Primary author:** BRAR, Rajnoor Singh (Lovely Professional University)

**Co-authors:** Dr GUPTA, Naveen (Lovely Professional University); Ms MALIK, Nishu (Lovely Professional University)

**Presenter:** BRAR, Rajnoor Singh (Lovely Professional University)

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