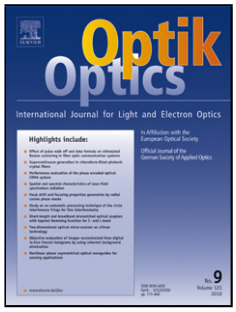

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Stronger self-focusing of a chirped pulse laser with exponential density ramp profile in cold quantum magnetoplasma

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ABSTRACT

Stronger self-focusing of chirped pulse laser with exponential plasma density ramp profile in cold quantum magnetoplasma has been presented. Low value of the beam width parameter in the focal region due to nonlinear dielectric role of relativistic plasma with exponential density transition is observed. Further, the significant contribution of the cold quantum magnetoplasma with the optimized value of magnetic field lead to enhanced self-focusing. Here, in this present manuscript we have observed stronger self-focusing with increased value of the chirp parameter '*b*'. Also intensity of the laser beam imparts chief role in achieving the stronger self-focusing. The present work may have very valuable applications in the field of laser driven accelerators, laser driven fusion etc.

Key Words: Self-focusing, exponential plasma density ramp, chirped pulse laser, cold quantum plasma

1. INTRODUCTION

Latest endless advances in ultra-intense short-pulse laser fascinated the scientists because of their number of applications in the field of ion block acceleration, mono-energetic electron generation, harmonic generation and inertial confinement fusion [1-8]. Change in the refractive index of plasma occurs because of the induced quivering motion of electrons, whenever highly intense lasers beam penetrates through plasma [9, 10]. Under these conditions, the plasma starts behaving like to a positive lens initially, decreasing laser spot size and hence, continues its de-