

## 2<sup>nd</sup> International Congress on Optics and Laser Technology

October 22 | Virtual Event



### Jyoti Rajput

Lovely Professional University  
India

### Static Magnetic Confinement Influence on Electron Acceleration Induced by Laguerre-Gaussian Laser Pulse

#### Abstract:

Electron acceleration using structured laser beams provides an attractive approach for developing compact acceleration systems applicable to high-energy density physics. This work presents a theoretical analysis of electron motion driven by a Laguerre-Gaussian (LG) laser pulse under the influence of a static magnetic confinement field. The inherent orbital angular momentum and helical phase structure of LG beams generate azimuthal field components that, when interacting with the cyclotron motion induced by a uniform magnetic field, significantly modify the acceleration process. A relativistic Lorentz-force model is employed to capture the coupled dynamics, and analytical expressions are derived to estimate energy gain and trajectory variations for different laser and field conditions. Numerical simulations demonstrate that magnetic confinement strengthens longitudinal trapping, minimizes transverse spreading, and enhances overall energy transfer from the laser to electrons. The findings suggest that the synergy between LG beams and static magnetic fields can address key constraints of Gaussian-laser-driven acceleration, offering a viable route toward efficient, tunable, and compact laser-based electron acceleration systems

#### Biography

**Jyoti Rajput** is featured in world's top 2% scientist list in the field of optics, and is working as a professor in the department of physics, Lovely Professional University, Phagwara, Punjab, India. She received his/ her Ph.D. degree from National Institute of Technology, Jalandhar, India in 2019. Her research areas include Laser-induced Plasma interactions viz charged particle acceleration, THz radiation generation and harmonic generation in plasma. She has submitted research proposals in DST (SERB) and CSIR. She is also a member of different reputed organizations like Plasma Science Society of India (PSSI) and Indian Science Congress Association (ISCA). She has published around 48 SCI research publications. She has been an active reviewer in eminent international SCI journals and has been an invited speaker in various internationally reputed conferences held in Germany, UK, Italy, etc. She has edited various research books and been an organising committee member with international conferences.