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## **Optical Design Of Laser Beam**

Beam-expander design concepts are derived from the fundamental principles of telescope design. When a collimated laser beam is input to one side of the beam expander, a collimated beam is output from the other end—that is, the object space and image space rays converge at infinity. This characteristic

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defines a beam expander as an afocal system.

## **Optical Design: How to select the right laser beam ...**

- Geometrical methods for design of laser beam shaping systems uses: - Conservation of energy within a bundle of rays, - Constant optical path length

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condition. • Numerical and analytical techniques used to design a 2-plano-aspherical lens system and a 2-mirror system with no central obscuration. • Laser beam shaping merit function used with

## **Optical Design of Laser Beam Shaping Systems**

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Using geometrical methods for the optical design of laser beam shaping systems involves incorporating the geometrical optics intensity law for propagation a bundle of rays (conservation of energy) and the constant optical path length condition into the ray trace equations for the optical system, and then, determining



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the geometrical shapes of several optical surfaces (or GRIN materials) so that the beam shaping design conditions are satisfied.

## **Optical design of laser beam shaping systems**

Abstract Control of the optical fields of laser beams, i.e., laser beam shaping, is

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of great importance to many laser applications. Freeform optics offers plenty of advantages for complex beam shaping requirements, including precise beam control, energy efficiency, compact structure, and relatively low cost.

## **Simplified freeform optics design**

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## **for complicated laser ...**

elements and optical systems have been developed for laser beam shaping. Hoffnagle et al. [1] described a refractive beam shaper which can be used to sort the light into a flat-top distribution using two specially designed aspherical lenses. The disadvantages of such systems are the strict dependence

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on the entrance profile and the proper alignment. Alignment errors and fluctuations of the laser beam have a strong influence on the achieved uniformity.

## **Laser Beam Homogenizing: Limitations and Constraints**

Finally, we assumed the laser was a

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Helium Neon (HeNe) design and optimized for a design wavelength of 632.8nm. Since beam expanders are afocal systems, make sure “afocal image space” is checked in the Zemax lens data editor. This will change the units of the metrics to be angular rather than distances.

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## **How to Design your own Beam Expander Using Stock Optics**

Examples of the application of the Galilean telescope design to laser beam expanders can be found in several Edmund Optics products, all of which can be used to collimate and focus laser beams. Our TECHSPEC<sup>®</sup> Arcturus HeNe Beam Expanders is a simple two-lens

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design, consisting of a negative lens and achromatic lens. Drawing of the internal optical elements is shown for reference.

## **Laser Beam Expanders | Edmund Optics**

Unstable laser resonators (not used in most lasers) produce fractal-shaped beams. Specialized optical systems can

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produce more complex beam geometries, such as Bessel beams and optical vortexes. Near the "waist" (or focal region) of a laser beam, it is highly collimated: the wavefronts are planar, normal to the direction of propagation, with no beam divergence at that point.

**Laser - Wikipedia**



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The optical setup below shows a laser coupled to a MM fiber to achieve uniform intensity distribution in the far field or alternatively in the focal plane when used with a focusing lens. The number of modes in the output is proportional to the fiber length and core diameter.

## **Optical Diffuser / Homogenizer**

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## **Application notes - Holo Or**

Laser system design. Photonics software (OmniSim, FIMMPROP, CrystalWave, PICWave) for active and passive component and circuit design. Gaussian beam propagation along optical systems and laser cavities. Universal rigorous grating solver based on the RCWA and the Rayleigh-Fourier method.

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## **OpTaliX: Optical Design Software**

These Galilean beam expanders incorporate the highly regarded Tropel optical designs with improved adjustability and mounting. They are ideal for applications in which a small spot must be formed at some distance from the laser, or where the collimation

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range must be extended for illumination, or for alignment of distant objects.

## **Laser Beam Expanders - Newport**

Laser Beam Shaper-Design an aspheric surface to modify a gaussian beam into a top hat beam  
Laser Resonators -Adjust resonator parameters to determine mode size and stability Index &

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Reflection -A summary of material properties, index and Fresnel reflection at various angles

## **Design Tools | LightMachinery**

See the application gallery of systems designed by CODE V like the Hubble Space Telescope first servicing optics, Blu-Ray and HD-DVD Objectives Design,

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Laser Beam Shaping System,  
Ophthalmoscope, Photonics,  
Microlithography, Cameras, Aerospace

## **Optical Design Application Gallery - CODE V | Synopsis**

If a weakly diverging beam passes through the shaper, it is exactly as though a collimated beam passed

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though the shaper, followed by a weakly diverging lens. Calculator Details. Under the 'Parameters' section, various parameters of the optical system (wavelength, incident beam width, etc.) are set. Click a title for a description.

## **Laser Beam Shaper Users' Guide | LightMachinery**

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Our work: Optical, opto- mechanical design & production of sapphire lens for Co2 laser beam shaping Client: Consumer products Our work: Design & production of plastic light pipe with Fresnel surface for 4 color LED

**Need help with optical engineering or lens design?**



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OEM Laser Heads. Vigitek can design high-performance OEM laser heads, devise a cost-efficient manufacturing process and produce them. Learn more. Laser Beam Engineering. Vigitek, Inc. designs and develops beam-delivery arrangements with spatial beam processing, feedback logics and various imaging options. Learn more.

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## **Home - VigitekVigitek | Medical Laser Consultants**

Laser beam shaping are used in a wide range of laser instrumentation or laser applications, including laser beam steering or material processing. Laser Optics use specific optical substrates, optical coatings, or a combination of the

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two to provide superior performance at specific laser wavelengths or over a range of wavelengths.

## **Lens Design In Singapore | Laser Beam Shaping Techniques ...**

Precise expansion and shaping of laser beams - asphericon BeamTuning In addition to the aspheric beam expanders

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(a|BeamExpander) for expanding and reducing lasers, asphericon has developed further optical modules within the BeamTuning line.

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