EDU CA TION KITS

Photonics4Work

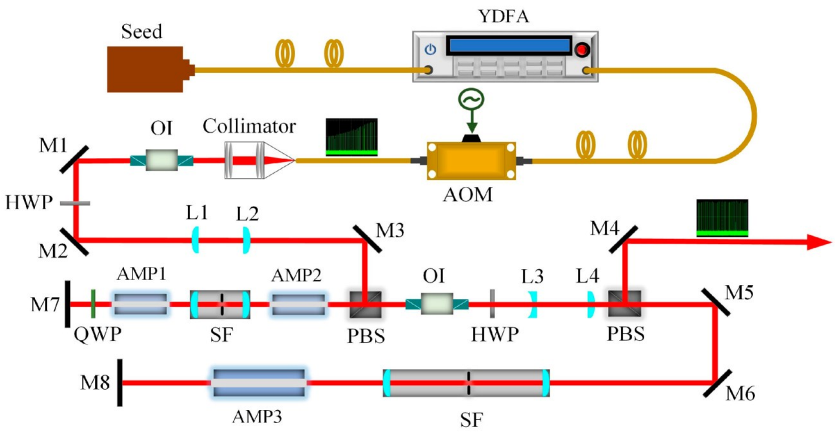
ASE Educational Kit

Educational system for amplifying and characterizing a pulsed laser
Study the fundamentals by building using building blocks.

An amplifier and measurement system was designed to keep academic education on track with industrial and scientific developments.
This system aims to clarify two major aspects of state-of-the-art short-pulse laser technology: the functionality of a Master-Oscillator Power-Amplifier (MOPA) based on an optically pumped Ytterbium-doped fiber, and the technique of pulse width measurements utilizing an intensity autocorrelator. Together, these components form a complex lab course which covers the necessary topics to understand these technologies.
The MOPA-system amplifies the pulses of a picosecond diode laser (the seed laser) and gives the opportunity to characterize all of the essential parameters of its operation; i.e. the pump-power dependent forward and backward propagating amplified spontaneous emission (ASE), and the time-integral power of the amplified pulses. In addition, the spectral differences between lasing and ASE and the side-fluorescence spectrum of the pumped fiber can be analyzed. The temporal pulse width of the amplified pulses can be measured with the intensity autocorrelator in order to calculate the actual peak pulse power.

To understand the interactions between different experimental parameters, the pump laser is adjustable in output power and center wavelength and the seed laser is adjustable in output power and repetition rate.

Overall, this educational platform gives the opportunity to vary and measure a large number of system parameters and helps to connect theoretical background with practical experience.



Included opto mechanics, optics & fibers
You use your own lab laser, and measurement equipment

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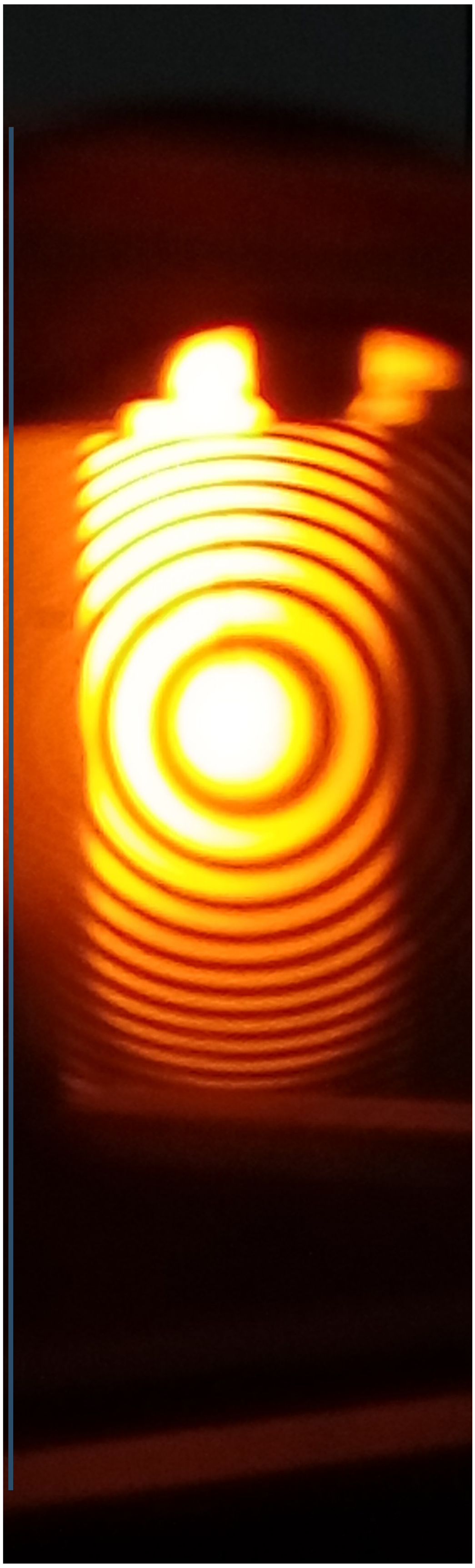
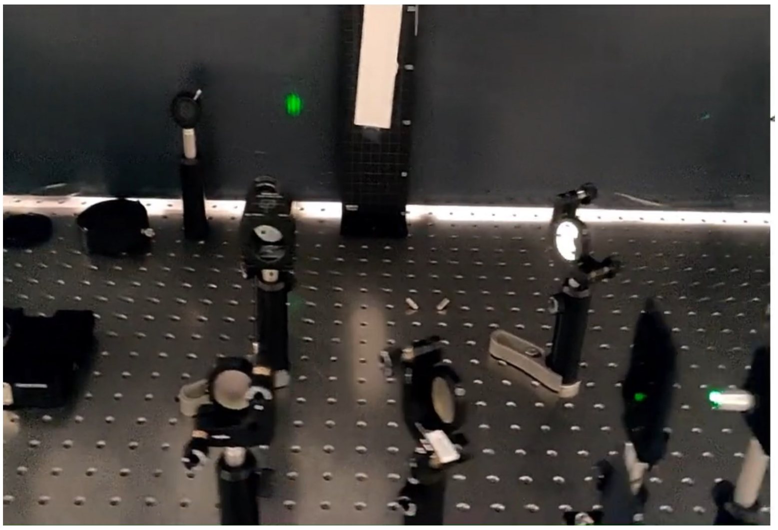
Michaelson Interferometer

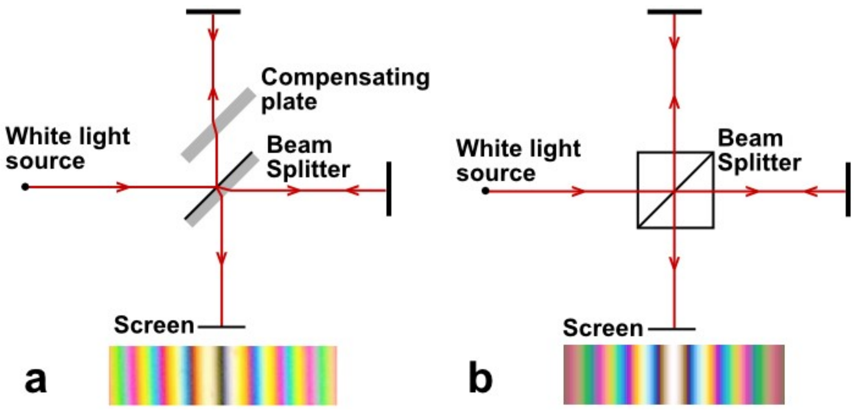
Educational system for amplifying and characterizing a pulsed laser
Study the fundamentals by building using building blocks.

A Michelson Interferometer is a straightforward interferometric setup consisting of a coherent light source, a beamsplitter, and two mirrors. The beamsplitter divides the light into two paths, with each beam traveling slightly different distances before reflecting off the mirrors and returning to the beamsplitter. When the beams recombine, interference fringes are produced if the difference in their path lengths is less than the coherence length of the light source. Since the coherence length is typically very short, achieving accurate alignment and using precision components is essential but can be challenging. .

This kit, will make you play to discover the dualism of light, does it behave like a Water droplet or like an electron.







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Spectrometer Kit

Study the fundamentals of various spectroscopy techniques, like Fluorescence, Transmission, Reflection and Raman.

Unlock the mysteries of the universe through the power of spectroscopy! Our Educational Spectroscopy Set is the perfect tool for students, hobbyists, and educators to explore the fascinating world of light and color.

* Key Features:

Comprehensive Learning Kit: Includes a high-quality diffraction grating, prism, light source, and everything needed to observe and analyze spectra.

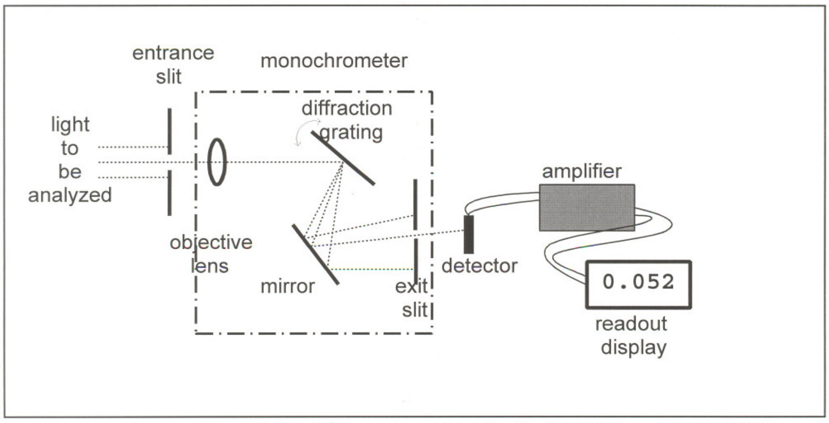
Hands-On Learning: Engage in real-world experiments that demonstrate core concepts like wavelength, frequency, and the electromagnetic spectrum.

Perfect for enhancing physics, chemistry, and astronomy lessons. Aligns with national science standards.

User-Friendly Guide: Step-by-step instructions and experiments designed for all skill levels.

* For Every Aspiring Scientist: Whether in the classroom, home lab, or science club, our set helps learners understand how visual light reveals the composition of stars, chemical reactions, and much more.

Ready to see the world in a new light? Order your Educational Spectroscopy Set today and bring science to life.



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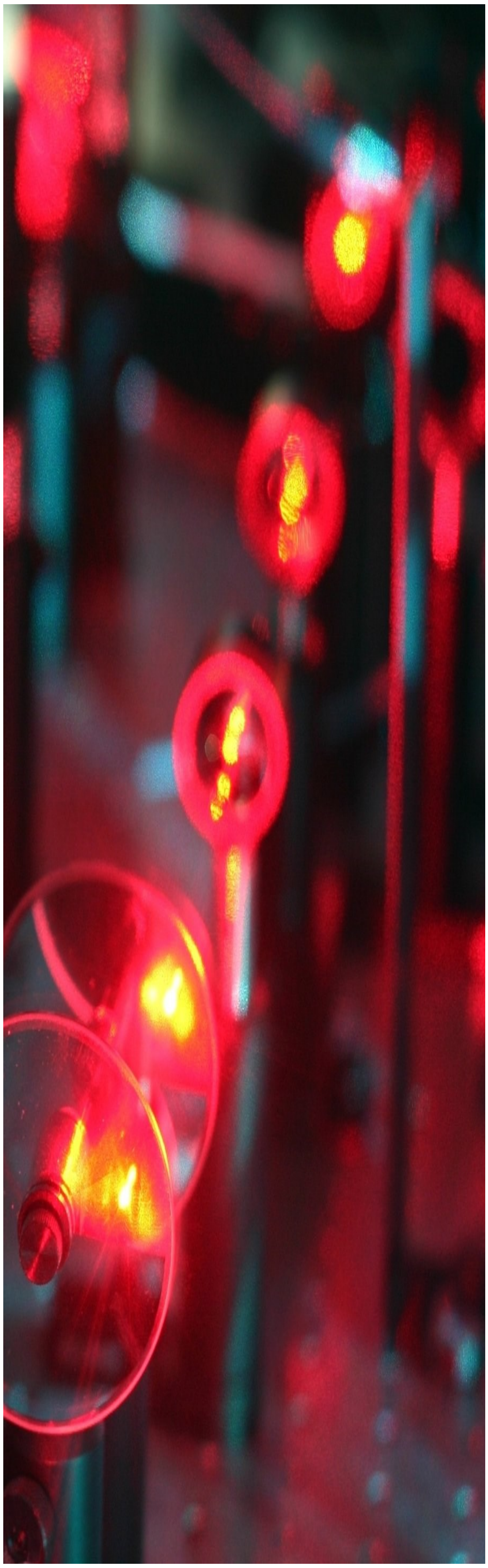
Optical Components Kit



Enhance Applied Physics Lessons with our Optical Components Kit!

Take your applied physics experiments to the next level with our Optical Components Kit—designed specifically for advanced learning and exploration in optics.

Kit Highlights:

High-Precision Optics: Includes lenses, prisms, mirrors, diffraction gratings, and more, made from premium materials for accurate, reliable results.

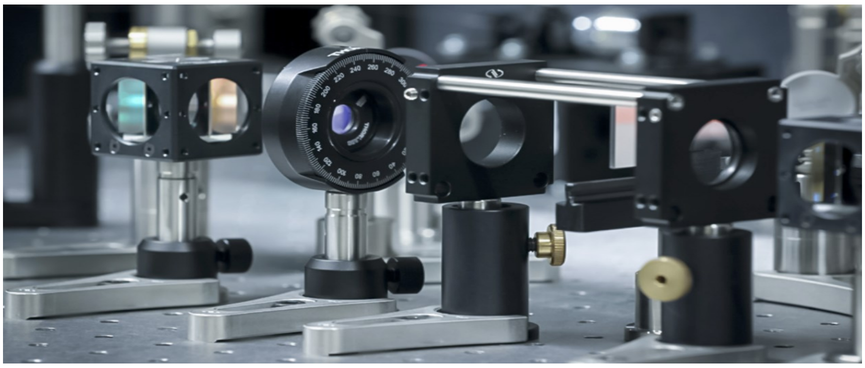
Comprehensive Learning: Perfect for experiments in reflection, refraction, diffraction, and interference, helping students understand core principles of light and wave behavior.

Versatile and Modular: Each component is designed to integrate easily into a wide range of setups, providing flexibility for diverse optical experiments.

Durable and Student-Friendly: Built to withstand frequent handling in university labs while ensuring ease of use for students and educators alike.

Advanced Application: Ideal for hands-on learning in physics courses covering geometric optics, wave optics, and quantum optics.

Empower students to see the beauty of light in action. Equip your university labs with the Optical Components Kit and inspire the next generation of physicists!.



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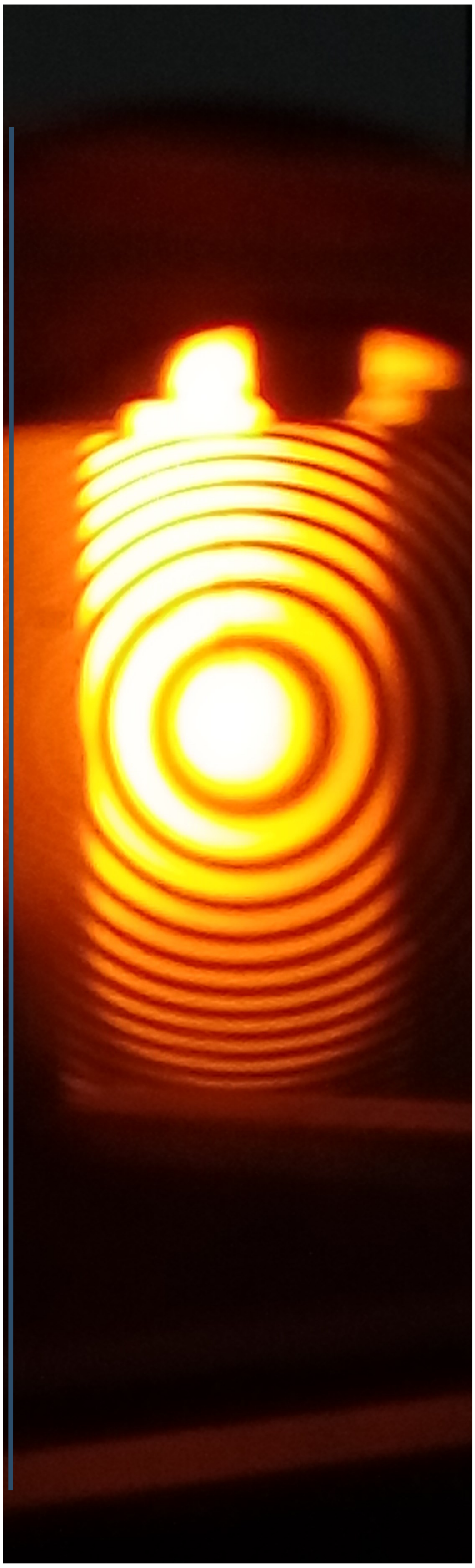
Laser unequal path interferometer

Educational like blocks LUPI interferometeryst



A **Laser Unequal Path Interferometer** (LUPI) is a type of interferometer that uses laser light as a coherent source and features optical paths of different lengths. This design is useful for applications where precise measurements of small distances, changes in refractive index, or other physical properties are required. It operates by splitting a laser beam into two paths, which travel unequal distances before being recombined, creating an interference pattern. The difference in path lengths causes a phase shift between the two beams, resulting in constructive or destructive interference depending on the relative phases.

Key Features of Laser Unequal Path Interferometers:
Unequal Path Design: The two arms of the interferometer have different lengths, which can be used to create a controlled phase difference between the two beams. This setup allows for sensitive detection of changes in optical path length, which could be due to variations in distance, material properties, or environmental factors (e.g., temperature, pressure).
Laser Source: A laser provides a coherent, monochromatic source of light with a long coherence length, which is crucial for maintaining interference even with significantly unequal path lengths. This ensures stable and precise interference patterns.
Applications:

- **Metrology**
- **Optical Testing**
- **Vibration and Motion Sensing**
- **Environmental Sensing**

•**Interference Fringe Patterns**: The recombination of light after traveling unequal paths produces interference fringes. Variations in the length of one path relative to the other shift these fringes, allowing precise measurement of changes in the optical path difference.

Sensitivity to Phase Differences: The unequal path interferometer is sensitive to phase changes caused by differences in the lengths of the two arms or by changes in the medium through which the light travels (e.g., air, vacuum, glass). This sensitivity makes it useful in detecting extremely small changes in distance or refractive index.

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Holography Setup

Creating 3D Images with Light

Holography is a technique that records and reconstructs the light field scattered by an object to create a 3D image. Unlike photography, which captures only intensity, holography captures both the intensity and the phase information of light waves. The result is a 3D image, or hologram, that changes perspective as the viewer moves. Setting up a holography experiment requires precision in optics and stable environmental conditions to record the interference pattern generated by light waves.

Key Components of a Holography Setup:

Laser Light Source: A laser is essential for holography due to its coherence (the ability of the light waves to remain in phase over a long distance) and monochromatic (single color) nature. The coherence allows the formation of stable interference patterns necessary to capture a hologram. He-Ne Lasers (Helium-Neon lasers) are commonly used in traditional holography due to their high coherence length and stable output at a wavelength of 632.8 nm.

Beam Splitter:A beam splitter divides the laser beam into two separate beams:

Object Beam: Illuminates the object being holographed.

Reference Beam: Directed directly toward the recording medium without interacting with the object.

Mirrors and Lenses: Mirrors and lenses are used to direct and shape the laser beams. Mirrors guide the beams into the desired paths, while lenses can expand or focus the beams to ensure even illumination of the object and recording medium.

Object: The object to be holographed should ideally have surfaces that scatter light effectively, such as a textured or matte surface.

Recording Medium:This is where the hologram is captured. Traditional holography uses:

Photographic plates coated with light-sensitive emulsions (such as silver halide or dichromated gelatin) that record the interference pattern formed by the object and reference beams.

Stable Mounting System:All components of the holography setup, including the laser, mirrors, object, and recording medium, must be mounted on a stable optical table or vibration-free platform. Even the slightest movement can disturb the interference pattern and ruin the hologram.

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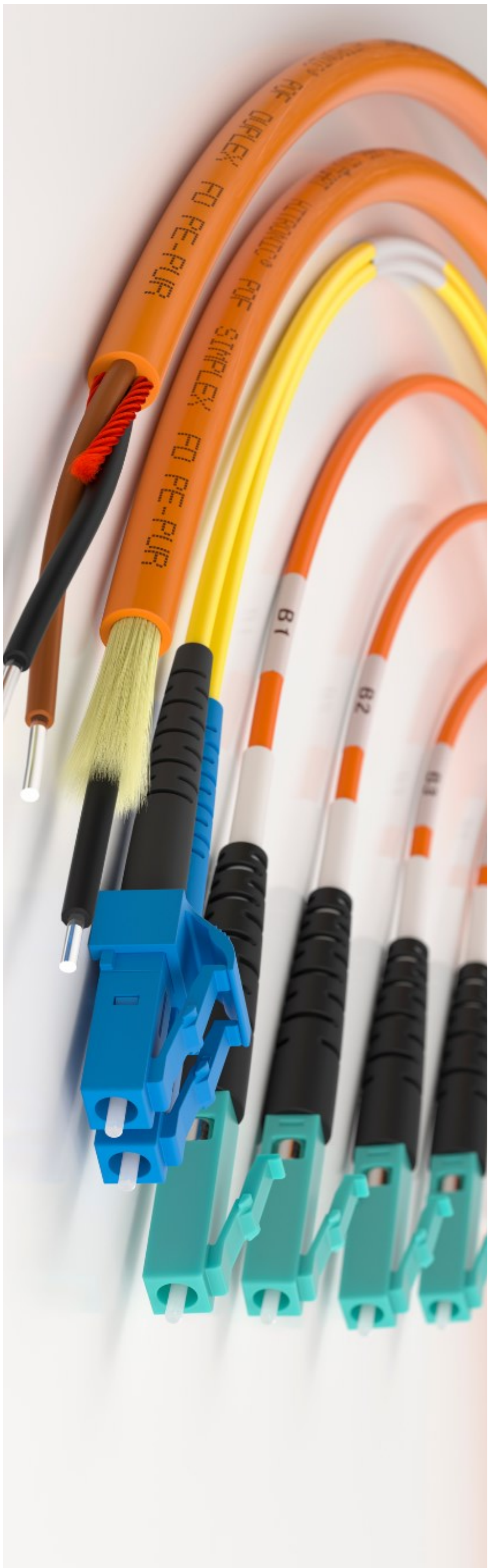
FiberOptic Workshop



Learn about all the differences between the most common used optical fibers:

Differences Between Single-Mode, Multimode, and Polarization-Maintaining Fibers

Single-mode fibers (SMF), multimode fibers (MMF), and polarization-maintaining fibers (PMF) are three distinct types of optical fibers, each suited for different applications due to their unique structural and operational characteristics.

Learn by “simple” tests which fiber to select for the following applications:

Sensing: Used in fiber optic sensors where polarization sensitivity is required, such as strain, temperature, or pressure sensors.

Coherent Communications: High-precision applications such as coherent optical communications systems, where polarization drift could affect signal quality.

Interferometry: Essential in setups like interferometers for maintaining the polarization state of light.

Quantum Computing and Cryptography: Due to the need for precise polarization control.

Short-distance communication like in LANs (Local Area Networks), data centers, and intra-building applications.

Used in industrial and medical applications where shorter range and cost-effectiveness are priorities.

Long-distance data transmission (telecommunications).

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