

ePulse: Laser Measurement News

The true measurement of laser performance



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October 2019

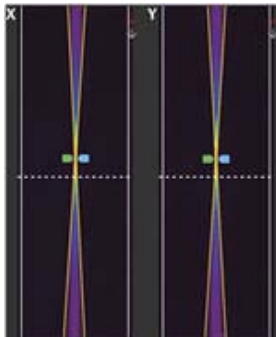
Welcome to **ePulse: Laser Measurement News**, a review of new developments in laser beam measurements, beam diagnostics, and beam profiling. Each issue contains industry news, product information, and technical tips to help you solve challenging laser measurement and spectral analysis requirements. [Please forward to interested colleagues](#) or have them [subscribe](#).

Features

Measuring Up with High-Power Fiber Lasers

By Kevin Kirkham, Sr. Manager, New Business Development, Ophir

In the 2- to 20-kW-power output range, fiber laser applications are growing in materials processing and such finesse applications as 3D micromilling, microcutting, blind-hole machining, and additive manufacturing. Each application requires that the working laser beam be consistent and its performance verified. Initial laser characteristics must be maintained to ensure quality and consistency. Here's how. [Fiber Lasers](#).



Measurement Technology for Lasers in Medical Applications

By Christian Dini, Director, Global Business Development, Ophir

For any application, a focused laser beam should live up to previously defined specifications. But for medical technology, precise adherence to the parameters is of even greater importance. Both for regulatory and ethical reasons, the laser beam must be carefully tested throughout the entire value chain: from the development of the laser source to its application on the patient and/or production of medical products. Scrimping on the purchase price of the measuring device can quickly result in hidden costs that turn out to be far higher than any initial savings. [Medical Lasers](#).

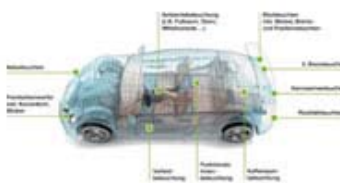


Applications

Photometric Measuring System Quickly Sheds Light on Luminaire Quality

By Dr. Simon Rankel, LED Business Development Manager, Ophir

LED/OLED technology opens up new possibilities for automotive designers around the globe. At the same time, autonomous cars attach increasing importance to the lighting of both the vehicles and their surroundings. As lighting possibilities grow more diverse, so do the demands on the quality of the LED luminaires used -



Videos of the Month

Juno+ : A Virtual Laser Power Meter, On Your PC

The new Ophir Juno+ enables you to connect your Ophir "Smart Sensor" to your PC via USB. Your PC then becomes a full-featured laser power meter, either running Ophir's StarLab software application, or perhaps communicating with your own system via our "COM Object." Get a glimpse in this overview video. [Video: Juno+](#).



Auto ISO Laser Measurements

The Ophir BeamSquared® system is a compact and fully automated tool for measuring the propagation characteristics of CW and pulsed laser systems from the UV to NIR to Telecom wavelengths. See how BeamSquared software's Auto ISO measurement feature makes obtaining an ISO compliant beam measurement as easy as "align and click." [Video: BeamSquared](#).



Laser Puzzle

[Try your hand at this month's Laser Puzzle](#). This month we're taking a train trip and enjoying an icy cold beverage along the way. Can you figure out why the train appears to travel in opposite directions?

All submissions will receive an 8GB USB pen drive. The grand prize winner will receive a 16GB iPad. E-mail answers to sales@us.ophiropt.com. Need a hint? E-mail john@enigmatarge.com.

and on the technology needed to measure them. Speed, reliability, and demonstrating compliance are of utmost concern when measuring the various light parameters of a finished luminaire, especially for safety-relevant applications. [LED Luminaires](#).

Webinars

Thermal Imaging Optics for Drones

By Dr. Nissim Asida, R&D and Engineering Director, Ophir Optics

Date: October 10, 2019 at 12:00pm EDT / 4:00pm GMT

While drones are relatively new additions to the military's stable of high-tech robotic systems, ground-based robots have been in use for more than a decade. From detecting, defusing, and disposing of explosives to working side-by-side with soldiers in the field, robots have found a myriad of applications within the military. This webinar will highlight how robotic systems - both airborne and ground-based - are easing the risks and burdens faced by modern warfighters. Hosted by *Military Robotics* magazine. [Register here](#).

What You Need to Know About Your AM Laser's Personality: Power is Not the Complete Story

By Dick Rieley, Senior Field Sales Engineer, Ophir

Date: October 22, 2019 at 1:00pm EDT / 5:00pm GMT

With the benefits of laser-based additive manufacturing come the challenges of keeping the machines operating and in spec. But the performance of your laser will change over time and a power check will not give you the complete story. To keep the process running efficiently and product quality high, you need a more complete understanding of your laser's personality before and after each build. In this webinar, we will discuss why laser system performance changes and why it is important to understand - as well as when, how, and how often to measure and analyze the laser's performance so as not to affect the efficiency and quality of the products being produced. Hosted by *Photonics Spectra* magazine. [Register here](#).

How to Know if the Laser in Your AM System is in Spec

By John McCauley, Key Accounts Manager, Ophir

Date: October 23, 2019 at 1:00pm EDT / 5:00pm GMT

Most of us are familiar with the many benefits and changes that laser-based additive manufacturing is bringing to manufacturing, including reduced tooling costs, easier testing of complex geometries, and faster time to market. With these benefits come a constant - the performance of your laser will change over time. Therefore, understanding your laser's behavior is critical to successfully applying it to the AM process. In this webinar, we will discuss why laser system performance changes, why it is important to understand, and the process for measuring and analyzing the laser's performance. Hosted by *Industrial Laser Solutions* magazine. [Register here](#).

Research News

Thermal Properties of Thin Films

This study investigates the macroscopic in-plane thermal conductivity (K) and thermal interface conductance (g) of large-area (mm²) thin film made from MoS₂ nanoflakes via liquid exfoliation and deposited on Si/SiO₂ substrate. The found values are much lower than those of single flakes, showing the effects of interconnections between individual flakes on macroscopic thin film parameters. Laser power was measured using an Ophir® Nova II system with a PD-300 photodiode sensor. [Thin Films](#).

Molecular Imaging of Oxidative Stress

This study examines molecular imaging reactive oxygen and nitrogen species (RONS) with a near-infrared (NIR) absorbing small molecule (CyBA) and LED-based photoacoustic imaging equipment. CyBA produces increasing photoacoustic signal in response to peroxyxynitrite (ONOO⁻) and

[Here's the answer to last issue's puzzle.](#)

Social Media: Blog

Measuring Extremely High Power Lasers (up to 120 kW)

Ophir's 120K-W laser sensor spreads out the beam into a very wide, water cooled surface area, allowing it to absorb over 99% of the beam and measure its power with high accuracy. Find out how. [120K-W Laser Sensor](#).

Measuring a Low Frequency Laser or VCSEL? Use These Tips to Increase Accuracy

If your laser or other light source is both low frequency and low duty cycle (leading to high peak power), you might encounter some difficulties when trying to measure its power. Here are a few tips to get the most accurate power reading possible when dealing with low frequency sources. [Low Frequency Laser](#).

Catalogs: Power Meters & Beam Profiling

Download the new 2019 Ophir Laser Measurement Catalogs today. Tutorials and product specifications for [Power Meters](#) and [Beam Profiling](#). [Beam Profiling Magalog](#) includes application notes, technology articles, and reference algorithms.

Trade Shows

[ICALEO: International Conference on Lasers and Electro-Optics](#)

October 7-10, 2019
Orlando, FL

[Laser Taiwan 2019](#)

October 16-18, 2019
Taipei, Taiwan

[Laser World of Photonics India](#)

October 17-19, 2019
Bombay, India

[Teknologia 19](#)

November 5-7, 2019
Helsinki, Finland

[FABTECH](#)

November 11-14, 2019
Chicago, IL

[Laser in der Automobilindustrie](#)

November 12-13, 2019
Schweinfurt, Germany

[Mittweidaer Lasertagung](#)

November 13-14, 2019
Mittweida, Germany

[Formnext](#)

November 19-22, 2019
Frankfurt, Germany

hydrogen peroxide (H₂O₂) with photoacoustic signal increases. An Ophir PE50BF-C pyroelectric laser energy sensor measured laser fluence. [Oxidative Stress](#).

Controlling Emission Properties of Organic Distributed Feedback Lasers

Surface-emitting distributed feedback (DFB) lasers, with both resonator and active material based on solution-processable polymers, are attractive light sources for low-cost applications. This study examines high performing all-solution-processed organic DFB lasers, consisting of water-processed photoresist layers with surface relief gratings located over the active films, whose emission properties can be finely tuned through resonator design. The pump and emitted energy were measured with the Ophir PD10-C and PD10-pJ-C high resolution energy detectors. [Distributed Feedback Lasers](#).

What's New

High Res Beam Profiling Camera with USB 3.0 Interface for Measuring CW and Pulsed Lasers

The Ophir SP920 High Resolution Beam Profiling Camera accurately captures and analyzes wavelengths from 190nm to 1100nm, with enhanced sensitivity at 1070nm. Based on a compact design, the camera features a wide dynamic range, unparalleled signal to noise ratio, USB 3.0 interface, and BeamGage® beam analysis software, the most advanced beam analysis software in the industry. Ideal for measuring CW and pulsed laser profiles in high-speed medical imaging, microscopy, or micromachining. [SP920 USB 3.0](#).



Large Aperture Laser Power/Energy Sensor for Pulsed Lasers

The Ophir L2000W-PF-120 Laser Power/Energy Sensor is a water-cooled sensor for measuring large pulsed lasers. The thermal sensor measures powers from 1W to 2000W and energies from 6J to 6000J over the spectral range of 0.3µm to 2.2µm. It features a large 120mm aperture to accommodate high energy densities and short pulses. A fast, 7 sec response time balances the need to measure fast drifts and instabilities with the ability to handle high energy levels. [Large Aperture Sensor](#).

16K-W High Power Laser Sensor Features Fast Response Time, High Damage Threshold

The Ophir 16K-W High Power Laser Sensor is a compact sensor for measuring very high power lasers. The water-cooled thermal sensor measures powers from 100W to 16kW over the spectral range of 0.8µm to 2µm and 10.6µm. A relatively large, 55mm aperture is insensitive to beam size or angle of divergence. The sensor delivers a fast, 3.5 sec response time. A deflecting cone and annular absorber can withstand high power densities to 10kW/cm². [16K-W Sensor](#).

Fast, Reliable Measurement of LED Luminaires

The Ophir FluxGage™ FG600/100LM-HR features an integrated high-resolution CCD spectrometer that delivers fast photometric measurement of LED luminaires with low total flux. Measurements include total luminous flux (down to 20 lm), spectrum and color parameters (CCT, CRI, TM-30-15), and flicker. Total luminous flux of colored LED light sources can be accurately measured, as well. The FG600/100LM-HR is designed for use where low total luminous flux



[Photonix 2019](#)

December 4-6, 2019

Makuhari Messe, Japan

Fast Ship Program

Ophir's [Fast Ship program](#) provides one-day shipment of the most popular power/energy, beam profiling, and M2 laser measurement equipment across the U.S.

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www.ophiropt.com/photonics

measurements are needed, such as automotive, traffic lighting, life sciences, and medical. [FluxGage](#).

Cooled MWIR Long Range Lenses

The Ophir SupIR 45-900mm MWIR f/4 and SupIR 50-1350mm MWIR f/5.5 long range, motorized continuous zoom lenses were featured at DSEI 2019 in London. The 45-900mm f/4 zoom lens is designed for ground applications, including long range surveillance systems, border control and multiple non-defense application such as forest fire control, critical infrastructure, security, and more. The 50-1350mm f/5.5 zoom lens is designed to fit a 20-inch airborne gimble. Its high-accuracy folded optics design answers the size limitations of the UAV gimble. [Cooled MWIR Long Range Lenses](#).

Advanced Laser Power Measurement Software

Ophir StarLab 3.40 is easy-to-use laser power/energy measurement software that supports a wide range of new functions, including pulsed power and low frequency (e.g. VCSEL) measurements. The software also supports the newest Ophir laser meters: Centuari, the full-color, touch-screen, dual-channel instrument with analog output, TTL output, and trigger input; and Juno+, the compact USB module that turns a PC into a virtual laser power meter. [StarLab](#).

Compact USB Module Turns PC Into Laser Power/Energy Meter

A smart, compact USB module, Ophir Juno+ turns a PC or laptop into a full laser power/energy meter. It connects any of the 100+ Ophir smart laser sensors - thermal, pyroelectric, and photodiode - to a PC USB port, including the Ophir BeamTrack family of thermal sensors that combines multiple functions into one device: laser power, energy, beam position, and beam size. The Juno+ operates with Ophir StarLab software to log power and energy, as well as calculate and display averages, statistics, and histograms. [Juno+](#).



FAQs

Beam Profiling

How do I profile a laser beam when the beam diameter is larger than any available Spiricon camera? [Read the FAQ.](#)

What is the best approach to profiling a 0.8 Terahertz wavelength beam when the average power is in the 10's of μ Ws? [Read the FAQ.](#)

Why is beam profiling of the lasers in Additive Manufacturing laser systems necessary and required to be conducted at different power levels? [Read the FAQ.](#)

Power Meters

Can a sensor such as the 3A-IS be used in a vacuum of about 10^{-6} Torr (0.001 Pa)? I've seen mention of vacuum being ok as long as it's "not ultra high." Is 10^{-6} Torr "ultra high"? [Read the FAQ.](#)

The Centauri has "Raw Analog Output" and "Analog Output." What is the difference? [Read the FAQ.](#)

Technical Tip

Until now, measuring beam power from sources such as VCSELs – slowly pulsing, low average power, with short pulses of high peak (instantaneous) power – has been difficult. The difficulties stem from some of the basic characteristics of VCSELs, and include:

- Beat frequency with the instrument's input sampling rate, and

- Either saturation (if we choose a power scale suitable for the average power) or poor resolution (if we choose a power scale suitable for the peak power) – any scale we choose would be wrong.

So how do you accurately measure the power of a VCSEL's beam? You use the new "Low Frequency Power" mode available on several of Ophir's instruments. [Read the Tech Tip.](#)

About Ophir

Ophir is a brand within the MKS Instruments Light & Motion division. The Ophir product portfolio consists of laser and LED measurement products, including laser power and energy meters, laser beam profilers measuring femto-watt to hundred-kilowatt lasers, high-performance IR and visible optical elements, IR thermal imaging lenses and zoom lenses for defense and commercial applications, and OEM and replacement high-quality optics and sub-assemblies for CO₂ and high-power fiber laser material processing applications. Dedicated to continuous innovation in laser measurement, the product portfolio includes the **R&D 100** award-winning **BeamTrack** power/position/size meters and Spiricon **Ultracal™**, the baseline correction algorithm that helped establish the ISO 11146-3 standard for beam measurement accuracy. The company is **ISO/IEC 17025:2005** accredited for calibration of laser measurement instruments. The company's modular, customizable solutions serve semiconductor, industrial, life and health sciences, research, and defense industries throughout the world. An ISO 9001:2008 Registered Company.

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3050 North 300 West, North Logan, UT 84341
Tel: +1 435-753-3729
www.ophiropt.com/photonics