

NEW PRODUCTS

Focus on lasers, imaging, microscopy, and nanoscience

The descriptions of the new products listed in this section are based on information supplied to us by the manufacturers. PHYSICS TODAY can assume no responsibility for their accuracy. For more information about a particular product, visit the website at the end of its description. Please send all new product submissions to ptpub@aip.org.

Andreas Mandelis



Single-frequency CW laser at 320 nm

Hübner Photonics has announced a new UV wavelength on the Cobolt 05-01 series laser platform. The Cobolt Zydeco 320 is a CW diode-pumped laser operating at a wavelength of 320 nm. It delivers an optical output power of 20 mW and has a spectral full-width-at-half-maximum linewidth of less than 1 MHz. The

linearly-vertically polarized laser has a beam divergence at full angle of less than 0.8 mrad, wavelength stability of up to 1 pm, a polarization ratio of above 100:1, and a beam symmetry at aperture of greater than 0.90:1. It produces a beam diameter at aperture of $700 \pm 50 \mu\text{m}$ with a power stability of 2%. The laser has an rms noise of 0.5%, beam pointing stability of $5 \mu\text{rad}/^\circ\text{C}$, and peak-to-peak noise of 5% in the range of 20 Hz to 20 MHz. The Cobolt Zydeco 320 is suitable for standalone laboratory use and for OEM integration in instruments for demanding applications that include fluorescence microscopy, flow cytometry, DNA sequencing, Raman spectroscopy, interferometry, holography, and particle analysis. **Hübner Photonics Inc**, 2635 N 1st St, Ste 202, San Jose, CA 95134, <https://hubner-photonics.com>

Erbium-glass microchip lasers

The FRLD-1535-xxxμJ-Q-BEyy series of laser modules from Frankfurt Laser are integrated 1535 nm high-energy erbium-glass microchip lasers with a photodetector and a beam expander up to 40×. The series is specified to deliver high peak power of 5 μJ–1 J at 1535 nm, with a divergence angle of less than 0.3 mrad. The wide operating temperature range is from -40°C to 65°C . With dimensions of approximately 78–83 mm × 32 mm × 20 mm, the lasers are very compact. Their high repetition rate, small full-width-at-half-maximum pulse, high reliability, and small size make them suitable for laser ranging, laser remote sensing, and lidar. **Frankfurt Laser Company**, An den 30 Morgen 13, D-61381 Friedrichsdorf, Germany, <https://frlaserco.com>



High-power single-frequency laser

Redesigned with new and improved hardware, NKT Photonics' single-frequency Koheras Boostik HP laser combines ultralow frequency and intensity noise, narrow linewidth, and high power. It is highly versatile and suitable for a wide range of applications, including quantum computing, quantum metrology and sensing, fundamental physics research, development of time and frequency standards, atomic trapping and cooling, and laser interferometry. The laser is alignment- and maintenance-free and reliable, and robust enough for use in demanding industrial settings and in space. The Boostik HP features up to 15 W output power at 1 μm or 1.5 μm, wide wavelength tuning, and excellent beam quality that enables efficient frequency conversion. Improved communication lets users control the amplifier via the NKTP Control software on the laser. A state-of-the-art fiber-delivery system handles high power, preserves the low-noise laser properties, and delivers single-mode light at all wavelengths. **NKT Photonics Inc**, 23 Drydock Ave, Boston, MA 02210, www.nktphotonics.com



Laser-pulse-characterization software

New software from APE uses the SPIDER algorithm (spectral phase interferometry for direct electric-field reconstruction) to provide precise measurement and analysis of ultrashort laser pulses down to the few-cycle (FC) regime. The Spider family is designed for phase-resolved ultrafast pulse measurements and is suitable for use in ultrafast laser development and research. The FC Spider version offers a precision tool for the complete characterization of ultrashort laser pulses with just a few electric-field cycles with a pulse width of less than 5 fs. For less-broadband pulses, Spider combined with a grating-based stretcher is the best choice for IR-wavelength pulse characterization between 15 fs and 500 fs at a central wavelength of about 0.8 μm or 1 μm. Key features of the software now include a full automatic mode, error checks, and command-driven handling in addition to established tools such as electric-field plots, peak-power calculation, phase-difference measurement, and spectral phase analysis up to fourth order. The software is backward compatible. **APE GmbH**, Plauener Strasse 163–165, Haus N, 13053 Berlin, Germany, www.ape-berlin.de



NEW PRODUCTS



Nanoscale 3D x-ray microscope

Bruker has released a CMOS edition of its SkyScan 2214, a multiscale x-ray microscope based on nanocomputed tomography. With the CMOS edition, the platform incorporates the latest scientific CMOS detector technology and offers cutting-edge x-ray imaging at high resolution, according to the company. The CMOS edition retains the modular design of earlier SkyScan 2214 versions. It accommodates up to four detectors and allows a wide variety of sample types and sizes to be scanned in one instrument. The design encompasses a 6 MP flat panel and three optimized 15/16 MP sCMOS detectors. They

provide a wide field of view for true 3D resolution down to the 500 nm range. The Skyscan 2214 CMOS edition is suitable for academic and industrial research in materials sciences, such as in the development of lightweight high-strength composite materials and energy-storage devices like fuel cells, and in the life sciences, such as for preclinical imaging and the study of plant and animal biology. **Bruker Corporation**, 40 Manning Rd, Billerica, MA 01821, www.bruker.com

Cryogenic-plasma FIB microscope

Thermo Fisher Scientific designed its Arctis Cryo-PFIB (cryogenic-plasma focused ion beam) automated microscope to advance cryo-electron tomography (cryo-ET) research. Able to perform at higher resolutions than other microscopies, cryo-ET is used to study how proteins and other molecules operate together in a cellular context. The Arctis Cryo-PFIB helps users address the time-consuming, complex process of preparing optimal samples for analysis by structural biology. According to the company, compared with other commercially available solutions, it speeds up reproducible production of high-quality samples with consistent thickness while minimizing sample contamination. Users performing cryo-ET will benefit from integrated correlative light and electron microscopy for quick targeting of the area of biological interest, PFIB technology for rapid removal of large sample volumes, automation to simplify sample preparation and enable remote operation, and connectivity in the workflow that simplifies transferring samples to the Thermo Scientific Krios or Glacios cryo-transmission electron microscopes. **Thermo Fisher Scientific Inc**, 168 Third Ave, Waltham, MA 02451, www.thermofisher.com



Confocal microscope

Oxford Instruments Andor has presented a new flagship product in its confocal microscopy portfolio. Dragonfly 600 introduces three groundbreaking features: a new total internal reflection fluorescence (TIRF) modality, Borealis TIRF; a high-power laser engine; and a uniquely designed 3D superresolution module that retains parfocality across all imaging modes. Combined with innovative software, those technical advancements enable Dragonfly to deliver results with nanometer precision and thus to excel at single-molecule localization microscopy. The new product is 10 times as fast as point-scanner confocals. It images very

deeply into thick organisms, and live specimens can be imaged for days without phototoxicity or photobleaching. According to the company, cancer and neuroscience research are among the fields that will benefit from the highly flexible system. **Andor Technology Ltd**, 7 Millennium Way, Springvale Business Park, Belfast BT12 7AL, UK, <https://andor.oxinst.com>

Optical reference cavities for stabilized lasers

Menlo Systems and Thorlabs have jointly brought to market a co-branded line of high-finesse Fabry–Perot optical reference cavities housed in a stainless-steel vacuum chamber. The XM-ORC series comprises a 12.1-cm-long cylindrical ultralow-expansion glass spacer that incorporates cavity mirrors with high-reflectivity crystalline (xtal stable) coatings on fused silica substrates. Designed to provide high laser stability, the XM-ORC series includes all necessary hardware to stabilize the cavity at its zero crossing of the thermal-expansion coefficient, which is near room temperature. The optical reference cavities are offered with finesse values of greater than 300 000 for operation at 1550 nm or 1397 nm and greater than 100 000 for operation at 1064 nm. Other wavelengths are available upon request. With a thermal-noise Allan-deviation limit of as low as 1.6×10^{-16} and a low linear-drift rate of about 150 mHz/s, the XM-ORC series

is an optimal reference for cavity-stabilized lasers. It is suitable for select applications in high-resolution spectroscopy, quantum computing, optical clocks, cooling and trapping of atoms and ions, and low-noise microwave generation. **Menlo Systems Inc**, 56 Sparta Ave, Newton, NJ 07860, www.menlosystems.com





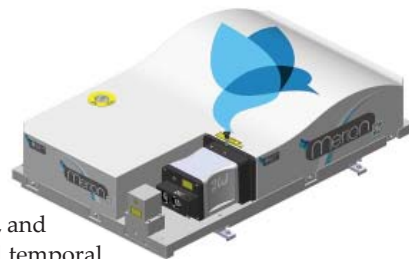
Microlens for SPAD array cameras

Photon Force has launched a microlens option for its single-photon avalanche diode (SPAD) array PF32 camera range. The microlenses increase by a factor of 10 the image sensor's effective fill factor—the ratio of the actual sensitive area of a pixel to the total area of each element of an array. In many arrays, much of the area of each element is occupied by support circuitry for each pixel, which reduces the active sensitive area. A microlens—one is needed for each pixel—concentrates more of the incident light onto the sensitive area of the pixel, thereby enhancing the sensitivity of the camera for time-resolved measurements. The option especially benefits low-light applications such as

imaging through scattering media and fluorescence microscopy. The PF32 time-resolved photon-counting camera range includes powerful features such as ultrahigh-speed digital readout, picosecond timing resolution, and low power consumption. **Photon Force Ltd**, Murchison House, 10 Max Born Crescent, Edinburgh, Scotland, EH9 3BF UK, www.photon-force.com

Compact high-power diode-pumped laser

The Merion MW HP is the latest addition to Lumibird's family of high-power diode-pumped Nd:YAG (neodymium-doped yttrium aluminum garnet) lasers for laboratory and industrial applications. Leveraging the technology developed for the company's Merion MW series, configured with an oscillator and amplifier combination, the lasers can reach up to 100 W at 1064 nm. Use of the platform Lumibird developed for its Q-smart HE series provides versatility while minimizing the footprint. The Merion MW HP features plug-and-play harmonic modules, automatic phase matching, and detachable cables and coolant lines. The optical specifications deliver high spatial and temporal beam qualities. A single longitudinal mode option is offered with a narrow linewidth of 0.005 cm^{-1} . **Lumibird**, 2 Rue Paul Sabatier, 22300 Lannion, France, www.lumibird.com



Nanoscale 4D scanning TEM

Tescan's Tensor 4D scanning transmission electron microscope (4D-STEM) addresses the needs of users working in multimodal—morphological, chemical, and structural—nanocharacterization applications. Integrating 4D-STEM capabilities onto legacy TEM columns, it synchronizes scanning of the electron beam with diffraction imaging. That synchronization is achieved through the use of a hybrid-pixel direct electron detector, electron-beam precession, energy-dispersive-spectroscopy acquisition, beam blanking, and near-real-time analysis and processing of 4D-STEM data. For materials science and semiconductor R&D and failure analysis, the Tensor 4D-STEM provides high-contrast, high-resolution 2D and 3D characterization of functional engineered materials at the nanoscale. It can be applied to thin films for R&D and failure analysis of logic, memory, and storage devices and can help determine the crystallographic structure of submicron natural or synthetic particles that are too small to be characterized using micro-x-ray diffraction techniques. **Tescan Orsay Holding AS**, Libušina tř 21, 623 00 Brno-Kohoutovice, Czech Republic, www.tescan.com



High-resolution holotomography microscope

According to Tomocube, its holotomography (HT) platform HT-X1 is the first holotomography microscope to utilize incoherent light. Instead of a laser light source, the HT-X1 uses a conventional single-beam LED to illuminate the sample with various beam patterns specifically designed to retrieve the refractive index and capture a sequence of holograms from different positions. The unique single-beam technique simplifies the imaging process by eliminating the need for background calibration and allowing imaging in confluent samples without an increase in light intensity. It provides high mechanical stability, and because it is less sensitive to speckle noise, it delivers high-contrast imaging with a lateral resolution of 156 nm. The all-in-one system offers label-free, true 3D time-lapse live-cell imaging for higher-throughput and automated screening applications. **Tomocube Inc**, 4th Flr, 155, Sinseong-ro, Yuseong-gu, Daejeon 34109, South Korea, www.tomocube.com



NEW PRODUCTS

Shortwave IR cameras

With the introduction of new sensors from Sony, Allied Vision has expanded the spectral range of its GigE Vision Alvium G1 camera series. The Alvium G1-130 VSWIR and Alvium G1-030 VSWIR cameras feature Sony's SenSWIR IMX990 and IMX991 InGaAs-based shortwave IR (SWIR) sensors, respectively. The SenSWIR sensors do not require thermoelectric cooling. The resolutions of the IMX991's video graphics array and the IMX990's superextended graphics array enable users to capture images with high quantum efficiency in the visible and SWIR regions with a single camera. The architecture of the InGaAs digital sensors allows pixel sizes of only $5\text{ }\mu\text{m}$; because of their copper-to-copper interconnects, they have high image homogeneity. The small pixel size facilitates SWIR applications that require high resolution and precision, such as semiconductor inspection and quality inspection of optics for laser-based measurement systems. *Allied Vision, Taschenweg 2a, 07646 Stadtroda, Germany, www.alliedvision.com*

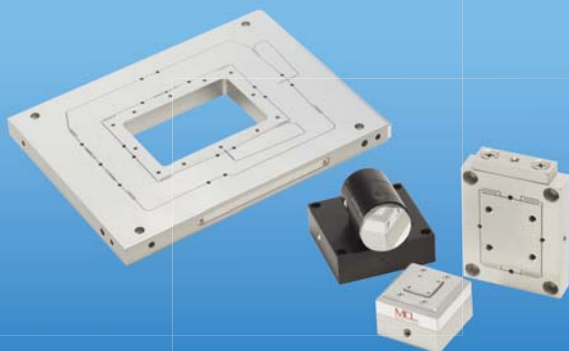


Nanoscale metrology for demanding environments

Queensgate now offers its NanoCeramic NanoSensor series for nanoscale metrology in demanding environments such as ultrahigh vacuum, high radiation, and extreme temperatures of 80 K to 423 K. The NanoCeramic series is based on the principle of capacitance micrometry: Two gold-coated sensor plates—a target and a probe—form a parallel-plate capacitor; the spacing of the plates is measured using an electronic controller. A glass ceramic glaze protects the sensor faces and prevents accidental shorting between the plates. The series offers measurement ranges from $20\text{ }\mu\text{m}$ to $1250\text{ }\mu\text{m}$ with frequency responses up to 20 kHz, capabilities that make it suitable for vibration monitoring and detecting noise in precision instrumentation. They ensure linearity down to 0.05% and measurement resolution as low as $7\text{ }\mu\text{m}$ (rms) in a non-self-heating assembly. Selected designs are suitable for ultrahigh-vacuum operation down to 10^{-9} torr. Housing materials include Invar, stainless steel, and aluminum as appropriate for specific uses, among which are long-term space missions, synchrotron light sources, and materials science applications. *Queensgate Instruments, 3-4 Fielding Industrial Estate, Wilbraham Rd, Fulbourn, Cambridge CB21 5ET, UK, www.nanopositioning.com*

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