

NEW PRODUCTS

The descriptions of the new products listed in this section are based on information supplied to us by the manufacturers, and in some cases by independent sources. PHYSICS TODAY can assume no responsibility for their accuracy. To facilitate inquiries about a particular product, a Reader Service Card is attached inside the back cover of the magazine.

Polycrystalline X-Ray Diffractometer

The new D 5000 HR polycrystalline x-ray diffractometer system from Siemens combines new high-resolution diffractometer hardware with control, evaluation and simulation software for the complete characterization of epitaxially grown thin films. In addition to identifying crystalline structure and orientation, the D 5000 calculates layer thickness, chemical composition and bond lengths for single and multi-layer thin films.

The system incorporates a 4-bounce incident-beam monochromator and reduction gearing to achieve accurate resolution at a minimum step size of 0.0002°. If necessary, an additional diffracted-beam monochromator consisting of a flat Ge (111) crystal can be added to produce the 4 + 1 + 1 triple-axis geometry. The high-resolution configuration includes an open Eulerian cradle for examination of any desired reflection, a motorized x-y stage to position the sample for surface mapping and a wafer stage that can accommodate 6" wafers. *Siemens Analytical X-Ray Instruments, 6300 Enterprise Lane, Madison, Wisconsin 53719*

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CdSe Liquid Crystal Light Valve

Control Optics has introduced a liquid-crystal light valve. This is the only commercially available light-valve made of CdSe, we are told. That makes possible a response time approximately twice as fast as liquid-crystal valves made of CdS. For example, at 10uW/cm rise time is approximately 10–25 ms with the new Control Optics valve.

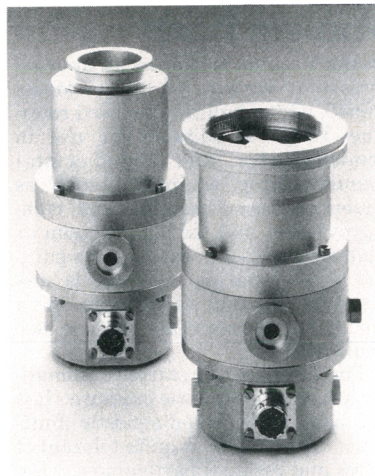
This valve is claimed to have excellent wavefront uniformity. It is 90 mm (diam.) × 22 mm in size, with an aperture of 45 mm. Resolution is 40 line pairs per mm with a contrast

of 100/1. Its spectral response ranges from 450–780 nm. The price of the CdSe valve is about half that of CdS valves, we are told. *Control Optics, 13111 Brooks Dr., Unit J, Baldwin Park, California 91706*

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Pumping down to 10⁻⁷ torr

Balzers has developed a molecular drag pump offering a lower-cost alternative to the turbomolecular pump. The new Model TPD 020 has an ultimate pressure of 10⁻⁷ torr and a working range from 0.75 down to less than 10⁻⁶ torr at a volume flow rate of 18 liters of nitrogen per second. Down to 10⁻² torr, the pump is



claimed to have a higher volume flow rate than conventional turbomolecular pumps. That makes the TPD 020 an efficient and economical pump for a wide range of applications, we are told. Among these applications are load-lock chambers, gas-inlet systems for mass spectrometers, industrial degassing and distillation, leak detection, refrigeration drying, tube and lamp production, cryopump regenera-

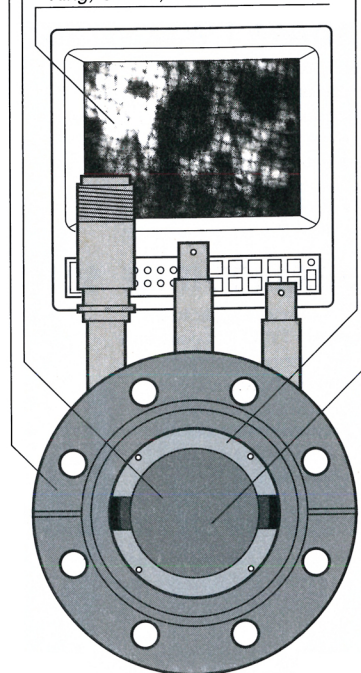
Large dynamic range—from single photons to greater than 10⁸ photons/s • cm².

Uses standard 4-1/2" OD (ISO 64mm) copper seal flange.

Ultra clean UHV operation.

Broad radiation sensitivity—electrons, ions and photons from 250 nm to hard x-rays.

Image of the electron emission from a photocathode illuminated by intense synchrotron light. Data courtesy P. Pianetta, P. King, C. Kim, SSRL.



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BEAM THREE \$289

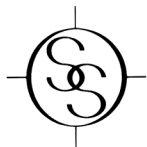
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tion, electron microscopy and corrosive gas pumping.

The Balzers TPD 020 consists of a single turbomolecular impeller and a four-stage molecular pumping system. This enables it to attain its ultimate pressure at a backing or foreline pressure of 10 torr. When combined with a dry-diaphragm backing pump, the TPD 020 can be used for ultraclean vacuum production. It is also claimed to be well suited to serve as an effective, low-maintenance backing pump for existing ultrahigh-vacuum systems. A sealing gas connection is provided for corrosive or aggressive gas processes. The connection can be equipped with a standard sealing gas inlet valve, with pump and vacuum chamber vented through the high-vacuum side.

On the high-vacuum side the Balzers molecular drag pump is equipped with an upper permanent-magnetic bearing. On the backing side it has an oil-lubricated high-precision ball bearing that requires very little service, we are told. The TPD 020 can be mounted in any position from vertical to horizontal. *Balzers, 8 Sagamore Park Road, Hudson, New Hampshire 03051*

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Helically Grooved Molecular Vacuum Pump

Osaka Vacuum is offering an unusual molecular vacuum pump, its Model TS440, with a helically grooved rotor. The TS440 is suitable for use in semiconductor and liquid-crystal manufacturing equipment such as chemical-vapor-deposition and etching systems, and for high-vacuum or high-throughput pumping. Gas purging at the bearing assembly is provided for corrosive applications, but a chemically-resistant assembly is also available.

The TS440 can be started automatically from atmospheric pressure. It is equipped with self-diagnostic functions. The TS440 is quite tolerant of dusts and residual particulates. *Osaka Vacuum, 911 Bern Court, Suite 140, San Jose, California 95112*

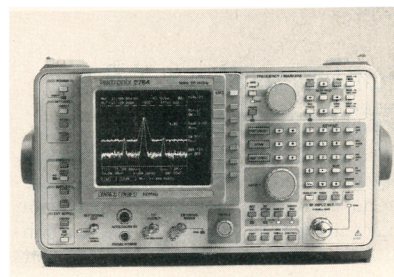
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Coax Coverage to 40 GHz with Microwave Spectrum Analyzer

The new Tektronix Model 2784 microwave spectrum analyzer has pre-

lected coverage to 40 GHz in coax. It is thus well suited to characterize millimeter-wave signal sources and devices. The user need not switch between coax and waveguide for spectrum response searches up to 40 GHz. Full-range sweeping in coax from 100 Hz to 40 GHz also expands the range of optical heterodyning methods for characterizing optical sources.

The 2784 also offers coverage up to 325 GHz with a waveguide. The instrument's calibrated frequency



range in fact goes all the way up to 1200 GHz, permitting extended coverage with external mixers. Other features of the Model 2784 include direct fundamental mixing up to 28 GHz, resolution bandwidths from 3 Hz to 10 MHz, a display dynamic range of 100 dB, good phase noise and sensitivity performance, built-in microwave counter and signal processing functions and full GPIB programmability. *Tektronix, Howard Vollum Industrial Park, PO Box 500, Beaverton, Oregon 97077-0001*

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Cesium Atomic Clock

Hewlett-Packard Company has introduced what it describes as "the world's most precise commercially available atomic clock." It keeps time, we are told, with an accuracy of one second in 1.6 million years. The HP 5071A primary frequency standard is twice as accurate as its predecessor, the HP5061B.

The HP 5071A is claimed to achieve near-laboratory specifications under ordinary environmental conditions. It is insensitive to changes in temperature, humidity and magnetic fields. Its microprocessor-controlled electronics package constantly regulates the cesium-beam tube's microwave power, cesium-oven temperature, magnetic field, electron-multiplier voltage and signal gain to operate at the optimum levels. HP's new cesium technology reduces the clock's susceptibility to frequency pulling and a host of environmental

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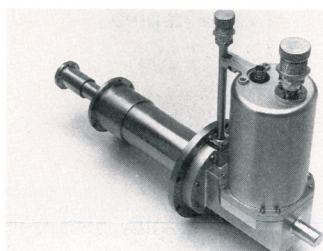
effects. The new technology, comprising an improved cesium-beam tube design and microprocessor-controlled digital electronics, makes it the first cesium-beam atomic clock to specify stability for averaging times longer than a day.

The new clock can power up automatically to full specifications in only 30 minutes under ordinary environmental conditions without operator intervention. The cesium-beam tube design uses single-beam atomic optics, enhanced magnetic-state selectors and new alignment techniques that reduce Rabi and Ramsey pulling. These design changes result in a smaller package, reducing the overall size of the clock to roughly that of a personal computer. The tube design also enables the HP071A to achieve a stability of better than two parts in 10^{14} for averaging times longer than five days under laboratory conditions with the high-performance Option 001 tube. *Hewlett-Packard, 3000 Hanover Street, Palo Alto, California 94304*

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Two-Stage 6.5-Kelvin Cryogenic Refrigerator

Balzers has developed a two-stage, closed-cycle cryogenic refrigerator that reaches 6.5 K in under 45 minutes and 20 K in 25 minutes. This new low-temperature, high-capacity refrigerator is claimed to produce the



lowest temperature available in a standard refrigerator design, without the need for a third stage. The unit is designed for a mean time of 9000 hours between maintenance shut-downs.

The refrigerator provides high refrigeration capacities for a variety of cryogenic applications: It is well suited for cryocooling superconducting magnet shields, superconducting materials, and infrared and radiotelescope detectors, and for doing gas liquefaction and magnetic resonance imaging.

As a cryopump, the new refrigera-

tor permits longer intervals between regeneration cycles, and is suitable for high-gas-load conditions encountered in vacuum process systems. It can also be used to replace a diffusion pump for ultraclean vacuum pumping without liquid nitrogen. The refrigerator will be integrated with the Balzers 20" and 26" cryopumps. *Balzers, 8 Sagamore Park Road, Hudson, New Hampshire 03051*

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Custom Imaging and Nonimaging Light Sources

EMR Photoelectric, a division of Schlumberger, has established a new facility for the design, fabrication and testing of custom light-detection and imaging tubes. Located in Princeton, New Jersey, the new facility will manufacture small quantities of custom tubes specified by users. The company will concentrate initially on proximity-focused, microchannel plate tubes. User-defined variables include photocathode material, sensitive area, microchannel configuration, readout and gatability. Among the uses for these tubes would be low-light-level sensors and intensifiers in space research, astronomy and military applications. The company's new design, we are told, improves the tubes' temperature range and lifetime. *EMR Photoelectric/Schlumberger, P. O. Box 44, Princeton, New Jersey 08542*

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Gas Purifier for Excimer Laser

Applied Photonics has introduced its new Model C-6000 cryogenic gas purifier, designed to extend excimer laser operation by removing gaseous impurities generated by the laser action. The multigas purifier has liquid-nitrogen capacity of 13 liters, with improved insulation and convenient service access. The cryotrap and heat exchanger, we are told, offer increased purification efficiency, and they can be configured for high-flow or high-pressure applications. The manufacturer stresses the ease of operation and long-term reliability of the automated purifier. The operating gas pressure range is 500 to 4500 mbar absolute, and the gas circulation flow rate is 30 standard liters per minute at 4000 mbar. *Applied Photonics, 97 Marcus Boulevard, Hauppauge, New York 11788*

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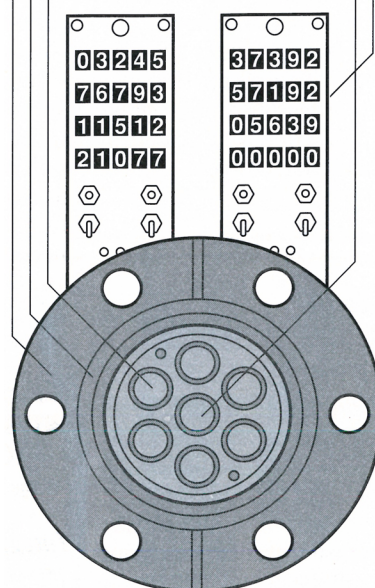
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