

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.

High Brightness Cyclotron-Resonance Ion Sources

The Accelerator Physics Branch of Canada's Chalk River Nuclear Laboratories is offering to develop electron-cyclotron-resonance ion sources for new applications or to customize Chalk River designs for retrofit into existing machines. ECR ion sources are comparable in cost to conventional arc-discharge sources. But, we are told, they provide significantly better reliability.

Chalk River's accelerator branch has considerable experience in designing and constructing high-current, high-brightness ion-sources and complete ion-beam systems. Their special expertise is in ECR ion sources for singly charged ions. High-current, high-brightness ECR sources can be used as injectors for particle accelerators, in magnetic separators for isotope production, as ion implanters for modifying materials and also in neutral beam diagnostics for fusion.

Most ion sources consist of a plasma generator that produces ions and an extraction column that accelerates them. The basic elements of an ECR plasma generator for a high-current ion source are a gas- or vapor-filled chamber with a means of introducing microwaves and a superimposed magnetic field. If the magnetic field is appropriate, the energy of the microwaves is resonantly transferred to free electrons. The electrons, in turn, ionize the gas or vapor feed. A multi-aperture triode operating at tens of kilovolts is a suitable extraction column. The shape of the apertures has been optimized by computer. The magnetic field is minimized to give the brightest possible ion beam.

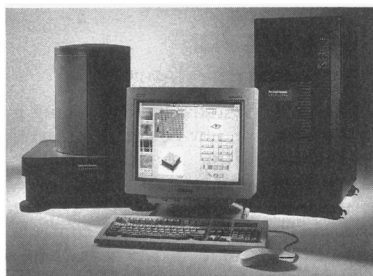
Microwave ion sources operating at or near the electron cyclotron resonance have proven to be superior sources of high-current ion beams. The principal advantages are en-

hanced reliability and higher currents of the desired ions, with lower feed rates and simpler system configurations. ECR ion sources operate smoothly for hundreds of hours on feeds that would quickly destroy the cathodes of arc-discharge ion sources. Chalk River ECR ion sources have generated hundreds of milliamps of beam current at brightnesses of almost $10/\pi A$ (mm mrad)⁻². Contact Terry Taylor, Accelerator Physics Branch, AECL Research, Chalk River Laboratories, Chalk River, Ontario, Canada K0J 1J0

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Scanning Probe Microscope for Industry

Park Scientific has introduced Autoprobe, a new ambient scanning probe microscope. Autoprobe is designed to meet industry's need for a high level of automation. It integrates ambient scanning force microscopy with scanning tunneling microscopy. The microscope's features include: easy insertion of prealigned cantilevers; motorized tip and sample tilt control through an oblique video microscope; motorized sample positioning with a 2500× on-axis, motor-zoom color video microscope; three-dimensional closed-loop linearized scanning with atomic resolution; and integral vibration isolation. The microscope has a 33-MHz 486 PC controller with a 200-megabyte hard disk and optional opti-



CAMAC 'SCOPE

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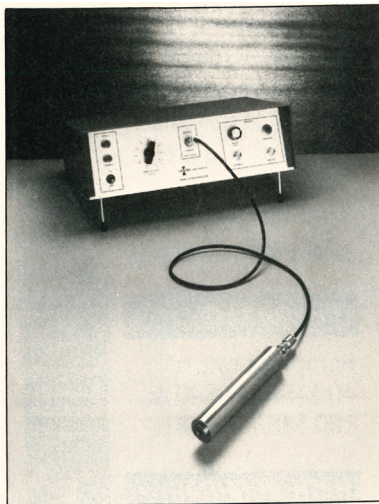
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cal floppy drive and with an advanced graphical user interface. The metrology and automations software runs under Windows 3.1. Measurement data and system parameters are linked into the Paradox database.

The samples can be loaded and imaged in less than a minute, and the microscope can be used effectively by relatively unskilled operators. The advanced scan-position sensor and linearization system make precise dimensional metrology possible. In earlier systems, we are told, performance was limited by the instability and nonlinearity of piezoelectric tube scanners. *Park Scientific Instruments, 1171 Borregas Avenue, Sunnyvale, California 94089*

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Pedagogic SQUID of High-Temperature Superconducting Film

Conductus has introduced what it describes as "the first electronic system product that incorporates an integrated circuit chip made with high-temperature superconducting thin film devices." Bearing the unlikely name "Mr. SQUID," this product is a superconducting quantum-interference device designed for use in college student experiments and lecture demonstrations. It can be used in any laboratory that has access to liquid nitrogen.

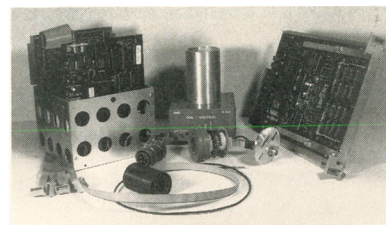
Mr. SQUID is a complete system that includes a superconducting chip encapsulated in a cryogenic probe, a dewar flask and a self-contained electronic control box. The integrated circuit that forms the heart of the system contains ten thin film layers incorporating the YBCO superconductor, several insulators and silver. The Josephson junctions are bi-epitaxial junctions invented at Conductus in 1991, we are told. *Conductus, 969 West Maude Street, Sunnyvale, California 94086*

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Cableless Base Network for Photomultipliers

Nanometric Systems is introducing a new system of low-power (150 mW) Cockcroft-Walton photomultiplier bases that employs a local area network for the high-voltage system control. Each control station controls up to 192 photomultiplier bases.

The system was developed by high-



energy physicists for experiments requiring large numbers of photomultipliers. It greatly simplifies large, compact installations by eliminating all high-voltage cabling and the attendant safety concerns. It reduces base heat loss and provides a universal control system through the Ethernet network.

The system can also support individual photomultiplier bases as well as a CAMAC 32-channel photomultiplier control system. Alternatively, communications can be handled with either RS-485 or RS-232C. To date the new system has been implemented for 8575 and R580 photomultipliers. Custom bases for other photomultipliers can be generated with two months notice. *Nanometric Systems, 451 South Boulevard, Oak Park, Illinois 60302*

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Ultrahigh-Vacuum Scanning Tunneling Microscope

Perkin-Elmer's Physical Electronics Division has introduced a new ultrahigh-vacuum scanning tunneling microscope. The PHI UHV Nanoscope 301 STM was developed in cooperation with Digital Instruments. The new microscope combines the imaging capabilities of a scanning tunneling microscope with the cleanliness of an ultrahigh-vacuum environment to provide atomic images of structures that are not obtainable with an STM in air. The instrument's interchangeable scan heads provide scan ranges from 75 microns down to atomic resolution. Tips can be exchanged *in vacuo*.

The PHI UHV Nanoscope 301 has a compact, rigid head design. The stage is vibrationally isolated. The instrument is completely UHV-compatible and -bakeable. A high-speed 486 computer with an MS-DOS operating system does the processing. Pull-down menus provide a flexible format for selecting instrument parameters. The microscope incorporates advanced feedback control electronics and software technology. It can be used as a stand-alone instrument or

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as an addition to other surface-analysis systems. Current users of Digital's Nanoscope III air microscope can add the capabilities of the PHI UHV Nanoscope 301. The systems are completely compatible. *Perkin-Elmer, Physical Electronics Division, 6509 Flying Cloud Drive, Eden Prairie, Minnesota 55344*

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Fortran Compiler for Massively Parallel Computers

Digital Equipment Corporation is offering a new FORTRAN compiler that automatically optimizes programs for execution on computers with massively parallel architectures. The new DECmpp FORTRAN runs on DECmpp 12000 Series computers, and it is layered on the ULTRIX operating system. DECmpp 12000 massively parallel computers can put as many as 16 K processors to work simultaneously on a single task. The new compiler automatically divides user programs into parallel and scalar (sequential) components.

The DECmpp FORTRAN performs parallel program execution automatically and transparently, so outside software developers don't have to identify and manually code program sections for parallel machines. This, it is hoped, will facilitate the developments of new application programs for massively parallel computers.

The new FORTRAN is compatible with ANSI FORTRAN 77. It includes numerous array-handling extensions for the newer FORTRAN 90 compiler now under development by ANSI. FORTRAN 90 will be an important standard for parallel systems in the future. The FORTRAN 90 extensions in DECmpp FORTRAN allow developers to treat numerical arrays as they would normal variables: The compiler automatically identifies each array, determines its size and assigns it to the processor elements in the parallel computer. *Digital Equipment Corporation, Maynard, Massachusetts 01754-2571*

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Low-Pass Antialiasing Filter for Data Acquisition

RC Electronics is offering what it describes as "a cost-effective solution to the aliasing or signal conditioning problems inherent in digitizing in-

struments." Their new RC-AAF low-pass filtering is designed to provide accurate filtering for data acquisition systems and digital storage oscilloscopes.

Aliasing occurs when an analog signal is sampled digitally at a frequency less than twice the signal frequency. The low sampling rate causes false representation of the waveform, which then appears to have a frequency much lower than it actually has. One can use an anti-aliasing filter to correct this problem. Until now, antialiasing required large, dedicated instruments. The new RC-AAF filter is contained on a single board. One no longer needs racks of bulky analog filters, we are told.

The RC-AAF filter is suitable for test and measurement systems. One can configure as many as 128 channels. Sixteen channels can be contained on a single board, and 128 channels fit in a standard, 19-inch rack-mountable enclosure. The filter can be controlled by dedicated instruments, PCs or minicomputers. The RC-AAF filter costs about \$600 per channel. *RC Electronics, 6464 Hollister Avenue, Goleta, California 93117-3110*

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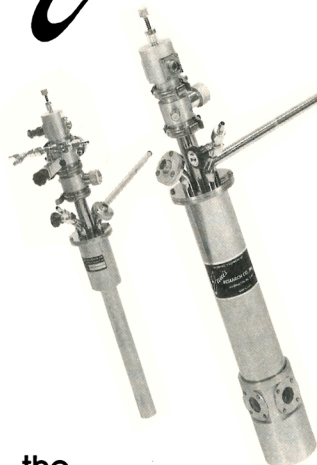
New Literature

Calibration services—The newly revised *NIST Calibration Services Users Guide 1991* lists more than 500 different calibration services, special test services and measurement-assurance programs available from the National Institute of Standards and Technology. The hundreds of individual services listed in the guide are the most accurate calibrations of their type available in the United States, we are told. These calibrations are intended as a direct link between national standards and the user's precision equipment or in-house transfer standards.

The NIST users guide lists the measurement calibration services in the following seven major areas: dimensional, mechanical, thermodynamic, optical, ionizing radiation, electromagnetic and time-and-frequency measurements. The guide explains fees, types of services and measurement criteria. It also lists NIST technical experts who may be contacted for further information. Copies of *NIST Calibration Services Users Guide 1991* (SP 250) are available from the *Calibration Program, Room A104, Building 411, NIST, Gaithersburg, Maryland 20899* ■

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