

AUGUST 1997

VOLUME 68 NUMBER 8

REVIEW OF SCIENTIFIC INSTRUMENTS

REVIEW ARTICLE:

*Diagnostic instrumentation for microturbulence
in tokamaks*

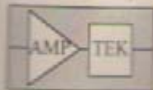
by N. Bretz

AVAILABLE ONLINE—See www.aip.org



0034-6748(199708)68:8;1-M

AMERICAN
INSTITUTE
OF PHYSICS



X-RAY DETECTOR



2-530-220-1

FEATURES

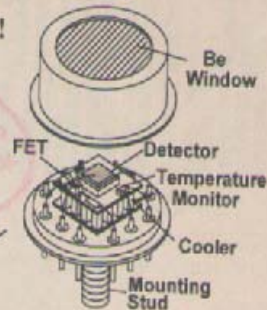
- Si-PIN Photodiode
- Thermoelectric Cooler
- Cooled FET
- Amptek A250 Preamp
- Temperature Monitor
- Beryllium Window
- Hermetic Package (TO-8)
- PX2T Amplifier & Power Supply

APPLICATIONS

- X-Ray Fluorescence
- Medical X-Ray Detectors
- X-Ray Lithography
- Portable X-Ray Instruments
- X-Ray Teaching & Research
- Mössbauer Spectrometers
- X-Ray Space and Astronomy
- Environmental Monitoring
- Nuclear Plant Monitoring
- Toxic Dump Site Monitoring
- PIXE

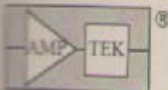
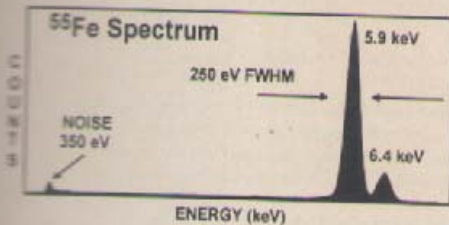
200 eV RESOLUTION
Technology Breakthrough

All Solid State Design / No More Liquid Nitrogen !!



Model *XR-100T* is a new high performance X-Ray Detector, Preamp, and Cooler system that uses a thermoelectrically cooled Si-PIN Photodiode as an X-Ray detector. On the cooler are also mounted the input FET and the feedback components to the Amptek A250 charge sensitive preamp. The internal components are kept at approximately -30°C, and can be monitored by a temperature sensitive integrated circuit. The hermetic TO-8 package of the detector has a light tight, vacuum tight 1 mil (25 μm) Beryllium window to permit soft X-Ray detection. The system resolution with a test pulser is 200eV FWHM.

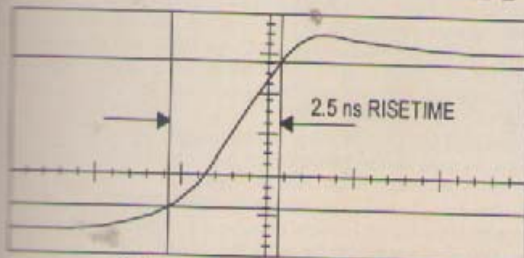
Power to the XR-100T is provided by the PX2T Power Supply. The PX2T is AC powered and includes a spectroscopy grade Shaping Amplifier. The XR-100T/PX2T system ensures quick, reliable operation in less than one minute from power turn-on.



CHARGE SENSITIVE PREAMPLIFIER

A250

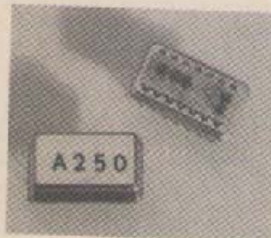
RUN SILENT — RUN FAST



Horizontal = 2 ns/div. Vertical = 500 mV/div.

Features

- Low Noise
- Low power
- Small size (Hybrids)
- High Reliability
- Radiation hardened
- One year warranty



STATE-OF-THE-ART

- EXTERNAL FET
- FET CAN BE COOLED
- NOISE: <100 e⁻ RMS (Room Temp.)
<20 e⁻ RMS (Cooled FET)
- GAIN-BANDWIDTH $f_T > 1.5$ GHZ
- POWER: 19 mW typical
- SLEW RATE: >475 V/μs

Applications

- Aerospace
- Portable Instrumentation
- Nuclear Plant Monitoring
- Imaging
- Research Experiments
- Medical & Nuclear Electronics
- Electro-Optical Systems

If you are using: Solid State Detectors, Proportional Counters, Photodiodes, PM tubes, CEMS or MCPs and want the best performance, try an

AMPTEK CHARGE SENSITIVE PREAMPLIFIER

AMPTEK INC.

6 De Angelo Drive, Bedford, MA 01730-2204 U.S.A.

Tel: +1 (617) 275-2242 Fax: +1 (617) 275-3470 e-mail: sales@amptek.com <http://www.amptek.com>

A15 **Announcement: Accepted Manuscript Status Inquiry System**

REVIEW ARTICLE

2927 **Diagnostic instrumentation for microturbulence in tokamaks**
N. Bretz

ARTICLES

OPTICS; ATOMS and MOLECULES; SPECTROSCOPY

2965 **Fast wavelength switching of narrow-band excimer lasers**
D. Grebner, D. Müller, and W. Triebel

2969 **Narrow bandpass multilayer x-ray monochromator**
A. Sammar, K. Krastev, J.-M. André, R. Barchewitz, and R. Rivoira

2973 **Time-resolved stopped-flow x-ray absorption fine structure system using synchrotron radiation for fast reactions in solution**
Yasuhiro Inada, Hiroo Hayashi, Shigenobu Funahashi, and Masaharu Nomura

2978 **Evanescent wave cavity ring-down spectroscopy with a total-internal-reflection micr cavity**
Andrew C. R. Pipino, Jeffrey W. Hudgens, and Robert E. Huie

2990 **Single molecule spectroscopy in He gas using a highly efficient mirror arrangement**
E. Heinecke, K. Donovan, Ch. Müller, and A. Hese

2994 **An arc discharge nitrogen atom source**
Ning Xu, Yuan-cheng Du, Zhi-feng Ying, Zhong-min Ren, and Fu-ming Li

3001 **Micrometer-sized nozzles and skimmers for the production of supersonic He atom beams**
J. Braun, P. K. Day, J. P. Toennies, G. Witte, and E. Neher

3010 **A technique for efficiently generating bimetallic clusters**
R. L. Wagner, W. D. Vann, and A. W. Castleman, Jr.

3014 **Spurious electrons in electron spectrometers and their effect on differential electron impact ionization cross-section measurements**
M. E. Rudd

CHARGED PARTICLE SOURCES, OPTICS and ACCELERATION

3019 **Use of thermal barriers in conceptual studies of high-temperature, high-intensity targets for producing radioactive ion beams**
W. L. Talbert, T. A. Hodges, H.-H. Hsu, and M. M. Fikani

3027 **Laser ion source via direct ionization at the outlet of a helium jet**
Shang Rencheng, Xu Sida, Zhang Wei, Yi Rong, Zhang Shuming, Ye Zipiao, Zhao Zhizheng, and Luo Yixiao

- 3031 **A mechanically tunable magnetron injection gun**
Ch. Wang, Y. S. Yeh, T. T. Yang, H. Y. Chen, S. H. Chen, Y. C. Tsai,
L. R. Barnett, and K. R. Chu
- 3036 **Interpretation of the connecting lines in the projectional xx' emittance in view of Liouville's theorem**
M. Sarstedt
- 3042 **Ion energy loss spectroscopic apparatus using cylindrical electrostatic energy analyzer equipped with the Matsuda plate**
Kenichi Iwamoto and Akira Matsumoto
- 3046 **Periodic drag force and particle size measurement in a double ring electrodynamic trap**
G. Göbel, Th. Wriedt, and K. Bauckhage

NUCLEAR PHYSICS, FUSION and PLASMAS

- 3053 **Analog gain of microchannel plates for 1.5–154 keV/ q Ar^{q+} ($3 \leq q \leq 16$)**
M. P. Stockli and D. Fry
- 3061 **Transversely magnetized microwave plasma in a rectangular waveguide under cutoff conditions**
Sudeep Bhattacharjee and Hiroshi Amemiya
- 3068 **A transmission grating spectrograph and its application in both laser plasma and plasma focus**
X. Feng, M. H. Liu, and S. Lee
- 3074 **An image converting system in framing and streak mode for impulsive soft x-ray observation**
Takeshi Yanagidaira and Katsumi Hirano

BASIC PHENOMENA

- 3079 **Performance of a precise infrared shadow sensor thermometer**
Shuhua Fan, Shuchao Wu, and Jun Luo
- 3082 **Compensation techniques for high-temperature superconducting quantum interference device gradiometers operating in unshielded environment**
J. Borgmann, P. David, H. J. Krause, R. Otto, and A. I. Braginski
- 3085 **Absolute displacement measurement by using the synthesized modulation index of a frequency-modulated interferometer**
Lih-Wuu Chang, Ching-Ting Lee, and Pie-Yau Chien

MICROSCOPY and IMAGING

- 3088 **Versatile scanning near-field optical microscope for material science applications**
P. G. Gucciardi, M. Labardi, S. Gennai, F. Lazzeri, and M. Allegrini
- 3093 **A shear force feedback control system for near-field scanning optical microscopes without lock-in detection**
J. W. P. Hsu, A. A. McDaniel, and H. D. Hallen
- 3096 **Thermal imaging with near-field microscopy**
B. D. Boudreau, J. Raja, R. J. Hocken, S. R. Patterson, and J. Patten
- 3099 **An improved lamellae drop-off technique for sharp tip preparation in scanning tunneling microscopy**
M. Klein and G. Schwitzgebel

- 3104 **Enhanced local surface conductivity measurements by scanning tunneling microscopy**

F. Müller, A.-D. Müller, O. Meissner, A. Heilmann, and M. Hietschold

- 3108 **A high-resolution scanning Kelvin probe microscope for contact potential measurements on the 100 nm scale**

W. Nabhan, B. Equer, A. Broniatowski, and G. De Rosny

- 3112 **High-resolution scanning microdensitometer**

Martin Feldman and Zhang Chunsheng

CONDENSED MATTER; MATERIALS

- 3116 **Precise linear internal friction expression for a freely decaying vibrational system**

Xianfang Zhu, Jiapeng Shui, and J. S. Williams

- 3120 **He activated loading device for low temperature uniaxial and anvil cell pressure experiments**

C. Pfeleiderer, E. Bedin, and B. Salce

- 3125 **Analysis of the optical reconstruction of shearograms using oblique illumination**

T. W. Ng

- 3130 **Description of a single modular optical setup for ellipsometry, surface plasmons, waveguide modes, and their corresponding imaging techniques including Brewster angle microscopy**

M. Harke, R. Teppner, O. Schulz, H. Motschmann, and H. Orendi

- 3135 ***In situ* fast ellipsometric analysis of repetitive surface phenomena**

J. Costa, J. Campmany, A. Canillas, J. L. Andújar, and E. Bertran

- 3140 **Personal computer-controlled 16 channel versatile pulse generator for nuclear magnetic resonance**

Tomonori Toyoda, Hisashi Yoshida, Osamu Oishi, and Seichi Miyajima

- 3143 **Intermodulation measurement of nonlinearities in piezoceramic resonators**

A. Albareda, R. Pérez, J. L. Villar, E. Minguella, and J. A. Gorri

- 3150 **Simple method for measuring refractive index of supercritical fluids**

C. F. Kirby and M. A. McHugh

- 3154 **Experimental setup for Fourier transform infrared spectroscopy studies in condensed matter at high pressure and low temperatures**

R. Bini, R. Ballerini, G. Pratesi, and H. J. Jodl

- 3161 **Instrument for the *in situ* measurement of depositing particles**

Masayoshi Tsuchiya and Katsumi Takami

- 3168 **A miniature single element effusion cell for the vacuum deposition of transition-metal and rare-earth elements**

V. G. Harris and N. C. Koon

CHEMISTRY

- 3172 **Paper I: Design and construction of a Knudsen-cell reactor for the study of heterogeneous reactions over the temperature range 130–750 K: Performances and limitations**

François Caloz, Frederick F. Fenter, Kevin D. Tabor, and Michel J. Rossi

(Continued)

- 3180 **Paper II: Simulation of flow conditions in low-pressure flow reactors (Knudsen cells) using a Monte Carlo technique**
Frederick F. Fenter, François Caloz, and Michel J. Rossi

BIOLOGY and MEDICINE

- 3187 **An improved inductive coupler for suppressing a shift in the resonance frequency of electron paramagnetic resonance resonators**
Hiroshi Hirata, Tadeusz Walczak, and Harold M. Swartz
- 3192 **An automatic swinging instrument for better neonatal growing environment**
Cheng-Hsing Lu, Ching-Hsing Luo, Yung-Jung Chen, and Tsu-Fuh Yeh

GRAVITY; GEOPHYSICS; ASTRONOMY and ASTROPHYSICS

- 3197 **Measurement of position and orientation of optical elements in interferometric gravity wave detectors**
Henrich Heitmann and Christine Drezen
- 3206 **Installation of a high-sensitivity laser strainmeter in a tunnel in central Italy**
Luca Crescentini, Antonella Amoruso, Giorgio Fiocco, and Guido Visconti
- 3211 **An ultra-low-noise, low-frequency, six degrees of freedom active vibration isolator**
D. B. Newell, S. J. Richman, P. G. Nelson, R. T. Stebbins, P. L. Bender, J. E. Faller, and J. Mason
- 3220 **A low cost microsatellite instrument for the *in situ* measurement of orbital atomic oxygen effects**
Ian L. Harris, Alan R. Chambers, and Graham T. Roberts

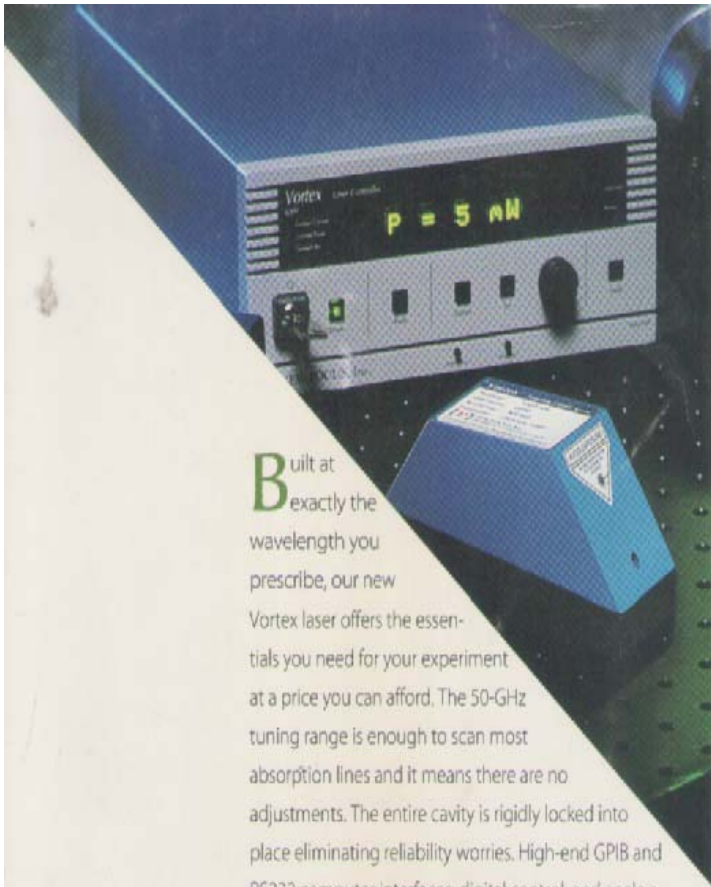
ELECTRONICS; ELECTROMAGNETIC TECHNOLOGY; MICROWAVES

- 3229 **Plasma wakefield klystron**
J. A. Pasour, R. Seeley, D. Smithe, and K. Nguyen
- 3236 **Pseudo-incommensurate two-stimulus generator**
F. Mitschke
- 3238 **A two-dimensional capacitive position transducer with rotation output**
M. J. Barker and M. S. Colclough
- 3241 **Design considerations for a three dimensional fiber optic laser Doppler velocimeter for turbomachinery applications**
Stephen W. James, Ralph P. Tatam, and Robin L. Elder
- 3247 **Sensing position and speed by recording magnetization transitions on mechanically functional machine members**
I. J. Garshelis

NOTES

- 3250 **Real time measurement of current and voltage in discharge pumped KrF[®] excimer lasers**
E. D. Onkels and W. Seelig
- 3252 **The effect of using silicon based diffusion pump fluid on spectral quality in an electrospray ionization ion trap/time-of-flight mass spectrometer**
Randy W. Purves, Wojciech Gabryelski, and Liang Li
- 3254 **Accelerometer adaptor for measurements of metal plate response from a near field explosive detonation**
George Yiannakopoulos
- 3256 **Liquid helium cooled sample holder assembly for surface x-ray diffraction**
J. S. G. Taylor and C. Norris

(Continued)



Built at exactly the wavelength you prescribe, our new Vortex laser offers the essentials you need for your experiment at a price you can afford. The 50-GHz tuning range is enough to scan most absorption lines and it means there are no adjustments. The entire cavity is rigidly locked into place eliminating reliability worries. High-end GPIB and RS232 computer interfaces, digital control, and analog inputs give this laser the flexibility you need while inexpensive interchangeable heads allow you to add other wavelengths easily.

These complete systems are ideal replacements for expensive DFB lasers (you don't need a custom wafer run), stabilized HeNe lasers (they come in a whole lot more wavelengths), and home-made ECCL's (they actually cost you less).

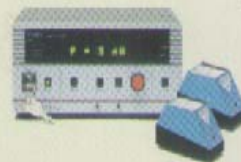
All built to order. All robust. All rock solid. This instrument is ready for your OEM needs.

Our new 1997/98 catalog features a full line of tunable diode lasers. Contact us for a free copy.

just what the
doctor ordered

at last a
laser that
fits your
prescription

- ◆ built at the wavelength you specify
- ◆ 5-MHz linewidth
- ◆ 50-GHz tuning
- ◆ starting at \$7,900



NEW FOCUS, Inc.

2630 Walsh Ave. • Santa Clara, CA • 95051-0905
phone: (408) 980-8088 • fax: (408) 980-8683
e-mail: Contact@NewFocus.com
www.NewFocus.com

Simply Better Photonics Tools...Simply Better Prices Too!

