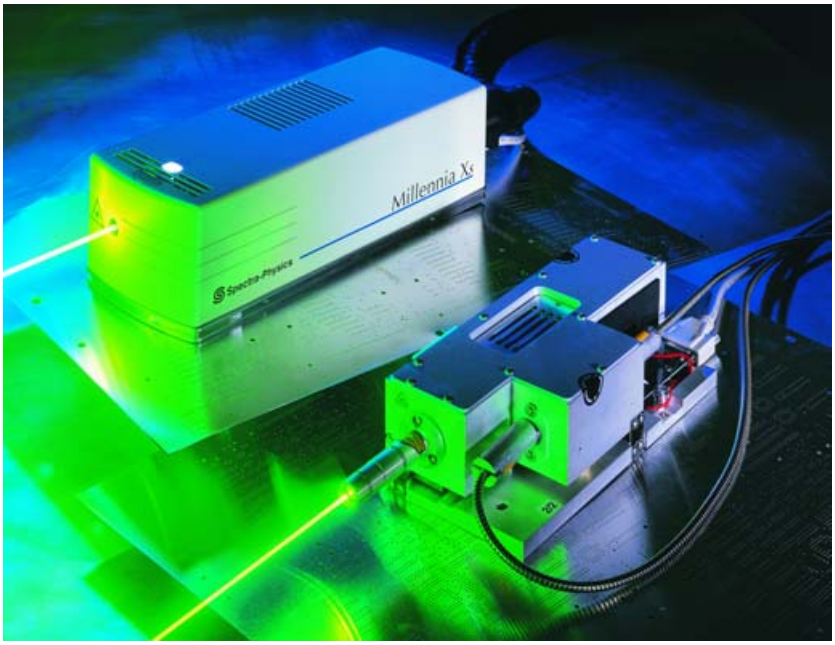
MILLENNIA

The Benchmark

In Diode-Pumped

Solid-State Lasers.



Spectra-Physics

Lasers & Photonics

Millennia. The Leader In High Power Diode-Pumped Solid State Lasers.

Unparalleled performance, unbeaten track record, and the largest installed base. Millennia® sets the standard by which all diode-pumped solid state, cw green lasers are measured.

Spectra-Physics, the recognized leader in the development of high power solid state lasers, completely revolutionized high power visible laser technology with the introduction of Millennia in January 1996, the first all solid state high power green laser.

Since then, we have worked closely with our industrial customers and the research community to develop the next generation technology—the Millennia *s* Series and the industrial Millennia *i* Series.

The Millennia *i* Series is specifically designed to meet the unique requirements of industrial applications and is, in fact, the only industrial high power diode-pumped, cw green laser on the market today.

Millennia *i* features innovative technology, which has yielded a monolithic architecture and advanced thermal design within an absolute minimum footprint. The result is unprecedented power stability, ultra low optical noise, and exceptional beam-pointing performance. The Millennia *s* Series combines the industrial features of the *i* Series in a compact CDRH compliant package—60% smaller than the competitive design, in a range of power levels from 2 W to 10 W, suited to your application needs.

Dr. Jeff Squier

Research Director, Wilson-Squier Group, University of California, San Diego

Our Millennias have proven an invaluable tool in our research lab. They ve gained us back a month per year in research time time previously spent dealing with chilled water issues. Five minute warm up, stable performance, zero downtime w e re into our fourth year with them and haven t required a single service call.

From semiconductor wafer inspection and Raman imaging, to disk texturing, film subtitling, and materials processing, to spectroscopy and pumping cw and mode-locked Ti:sapphire lasers, solid state materials or dye lasers—nothing streamlines and enhances your application like the Millennia *i* and *s* Series.

Complementing the unparalleled performance of the Millennia is Spectra-Physics' exemplary worldwide service and support capabilities. You can rely on the most comprehensive and responsive support at every step along the way—from initial design concepts, to system integration, and on through training and beyond. This partnership orientation is a key reason Spectra-Physics is the worldwide number one name in solid state laser technology.

The Millennia Advantage

- *Available in a range of output power configurations, from 2 W to 10 W.*
- *Compact monolithic architecture and an advanced thermal design ensures superior beam pointing and power stability, without the need of a bulky heat sink.*
- *An enhanced, patented intracavity doubling process (QMAD) provides ultra-low optical noise, less than 0.04% rms for all models from 2 W to 10 W.*
- *Manufactured in a clean room with micro-optical components and advanced fixturing technology, the Millennia is permanently aligned and sealed, ensuring hands-off operation no adjustments or cavity realignments, ever.*
- *The rugged, reliable X-cavity design requires a maximum of two high power diodes for the lowest cost of ownership.*
- *T-tune control software optimizes long-term system performance, assuring the pump diodes operate at their optimum current and pump wavelength.*
- *The ultra-compact size of the Millennia i and s Series enable them to be readily integrated into any application in fact, the Millennia s Series is 60% smaller than the competitive design.*
- *Output beam position is mechanically indexed for reproducible installations.*
- *Patented, FCbar™ fiber coupled source diodes are easily field replaceable without any realignment of the cavity.*

Superior Performance By Design.

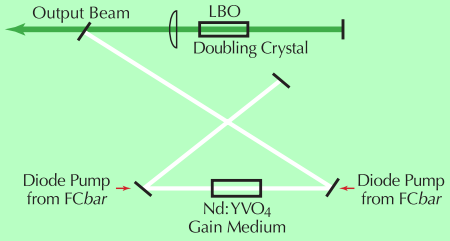
At the heart of the Millennia *i* and *s* Series is a robust, sealed, industrially hardened laser head that yields numerous performance advantages unavailable in competing systems.

This innovative platform provides unmatched levels of durability, reliability, and hands-off performance while minimizing the size to give greater flexibility for installation and integration.

Highest Power, Smallest Footprint.

The unique X-cavity design of the Millennia utilizes micro-optical components for high power performance with an absolute minimum footprint. The ultra-compact size of the Millennia *i* and *s* Series provides for ready integration into any application—the Millennia *s* Series is sixty percent smaller than the competitive design.

Millennia X-Cavity Schematic



Compact, Monolithic Architecture.

For simplicity, the Millennia features a simple standing-wave cavity design, ensuring reliable long term performance while minimizing the number of intracavity elements and electronic feedback loops required for complex, competitive ring designs.

This design concept is based on an OEM architecture, which has been proven in thousands of OEM installations. Even in the most demanding applications, you can count on the Millennia for consistent, repeatable performance—day after day, month after month, year after year.

Advanced Thermal Design.

The unique thermal design of the Millennia eliminates the delicate handling, long equilibration and beam pointing instabilities associated with competitive systems.

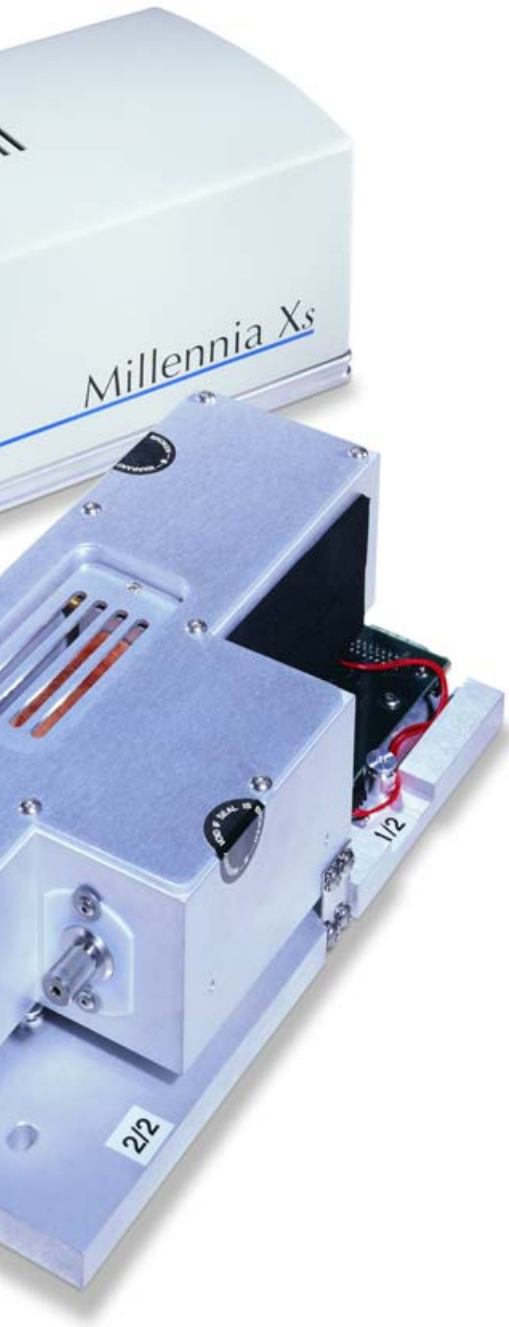
This advanced architecture allows the Millennia to be mounted on any surface while its monolithic structure ensures rapid thermal equilibration after turn-on with outstanding beam-pointing stabilization.

Maximum Two-Diode Architecture.

The Millennia's innovative design, utilizing high power pump diodes, translates into dramatically reduced long-term cost of ownership. The Millennia X*s* requires only two high-power diodes to produce more than 10 W of cw green power. Moreover, each diode is operated well below its rated power level, which when coupled with our proprietary T-tune software, results in excellent long-term system reliability.

Completely Sealed For Maximum Reliability.

The Millennia is designed for stable and reliable operation—the lasers are permanently aligned and sealed in a



clean room to provide hands-off performance. This has been proven over the last decade in thousands of demanding OEM applications.

Tight Boresight Tolerance, Mechanically Indexed Beam Position.

Unique to the Millennia is its tight boresight tolerance and mechanically indexed beam position. This guarantees reproducible beam positioning and consistent installations—features critical in an industrial or OEM application.

Exceptional Low-Noise Performance.

Spectra-Physics' innovative, patented QMAD (quiet multiaxial mode doubling) intracavity doubling technology provides exceptionally stable, ultra low-noise green output at unprecedented power levels. The Millennia *i* and *s* Series' enhanced, QMAD approach provides an intrinsic reduction of the entire noise floor for improved noise performance without the added complexity and fragility of a single frequency cavity.

Reliable FC*bar*™ Pump Architecture For Easy Serviceability.

Spectra-Physics pioneered and patented the use of optical fibers for efficiently coupling the output of laser diodes and diode bars to the gain medium of solid state lasers. Using an end-pumped mode matched geometry, this modular technology is known as FC*bar*. The FC*bar* modules are housed in the power supply simplifying the thermal management of the diodes and facilitating field replacement. The diode module can be changed without any realignment of the laser cavity or downstream optical beam trains.

Cleanroom Facilities

Spectra-Physics maintains the most technologically advanced, stringently controlled Class 100 cleanroom facility in the industry. It is staffed by a hand-picked team of highly skilled personnel, who work with leading-edge precision tooling systems.

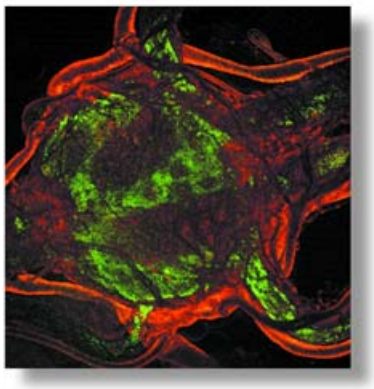
Power Supplies Designed To Meet Your Needs.

The Millennia features both T and J series power supplies to meet your applications demands. Each supply is optimized for ultra low-noise output and optimum diode lifetime with the widest range of drive current.

The new J Series power supplies are compact and rack-mountable. They house and power the diode modules and all the necessary logic and control electronics. The J series can either be air or water-cooled with temperature regulation of the diodes accomplished through an internal thermoelectric cooler.

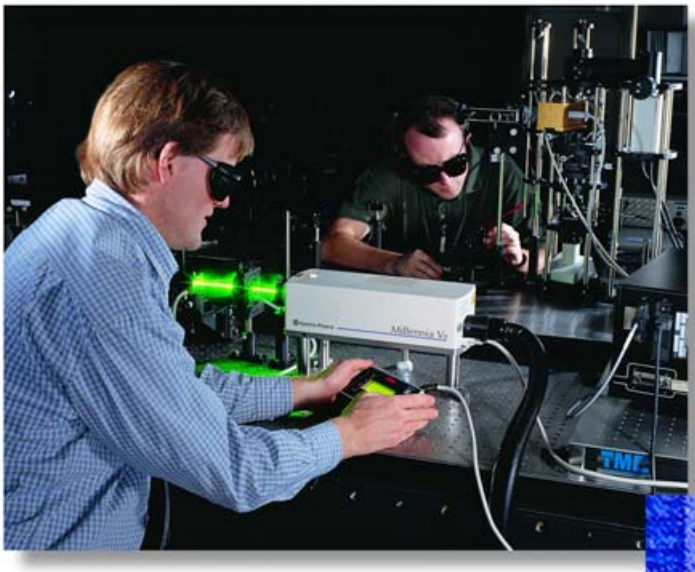
The T Series power supplies have been the workhorse for thousands of products installed in scientific and OEM applications. They are completely air-cooled, use an internal refrigeration loop for diode temperature regulation, and offer the widest range of operating ambient temperature.

Millennia Applications

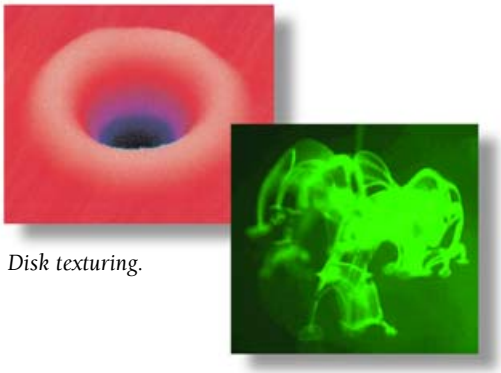


Multiphoton imaging.

Laser light show over Berlin.

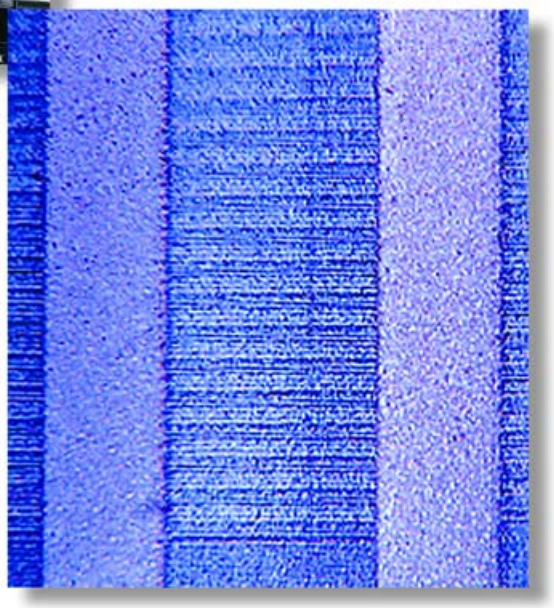


Pumping Ti:sapphire, Jeff Squier University of California, San Diego.



Disk texturing.

Holographic PIV.



Imation SuperDisk™ track.

Industry Leading Service And Support.

Whether you are a research scientist, an industrial system developer or an OEM integrator, Spectra-Physics is committed to being there as your partner. From initial design concepts through final installation and beyond, our sales and service teams are ready to provide the support you need to integrate and to ensure optimum performance of the Millennia in your application.

A wide range of service support and training programs are available including on-site programs, and service level training developed primarily to meet the needs of our industrial and OEM customers.

With sales and service offices located worldwide, Spectra-Physics leads the industry not only in uncompromising service, but in rapid response to your needs.

Call For More Information Today.

For more information on the Millennia *i* and *s* Series, or to discuss how you can integrate this exciting new technology into your application, please contact your nearest Spectra-Physics representative today. We look forward to working with you.

Dr. Patrick J. Treado

President, ChemIcon, Inc.
Pittsburgh, PA

The Millennia IIi has been beneficial to our designs in terms of cost effectiveness, integration ease, and overall robustness. From temperature performance to pointing stability in high vibration environments, it s really really a bulletproof laser. Moreover, communication between our engineering staff and theirs has been very good.

Spectra-Physics
Lasers & Photonics

CE

VISIBLE AND/OR INVISIBLE* LASER RADIATION
AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT
cw GaAlAs, or cw Nd:YVO_4 IR (1.06 µm) or SHG (532 nm)
MAXIMUM OUTPUT 50 W
* SEE MANUAL FOR DETAILS

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