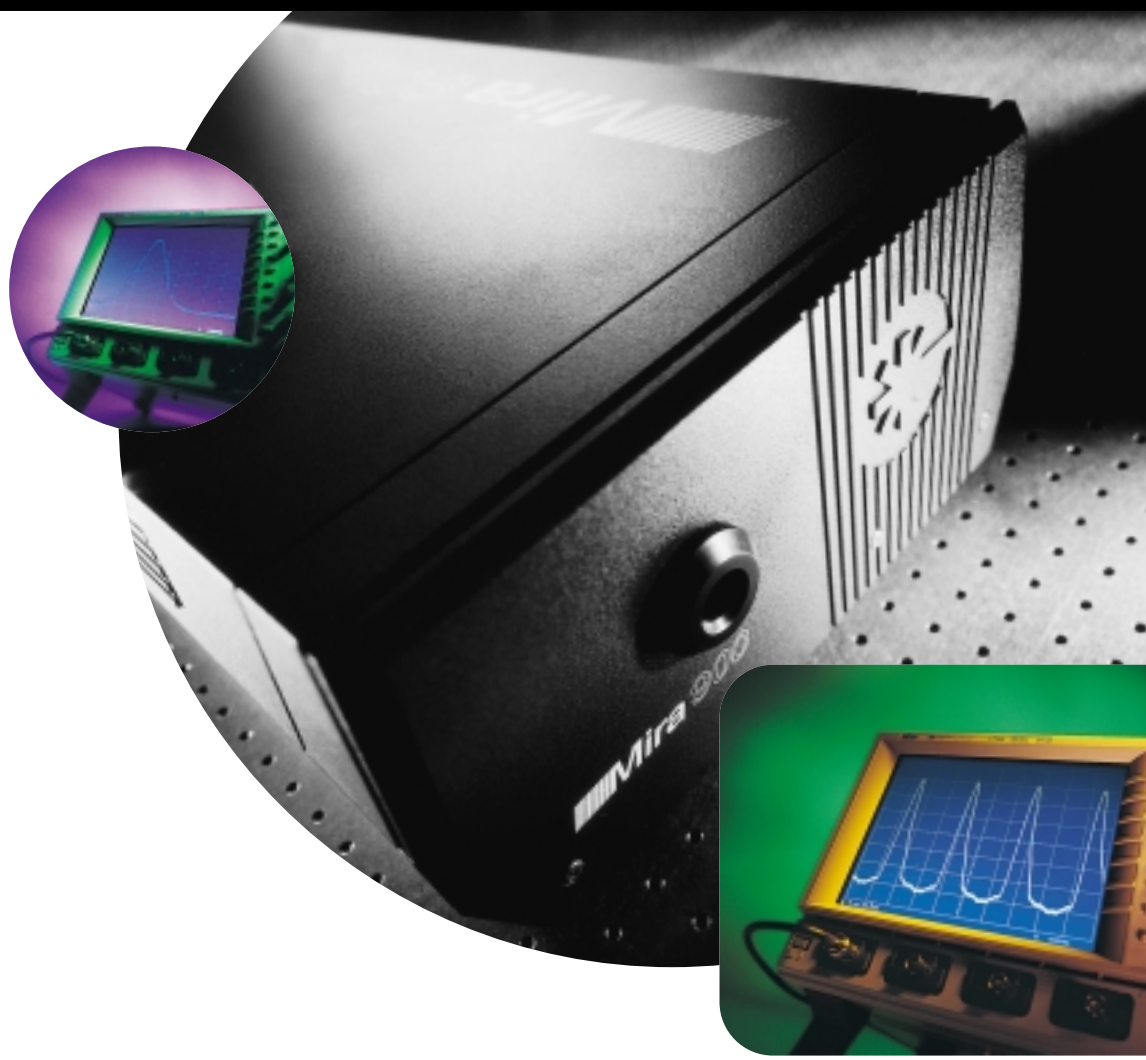
MIRA

The Mira 900 Family of Ultrafast Ti:sapphire Lasers

Unmatched simplicity and performance for ultrafast applications.



COHERENT

MIRA: 900

The Mira 900 Family of Ultrafast Ti:sapphire Lasers.

You are looking for clues to the dynamics of matter. Or, perhaps, for the very constituents of life itself. You are looking at processes so complex, phenomena so ephemeral, that observation is all but impossible.

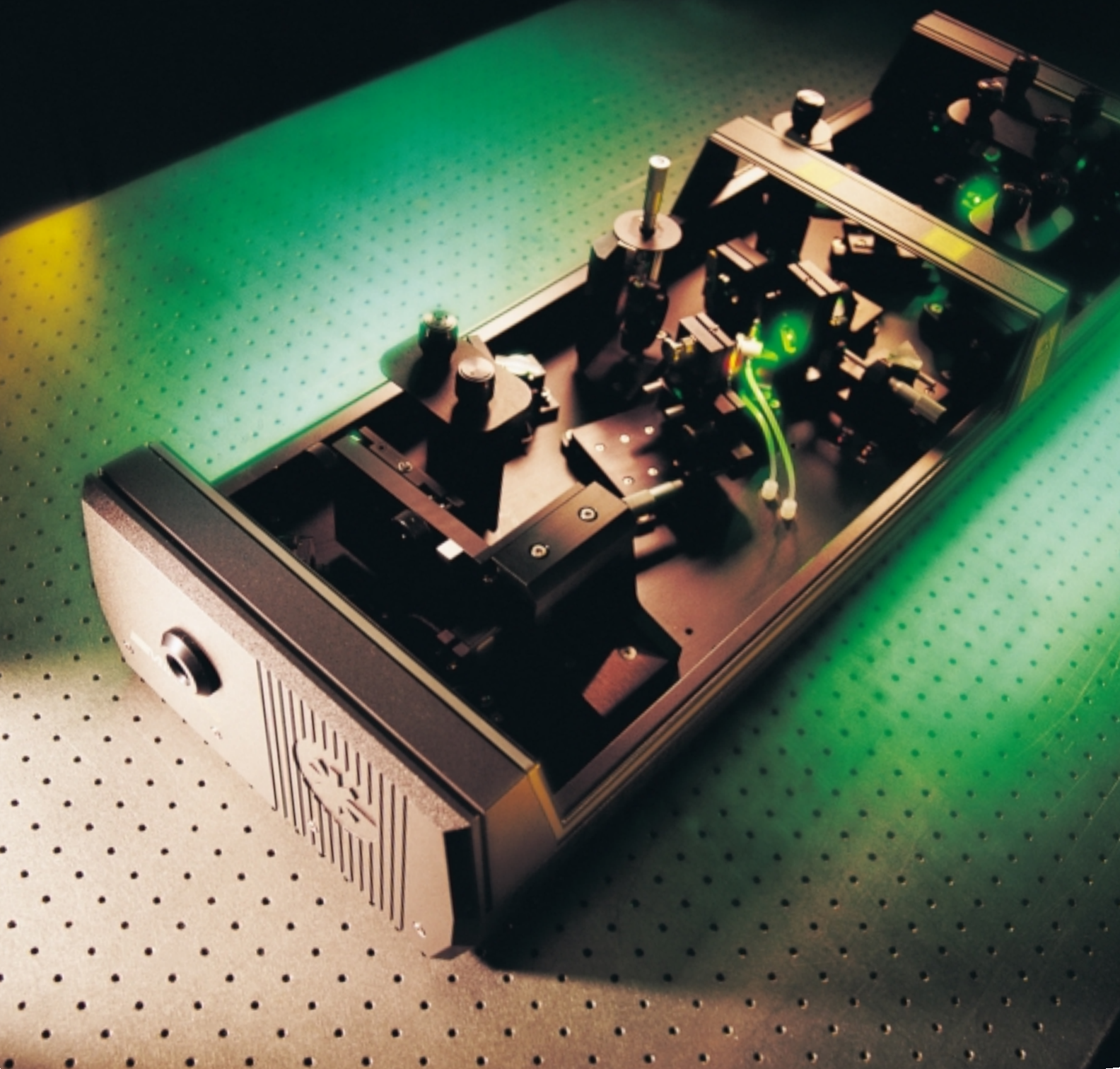
But now there's a way to make the invisible, visible; the unknowable, knowable. Now, you virtually see it unfold before your eyes. And best of all, you don't have to become an expert in laser technology to do it. Look closely. Welcome to Mira®.

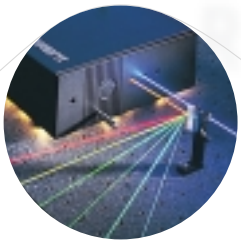
Performance you can use.

The Mira 900 family of modelocked titanium:sapphire (Ti:S) lasers is a series of versatile, easy-to-use laser systems designed specifically for the varying demands of ultrafast applications in scientific research. From time-resolved photoluminescence to pump-probe spectroscopy, from non-linear optics to multiphoton microscopy, the Mira 900 offers unprecedented opportunity for rich, scientific observation and discovery.

And now, thanks to recent advances in the technology of our industry-leading Verdi® pump laser, as well as the introduction of X-Wave™ broadband optics, Mira lasers feature even higher performance, and are significantly easier to use. Indeed, with Ti:S technology at its core, the all-solid-state Mira 900 has become the premier widely-tunable, modelocked laser available for both femtosecond and picosecond scientific research.

Simplicity, versatility, and reliability. Add the Coherent reputation for innovation and quality, and you've got the preferred ultrafast laser in use today.

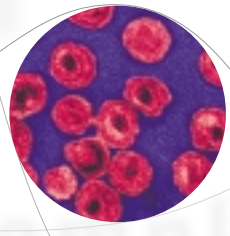




Non-linear Optics

Chemistry

Cell Imaging



Opening the possibilities *for Ultrafast Applications.*

The use of high-speed, short-pulse lasers over the last decade has enabled an ever-growing understanding of fundamental processes in chemistry, physics and biology. Today, the study of such ultrafast phenomena is enhanced by the performance properties of the Mira family of modelocked lasers.

Reliable ultrafast pulses.

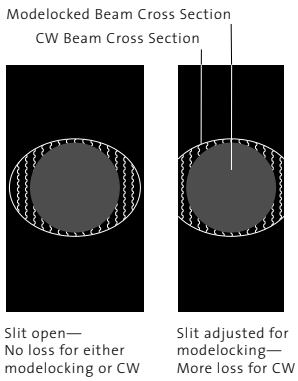
The Mira laser operates on the Kerr Lens Modelocking (KLM) technique. In the KLM process, the optical cavity is specifically designed to optimize modelocking by utilizing changes in the spatial profile of the beam. These changes are produced by the self-focusing that results from the optical Kerr effect in the Ti:S crystal. The process itself is initiated by a simple, optical design that varies the cavity length to create transient short-pulse fluctuations.

KLM is a highly reliable, all-solid-state modelocking technique that requires no unnecessary, additional cavity elements such as an acousto-optic modulator, and is analogous to a fast saturable absorber. The result is the efficient generation of short pulses in either the femtosecond or picosecond regime.

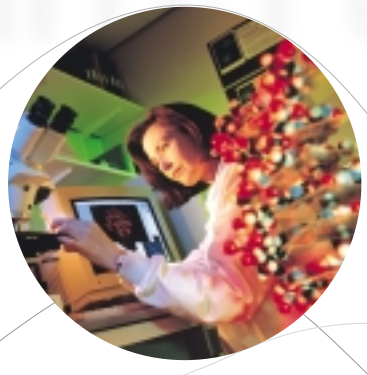
Superior pump lasers.

At the core of the Mira system is the Verdi CW diode-pumped laser. This 532 nm green laser offers several compelling advantages: stable, high-power operation; a compact, completely sealed package; adjustment-free operation; and the lowest cost of ownership in the industry.

Available in 5-watt, 8-watt or 10-watt versions, Verdi is the pump laser of choice for the majority of ultrafast scientific applications. Should you require the very highest powers possible, the Mira system can also be pumped by our high-power, multiline Innova® argon ion lasers. Either way, you get the highest performance available for your particular application.

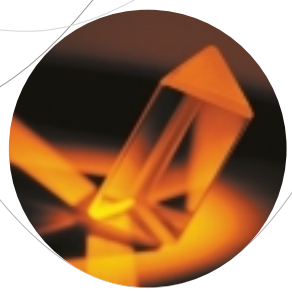


Kerr Lens Modelocking utilizes self-induced changes in the spatial profile of the beam. The cavity is optimized for modelocking by simple adjustment of a variable aperture.



Biology

Ultrafast Spectroscopy



Physics

Broadband, X-Wave optics.
Designed and commercially pioneered by Coherent, X-Wave optics greatly enhance operational simplicity. They allow you to tune the Mira's wavelength across the entire Ti:S range, from 700 nm to 1000 nm, without changing components—or sacrificing power. X-Wave optics are available for either femtosecond or picosecond operation, for both Verdi and Innova ion laser pumping. What's more, operation at the very longest wavelengths in the Ti:S regime can be accessed using Mira's Long-Wave optics set.

Unparalleled stability and low noise.
The powerful combination of Verdi pumping and precision opto-mechanical design results in Mira's unrivaled low noise level and long-term stability. Further, the superior design of the cavity—in which two intracavity prisms, required for femtosecond operation, are located at the rear—ensures optimum pointing stability across the tuning range. This dual-prism design eliminates the alignment problem found in the more complex, four-prism method used in other commercial systems.

Add it all up and you'll find that when it comes to performance, Mira lasers open up an entire new vista for ultrafast applications.

Optima:

A system that lets you focus on your work.

Today's ultrafast lasers must do more than identify the nature of chemical reactions. Or characterize the dynamics of solid-state materials. Or visualize the workings of a living cell. Today's ultrafast lasers must also perform with ease.

That means an operational simplicity so comprehensive, you hardly focus on the equipment at all. That means Mira. And its exclusive Optima™ system for diagnostics and control.

High-performance convenience.

Using a full suite of on-board detectors and a dedicated electronic control system, Optima displays important lasing parameters in real time, and provides you with the tools you need to quickly maximize the performance of your Mira laser. This ensures that you get the highest-quality results possible, with a superior level of productivity.

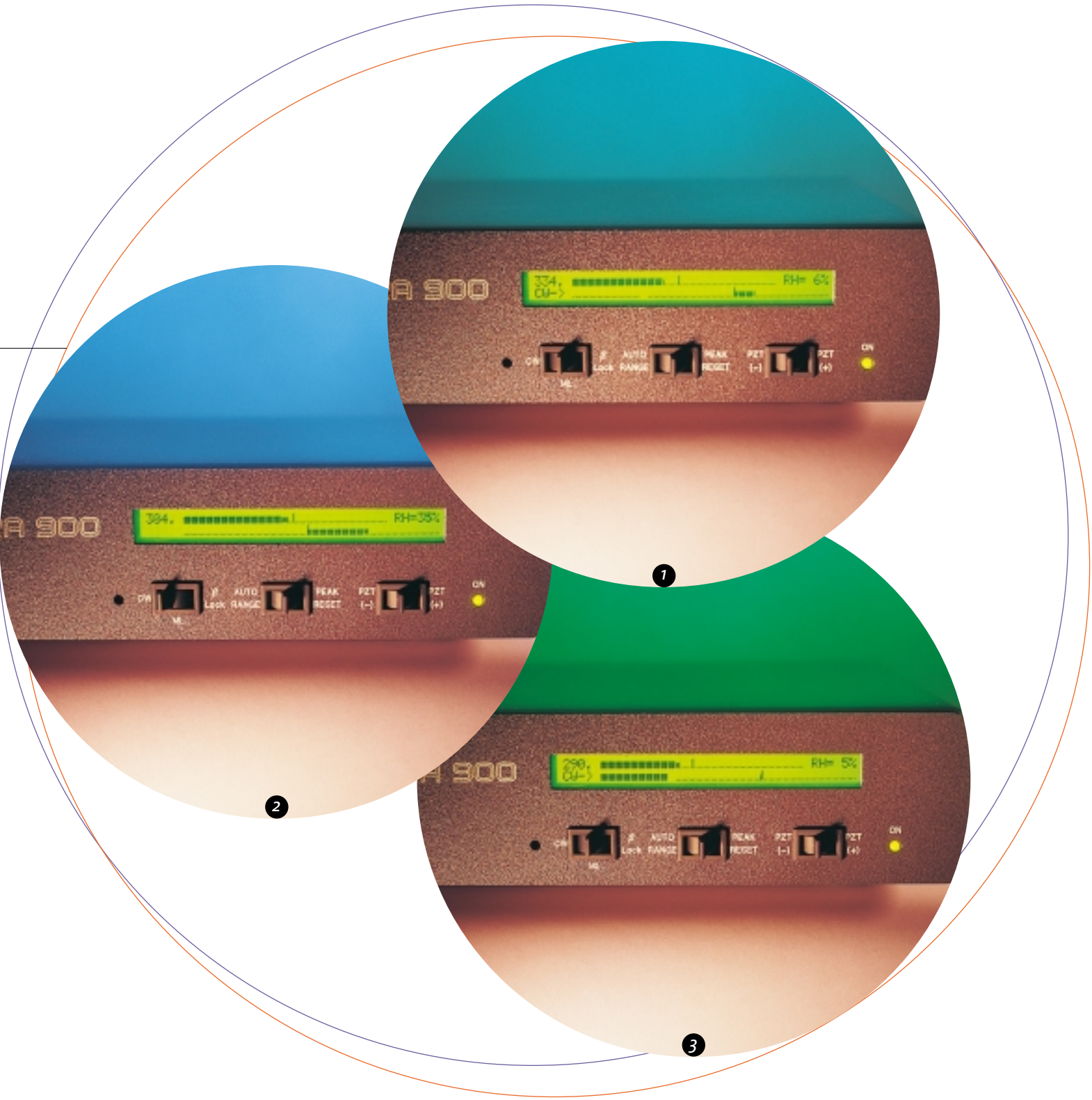
Through the Optima control panel, you receive a wide range of system information on modelocking status, power level, and the CW content of the beam. Control of CW content is simplified, compared to alternative ultrafast designs, through a convenient, external adjustment of the intracavity slit. The CW detector is also used to drive the automated starting of the modelocking process.

Not only that, but by using a sensitive device for monitoring power, Mira can easily detect the relative laser output power or fluorescence from the Ti:S crystal. The result? A significantly simpler alignment and optimization process when peaking mirrors or re-configuring the cavity.

A spectrum of capabilities.

For picosecond operation, the Optima system incorporates the unique ß-Lock™ system, which optimizes performance through continuous, skip-free tuning of picosecond pulses.

Optima also includes a fast photodiode output that can be used in a stand-alone mode to display the modelocked pulse train; or in conjunction with other optional equipment such as our Pulse Picker™ or RegA™ ultrafast amplifier. There's even a humidity detector to indicate the relative humidity inside the laser head, which allows for the easy adjustment of the nitrogen flow required when operating at wavelengths absorbed by water vapor.

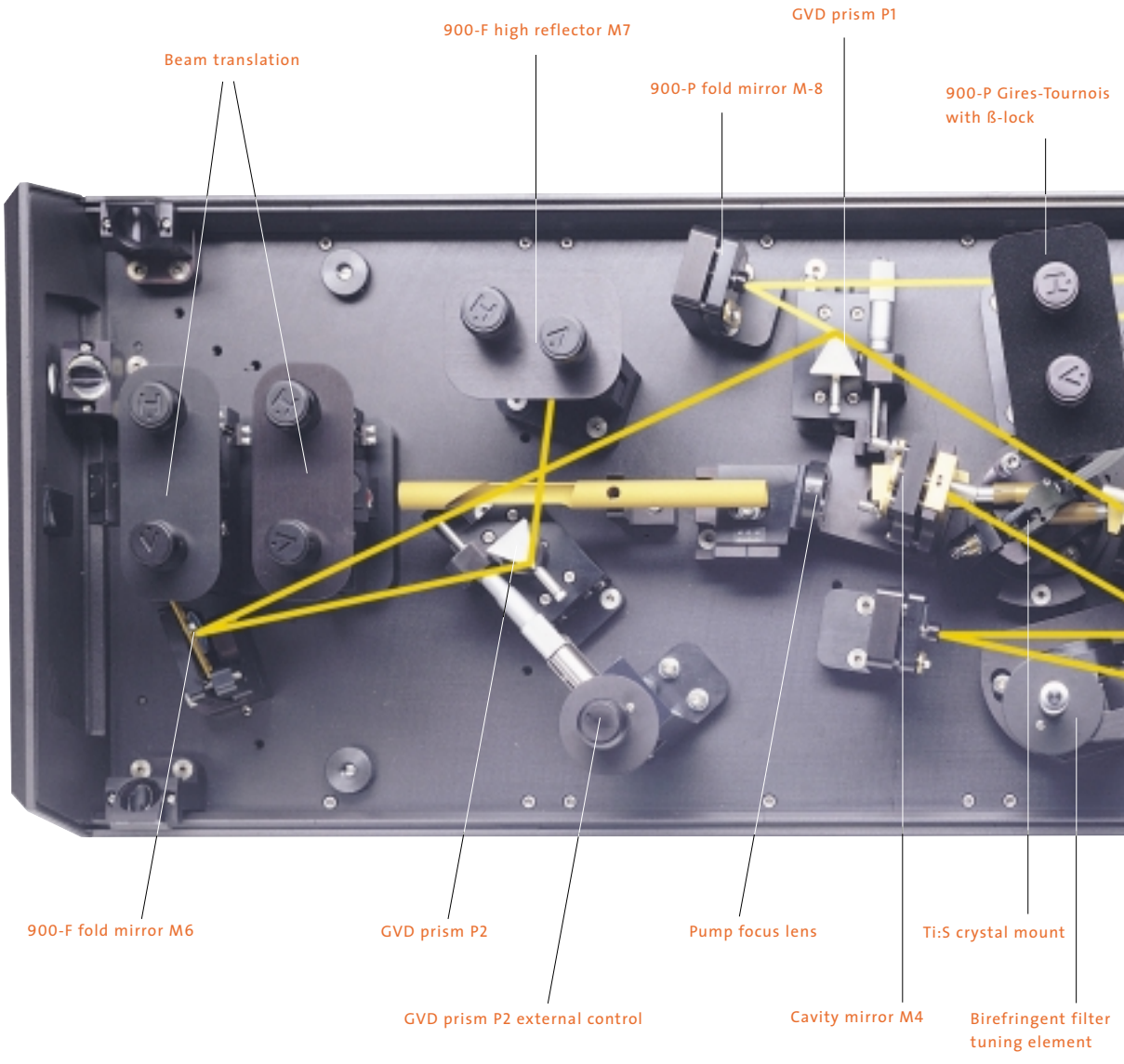


SAMPLE OPTIMA DISPLAYS

1) Normal modelocked operation
2) Peaking laser power
3) CW breakthrough

The inside

story of productive work.



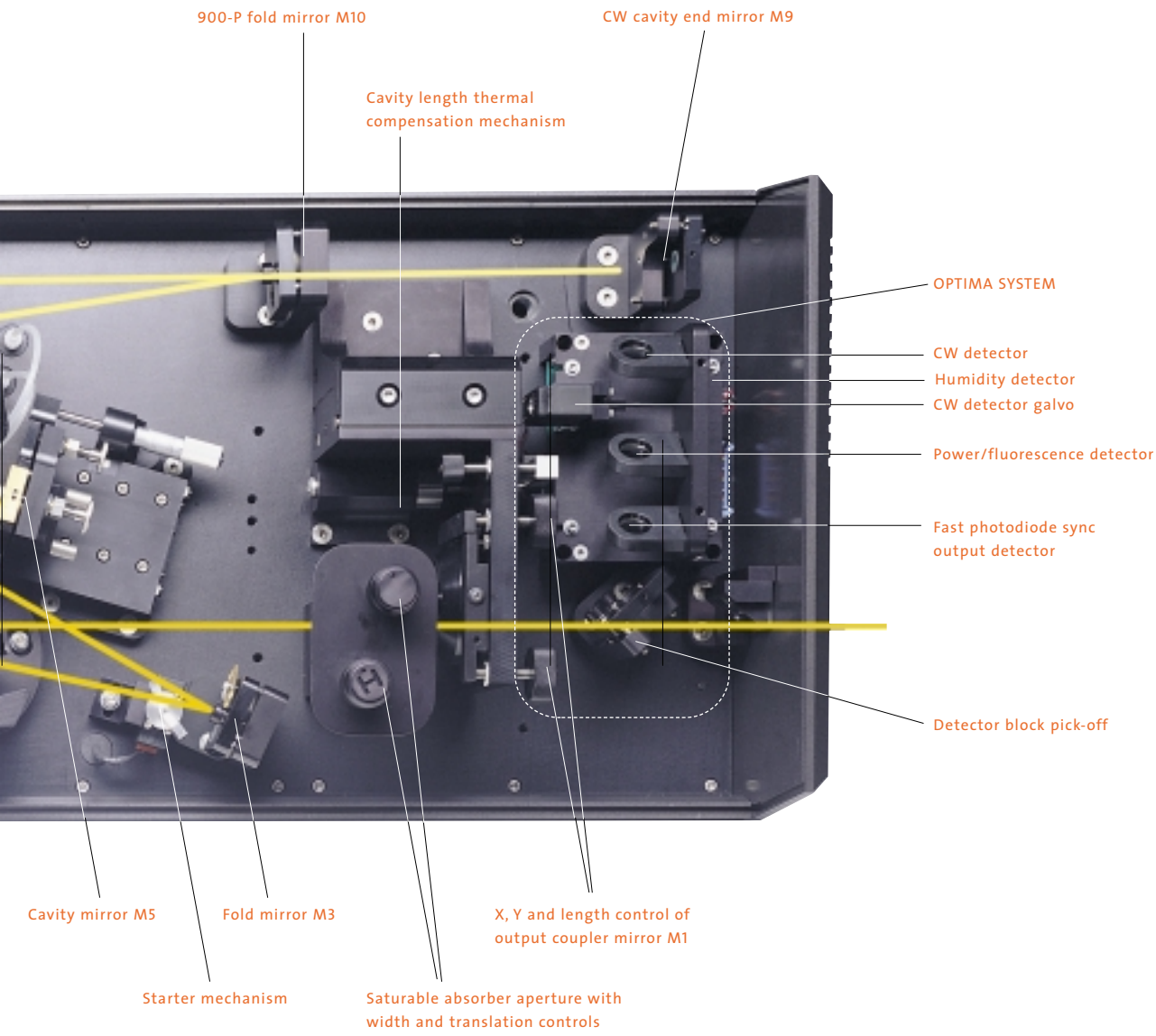
The inside story of productive work.
Mira was expressly designed with the convenience of users in mind. In addition to Optima, the laser incorporates several features that further simplify the operation, stability, and long-term reliability of the system.

Start with an elegant optical architecture that provides convenient access to all components, with the beam propagating solely in the horizontal plane. Add integral pump-beam steering mirrors, with external controls that greatly simplify the setup and maintenance of pump-beam alignment.

Include ports that allow three different input directions for the pump-beam, providing flexibility in experimental layout. An auxiliary CW cavity, to facilitate cavity alignment. And femto/pico/CW cavity configuration changes, which are simplified by the layout.

Want more? The Mira's resonator has a thermally-compensated, output-coupler mounting, ensuring cavity-length stability during ambient temperature changes. And the laser head is sealed and purgeable, for low maintenance and continuing operation at water-absorbing wavelengths.

Add it all up and you've got a complete system designed for the most demanding user.



An extensive range *of ultrafast systems.*

The Mira family has been designed to offer increased versatility through a variety of flexible configurations. These include:

Mira Optima 900-F.
The Mira Optima 900-F operates in femtosecond mode, with GVD (Group Velocity Dispersion) compensation achieved via an elegant, double-pass, two-prism sequence at the rear of the cavity.

Mira Optima 900-P.
The Mira Optima 900-P offers reliable picosecond performance, utilizing a Gires-Tournois Interferometer (GTI) to provide the required additional level of negative dispersion.

Mira Optima 900-D.
The Mira Optima 900-D incorporates both femtosecond and picosecond cavities in a dual configuration; changing from femto to pico, or vice-versa, is extremely straightforward.

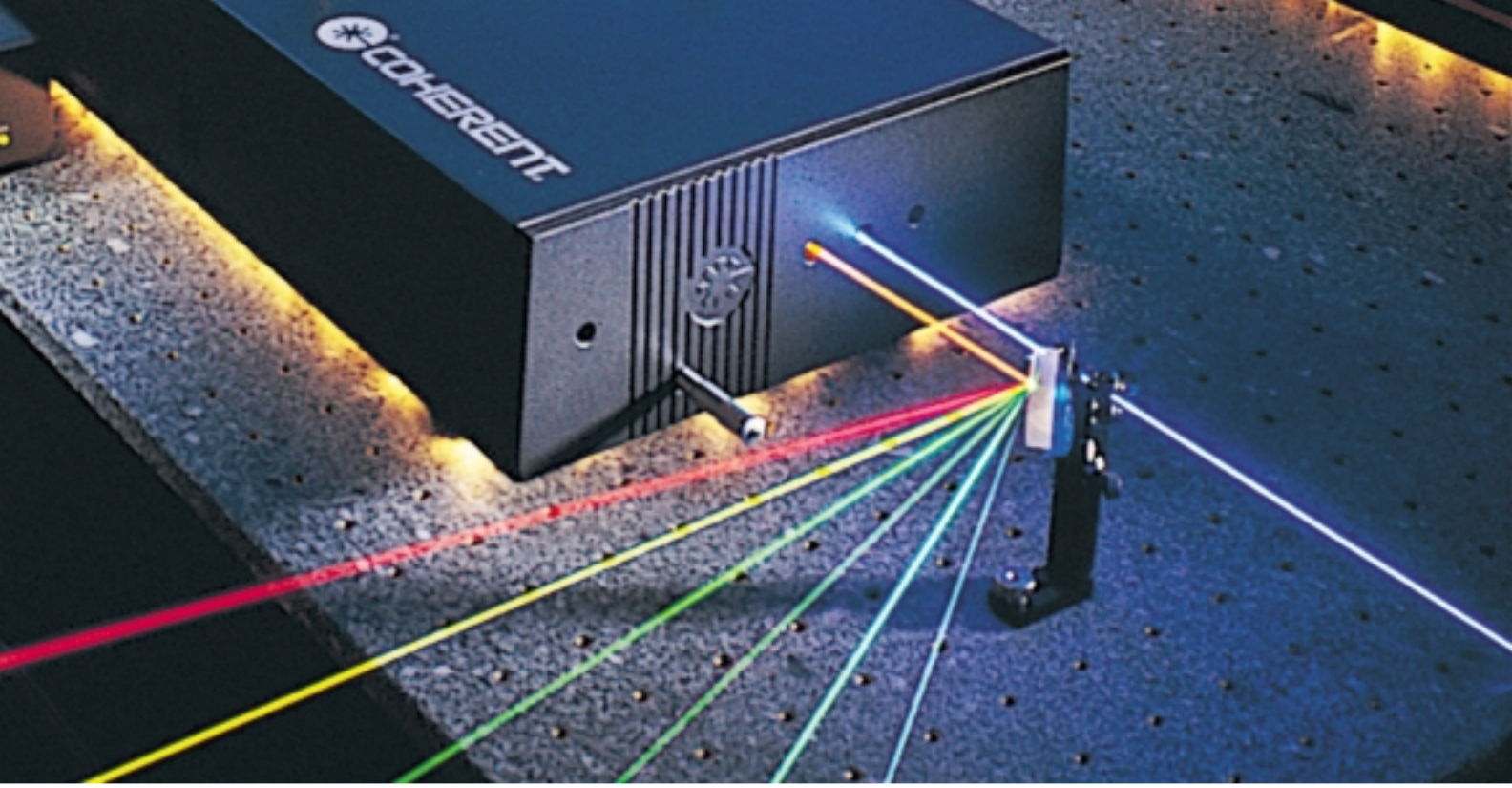
Mira 900-S.
The Mira 900-S is a standard femtosecond version of the Mira system, without the Optima control package.

System expansion for new applications.

At Coherent, we also offer a full range of optional devices that can be used in combination with Mira to extend system performance. From the optimization of tuning range, pulse energy, and repetition rate to synchronization, pulsewidth, and more, these devices open up an even wider vista of ultrafast applications.

Harmonic Generation 9300.
The Harmonic Generator 9300 converts the output of Mira into the blue and ultraviolet wavelength ranges. Systems for second, third, and fourth harmonic generation are available for both femtosecond and picosecond, or dual, operation.

Pulse Picker 9200.
The Pulse Picker 9200 is a standalone accessory that offers control of the pulse repetition rate over a wide range. A dedicated controller allows repetition rates from 9.5 kHz to 4.75 MHz. Rates down to single-shot are possible with external control.



Synchro-Lock 900.
For applications requiring synchronization of one or two Mira systems, the Synchro-Lock™ 900 option offers automatic cavity-length control. Length actuators are used to lock the cavity repetition rate to an internal crystal oscillator or to an external reference frequency. Computer control allows 'one touch' lock acquisition.

Mira OPO.
The Mira OPO, a synchronously-pumped optical parametric oscillator that extends the tuning range of Mira, provides simple access to high-repetition rate, near-transform-limited femtosecond and picosecond pulses in the visible and infrared spectral regions.

RegA 9000.
The RegA 9000 is a regenerative amplifier for ultrafast pulses that can be seeded by pulses from Mira or the Vitesse™, our compact ultrafast oscillator. CW-pumping and acousto-optic cavity dumping allow variable repetition rates with exceptional beam quality and stability up to 250 kHz.

OPA 9400/9800.
The microjoule energies and superior beam quality from the RegA 9000 can be used to pump one or more optical parametric amplifiers (OPA 9400/9800), offering a simple source of widely tunable ultrafast pulses. Wavelengths from the ultraviolet to infrared regions are readily accessible.

Detection.
A full range of power meters, autocorrelators, spectrometers, IR/UV viewers, and more are available from Coherent for use with Mira ultrafast laser systems.

Industry-leading support.
Beyond the high-performance Mira lasers themselves, Coherent offers the most extensive support in the industry. In addition to full service and worldwide support response, product-user training classes are scheduled regularly. And, Coherent's support organization provides customers access to its applications labs for experimentation and demonstrations.

Coherent as your partner.

To compete and succeed in today's fast-paced research and manufacturing environments, you need a laser partner that understands your needs. A partner that can provide a wide range of technology solutions, and the support that goes with them.

Since 1966, Coherent has been helping customers by providing complete, laser-based solutions to a wide range of commercial, scientific, and medical applications.

With a heritage of innovation and an uncompromising position on quality, Coherent is the most forward-thinking and diversified manufacturer of solid-state, gas, and semiconductor lasers in the industry.

For more information, visit us on the web at www.cohr.com. Or call 800-527-3786.

COHERENT®

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Coherent's scientific and industrial lasers are certified to comply with the Federal Regulations (21 CFR Subchapter J) as administered by the Center for Devices and Radiological Health on all systems ordered for shipment after August 2, 1976