

4 CHANNEL ULTRA HIGH SPEED
LED LIGHT SOURCE (<25 μsec)

LIQUID LIGHT GUIDE CONNECTION TO
ALL COMMON MICROSCOPES

CAPABLE OF COMBINING ANY COMBINATION
OF LEDs OR ANY LIQUID LIGHT GUIDE DELIVERED LIGHT SOURCES

EASY TO RECONFIGURE

SUPPORTED IN NEARLY ALL 3rd PARTY SOFTWARE SUITES (DG COMMANDS)

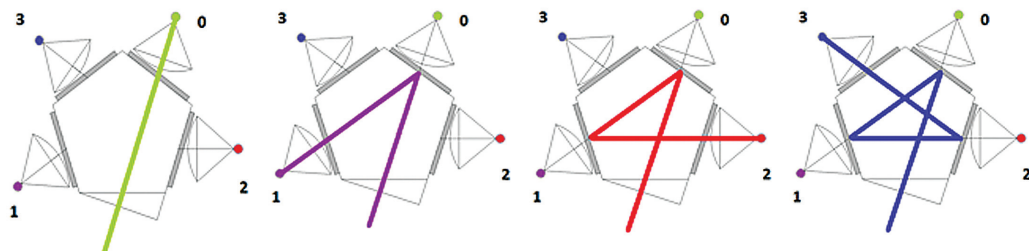
ADVANCED CONTROL METHODS (USB, TTL, RINGER BUFFER)

LAMBDA 421/821 OPTICAL BEAM COMBINING SYSTEM

The **Lambda 421** beam combiner is a new, patented, concept for combining separate light sources with different spectra into a single common output beam. Each separate light source is collimated before entering the optical path through a bandpass filter. The filters for each light source also function as mirrors that reflect the collimated beams from the previous light sources. In the diagram below the optical paths are outlined for each position including the reflections that occur:

Traditionally, combining more than two light sources required the use of a dichroic ladder. Dichroic mirrors, which switch from transmission to reflection at one point in the spectrum, allow the combining of separate light sources, provided that those sources do not have overlapping wavelengths. The downside of this approach is that light sources cannot be easily changed.

Dichroic ladders also demand careful attention to the order in which the light sources are introduced into the optical path, to avoid having the light blocked by the next dichroic in line. Typically, additional bandpass filters must be added in front of each light source before the dichroic, to select the desired range of wavelengths for each source. Each filter and dichroic used in the ladder decreases the total light output of the system.



(CONTINUED ON BACK)



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The **Lambda 421** was designed to keep the size of the beam combiner small, and the optical path short and efficient. Thin-film bandpass filters, such as Semrock's STR, reflect greater than 90% of out-of-band light. If the band pass of each light source does not overlap, it is possible to use the filters for both attenuation and reflection of the light from the other sources. By arranging the filters and sources into a pentagon, we were able to combine four light sources, in a compact design, with lower losses than previously achievable. As an added benefit, the last position in the optical train does not require any filter, since no other input reflects from that position. This input can be used with any sort of light source as long as you are aware of the possible losses if there are filters in use that overlap this light source. The fifth side of the pentagon becomes the output for the combined sources. The filters are easily exchangeable and are installed on small sliders inside the core of the pentagon. Filters and associated light sources can be arranged in any order around the pentagon.

The **Lambda 821** expands on the current **Lambda 421** design by integrating 7 monochromatic LEDs to the excitation port of the microscope through a liquid light guide, as well as an 8th LED for white transmitted light illumination through the microscope condenser. Individual high speed control of all 8 LEDs in the system with microsecond switching capability facilitates fast automated imaging. The use of the light guide provides very even illumination across the sample, while the white transmitted light LED offers a clean, broad and even illumination of the field of view for resolving detail and providing accurate color reproduction of the sample.

LAMBDA 421 / 821 OPTICAL BEAM COMBINER AND CONTROLLER

Includes controller, LED unit with liquid light guide, cables, and power cord. The instrument accepts either multiple LED modules (listed below) and can easily be reconfigured. The LED modules consist of the LED and the appropriate Semrock®-STR excitation filter for the output of the LED. Modules are sold separately and listed at right.

- LB-421-DG** Lambda 421 Optical Beam Combiner and controller (accepts up to 4 LED modules)
- LB-821** Lambda 821 Optical Beam Combiner and controller (accepts up to 7 LED modules)

LED MODULES FOR LAMBDA 421 / 821

- OBC-340** LED, 340 nm for Optical Beam Combiner
- OBC-365** LED, 365 nm for Optical Beam Combiner
- OBC-385** LED, 385 nm for Optical Beam Combiner
- OBC-410** LED, 410 nm for Optical Beam Combiner
- OBC-440** LED, 440 nm for Optical Beam Combiner
- OBC-460** LED, 460 nm for Optical Beam Combiner
- OBC-480** LED, 480 nm for Optical Beam Combiner
- OBC-506** LED, 506 nm for Optical Beam Combiner
- OBC-530** LED, 530 nm for Optical Beam Combiner
- OBC-561** LED, 561 nm for Optical Beam Combiner
- OBC-590** LED, 590 nm for Optical Beam Combiner
- OBC-617** LED, 617 nm for Optical Beam Combiner
- OBC-630** LED, 630 nm for Optical Beam Combiner
- OBC-660** LED, 660 nm for Optical Beam Combiner
- OBC-740** LED, 740 nm for Optical Beam Combiner
- OBC-810** LED, 810 nm for Optical Beam Combiner
- OBC-850** LED, 850 nm for Optical Beam Combiner
- OBC-940** LED, 940 nm for Optical Beam Combiner
- OBC-W5** LED, White Light for Optical Beam Combiner

Mounting adapters for Nikon, Zeiss, Leica and Olympus microscopes are available. Please call Sutter Instrument for further information.



(Shown: Lambda 821)