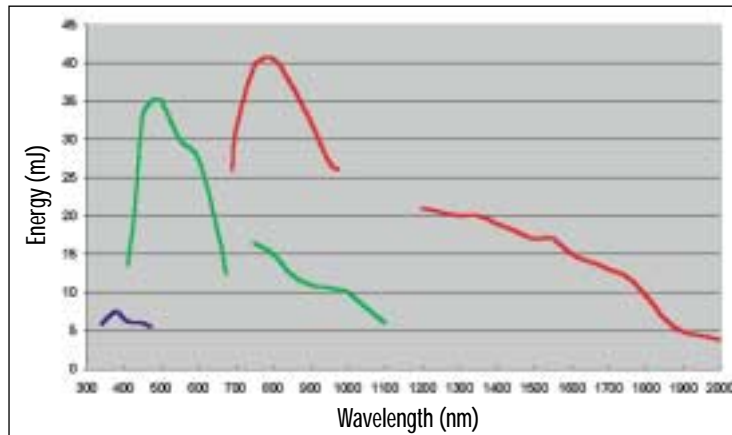


Typical Performance

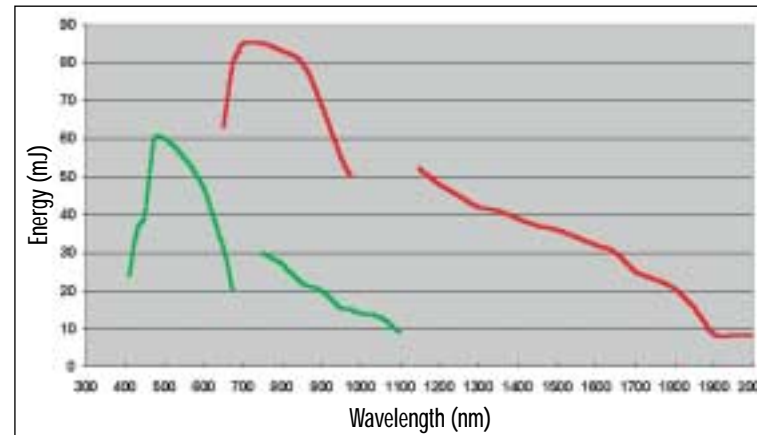
Rainbow reference		UVIS	VIS	VIR	NIR	NIRD
Tuning range	signal	340-475nm	410-680nm	410-680nm	680-970nm	680-970nm
	idler	N/A	N/A	720-1100nm	N/A	1200-2000nm
Pump laser	model	Brilliant	Brilliant or Brilliant B		Brilliant or Brilliant B	
	wavelength	266nm	355nm		532nm	
	energy at 10 Hz*	40mJ	100mJ or 200mJ		180mJ or 400mJ	

* information on higher repetition rates and other pump lasers is available on request

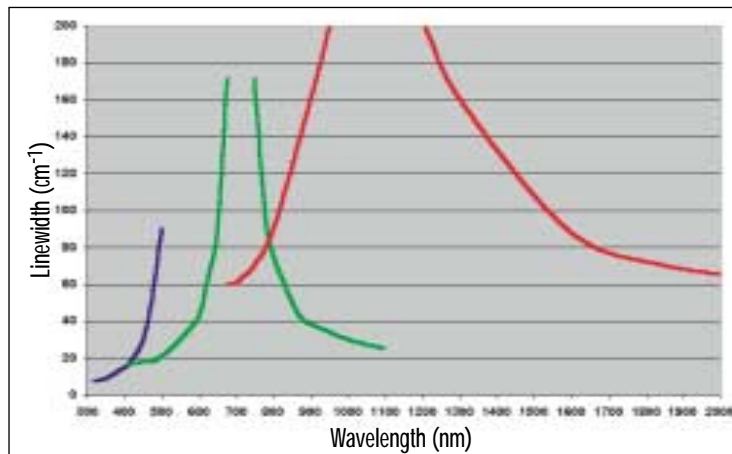
Energy (Brilliant pumped)



Energy (BrilliantB pumped)



Linewidth



Pulse duration : 4-8 ns
 Beam diameter : 5-6 mm
 Beam divergence : 2 mrad at 420 nm,
 10 mrad at 680 nm
 Polarization : vertical

— UVIS — VIR — NIR-D

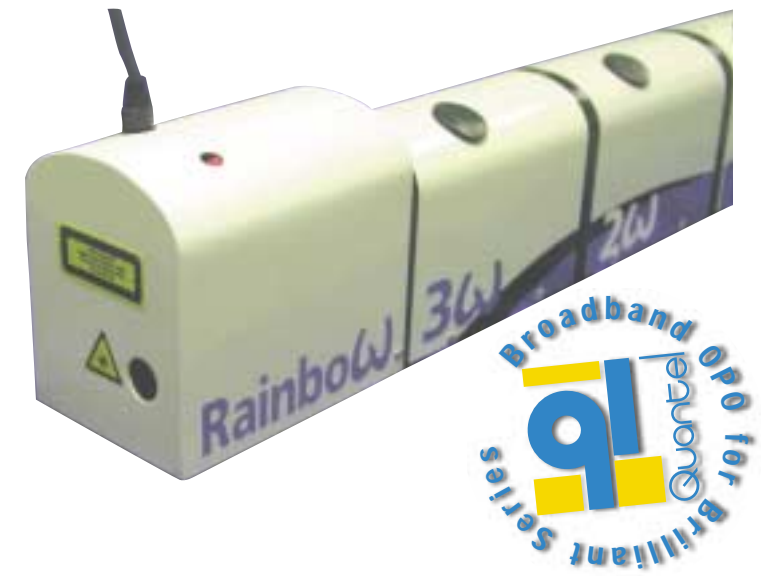


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 AVOID EYE OR SKIN TO DIRECT
 OR SCATTERED RADIATION.**

CLASS 4 LASER RADIATION PRODUCT

Max Average Power : 20 W
 Max Energy/pulse : 2J
 Pulse duration : <20ns
 Emitted Wavelength : 190/4000nm

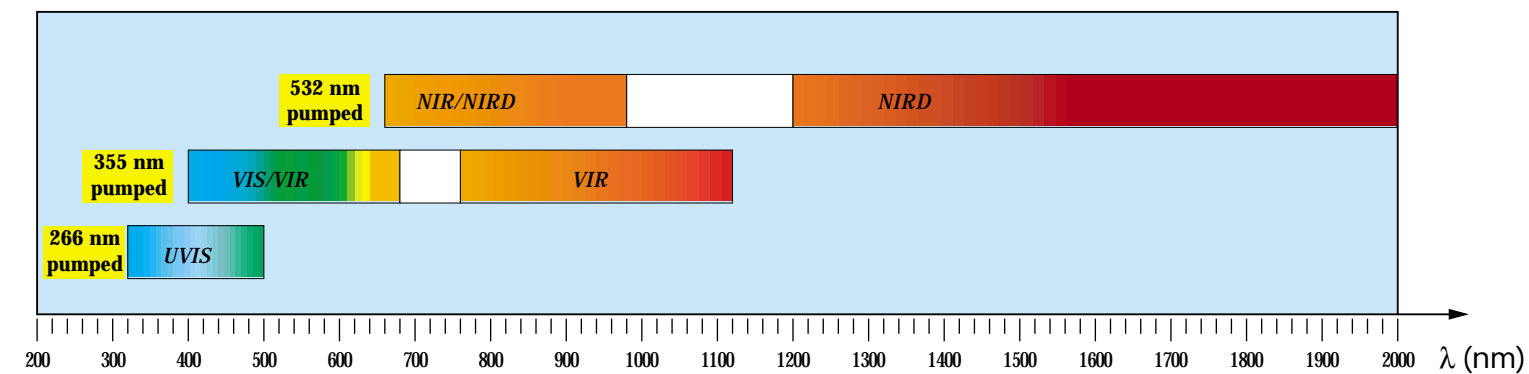
17, avenue de l'Atlantique - Z.A. de Courtabœuf - BP 23 - 91941 Les Ulis Cedex - France
 Tel : 33 (0)1 69 29 17 00 - Fax : 33 (0)1 69 29 17 29 - e.mail : quantel@quantel.fr - www.quantel.fr



Rainbow

All Solid-state Tunable System: Broadband Nanosecond Pulsed Optical Parametric Oscillator

Brilliant or Brilliant B pumped - patented ring OPO cavity - high conversion efficiency - widely tunable - compact and easy to operate - full computer control - real-time wavelength and energy measurement options.



This chart presents the wavelengths that can be generated using Quantel RAINBOW.
 The wavelength tuning range is determined by selection of the Nd:YAG pumping wavelengths.

Complete Turnkey System

Tunable lasers of the Rainbow family are turnkey OPO systems using the Brilliant (and Brilliant B) frequency-doubled, tripled or quadrupled Nd:YAG laser as the pump source. At the heart of every Rainbow system is the "Magic Prism" OPO from Opotek Inc (*), which converts the Nd:YAG laser wavelengths into a continuously tunable output.

To help you:

$$\Delta\lambda(\text{\AA}) = \lambda^2 (\mu\text{m}) \times \Delta\sigma (\text{cm}^{-1})$$

$$\Delta\sigma (\text{cm}^{-1}) = \Delta f (\text{Hz})/c (\text{cm/s})$$

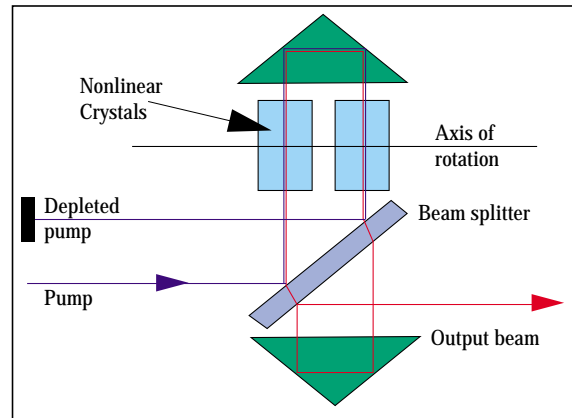
10/2003 © Mescal
 (*) www.opotek.com

Principle

OPOs (Optical Parametric Oscillators) are passive, nonlinear optical devices that convert the output of a pump laser into two discrete beams, signal and idler, whose combined photon energy equals the photon energy of the pump beam. In the Rainbow (see figure), two birefringent, nonlinear type I BBO crystals are positioned in a ring configuration oscillator.

Ring Cavity

The pump beam, signal beam, and idler beam all travel in the same direction in the cavity, and the output is tuned by rotating the two crystals with respect to the pump beam. The pump beam is coupled into the ring cavity, and the signal and idler beams are coupled out of the ring cavity by a specially coated beam splitter. Although the crystals are mounted on a single axis stage, they effectively counter rotate with respect to each other, cancelling the walk off between the cross-polarised beams, and eliminate beam steering during tuning. These design attributes produce a highly stable and efficient output. The ring design also permits a very small package.

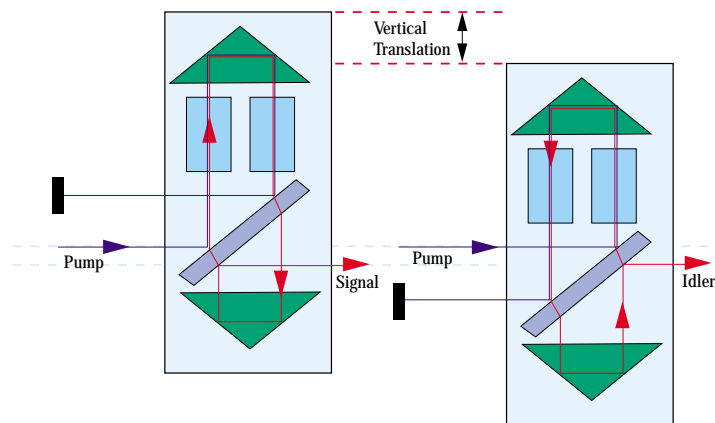


Patented ring oscillator design

The ring cavity design offers unique advantages in performance and costs:

- walk-off compensation
- high efficiency (as high as 65% pump depletion)
- no beam steering
- multilayer optics not exposed to pump
- signal separated from idler by design
- compactness

Signal Separated from Idler by Design – Built-in Wavelength Separation



For users who want to switch from signal to idler wavelengths, the back side of the beam splitter is partially coated to reflect idler wavelengths. A simple vertical translation is then enough to change the Rainbow tuning range. Expensive separation optics are not required.

Compact and Reliable Design

The Rainbow profits from the exceptional reliability and stability of the Brilliant series pump laser. The OPO itself is **hermetically sealed** to protect the crystals and other optical elements from moisture and particulate contamination. Its compact, rigid and reliable design leads to long term and low maintenance operation.

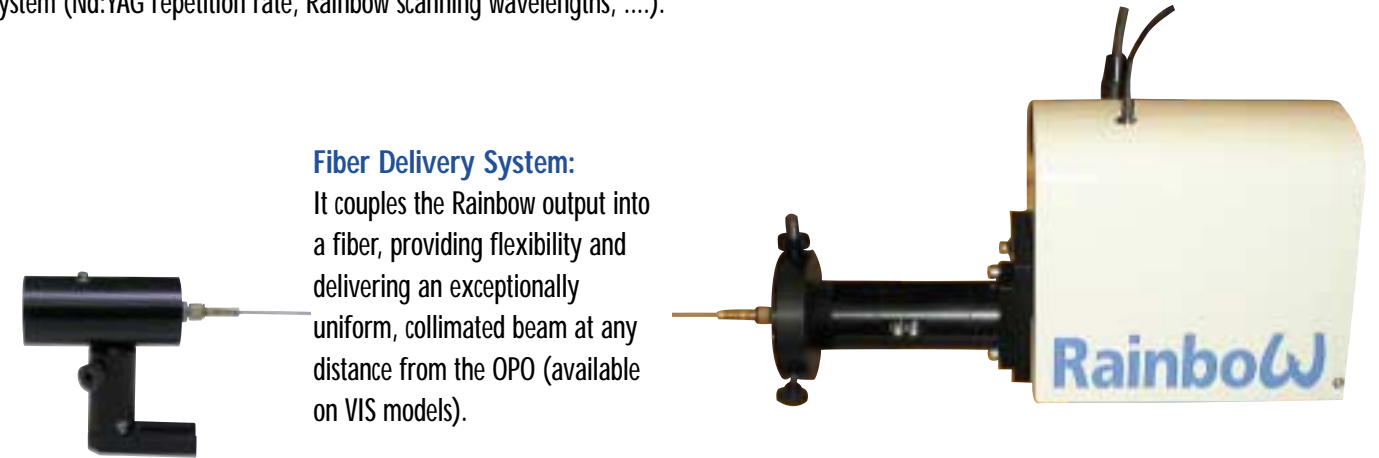


Options and Accessories

Manual or motorized wavelength tuning

The Rainbow is offered with manual tuning option (micrometer drive), or with computer control version.

In the motorised version, the Rainbow is driven by a stepping motor controlled by the user's computer. The software, using the Lab View™ application program, has been developed with an easy to use operator interface. It provides the user with automatic control of all functions of the system (Nd:YAG repetition rate, Rainbow scanning wavelengths, ...).



Fiber Delivery System:

It couples the Rainbow output into a fiber, providing flexibility and delivering an exceptionally uniform, collimated beam at any distance from the OPO (available on VIS models).

