3.5.3 Beam Splitter

Beam Tap I & II

Beam Tap I & II YAG

Stackable Beam Splitter

Single & Dual Front-Surface Beam Samplers

Model	Beam Tap I & II	Beam Tap I & II YAG	Stackable Beam Splitter	Single & Dual Front-Surface Beam Samplers
Wavelengths	400-700nm	1064nm	190-2000nm	200nm-2.5µm
Reflection	4% & 0.16% of incident beam	0.5% & 0.0025% of incident beam	5% & 0.25% of incident beam	0.057% @ 532nm
Clear aperture	Ø17.5mm	Ø17.5mm	Ø15mm	14mm x 14mm
Damage threshold	1MW/cm² CW, or 1MJ/cm² pulsed	1MW/cm² CW, or 1MJ/cm² pulsed	>5J/cm²	100MW/cm²
Mounting	C-Mount Threads	C-Mount Threads	C-Mount Threads	C-Mount Threads

Beam Tap I & II

- Dual surface reflector for equalizing S & P polarization
- The two planes of reflection are orthogonal

Single Surface Polarization Problems

A single surface reflection at 45° is often used to sample a laser beam for profile measurements or for monitoring power or energy. However, as shown on page 259, at 45° a single surface reflects the S polarization component at more than 10 times the reflection of the P component. Depending on the laser polarization content, or stability, this sampling can provide very misleading and unreliable measurements. (The BT-I-YAG has both surfaces A/R coated for 1064nm so the reflection for both polarizations is equal at 0.5%. At other wavelengths far from 1064nm the above discussion applies).

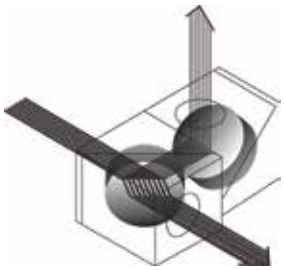
Equalizing S & P reflected polarization

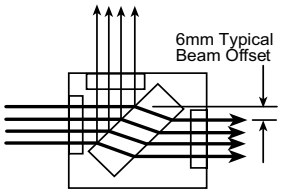
Any arbitrary polarization component can be broken into equivalent S & P components. With complimentary sampling surfaces any given component gets reflected once as the S polarization, and the second time as the P polarization. Thus using 2 surfaces, the total reflected energy for all polarization components is the sum of the S reflectance and the P reflectance. This causes the sampled beam to have S & P components that are identical to the original beam.

Beam path through beam tap

The Beam Tap II uses two reflecting surfaces such that the two planes of reflection are orthogonal. The standard Beam Tap I rear surface is AR coated from 400-700nm.

Beam Tap I & II





This diagram shows the 6mm offset of the through beam that is created by the reflecting optic. The deflection angle of the output beam is less than 0.007 degrees. The rear surface of the flat is AR coated to maximize the throughput of the main beam. The standard Beam Tap II rear surface is AR coated for 400nm-700nm. The YAG version is AR coated for 1064nm on both surfaces.

Beam tap reflection vs wavelength

Shown is the Beam Tap II final sampled reflection vs. wavelength. As shown both the S & P reflection are nearly constant at 0.05% from the UV to the infrared.

(See figure 7 in the Beam Tap manual in our website)

Specifications

Model	BT-I	BT-II	BT-I-YAG	BT-II-YAG
Wavelengths	400-700nm	400-700nm	1064nm	1064nm
Surface	Single surface, 1 cube	Dual surface, 2 cubes	Single surface, 1 cube	Dual surface, 2 cubes
Optical Material	UVFS	UVFS	BK7	BK7
Reflection	4%	0.16%	0.5%	0.0025%
Damage threshold	1MW/cm² CW, or 1MJ/cm² pulsed			
Part number	**SP90135**	**SP90133**	**SP90173**	**SP90172**