

PELLIN BROCA PRISMS

In a Pellin Broca prism, an ordinary dispersing prism is split in half along the bisector of the apex angle. Using a right angle prism, the two halves are joined to create a dispersing prism with an internal right angle bend obtained by total internal reflection, as shown in Figure 1.42.

In principle, one can split any type of dispersing prism to create a Pellin Broca prism. Typically the Pellin Broca prism is based on an Isosceles Brewster prism. Provided the light is p -polarized, the prism will be essentially lossless.

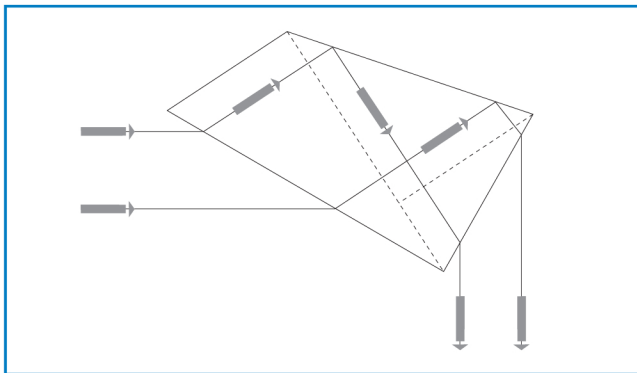


Figure 1.42 **One of the wavelengths deviates at exactly 90° to its initial direction**

Suppose wavelengths λ_1 and λ_2 are superimposed in a collimated beam, as at the output of a harmonic generating crystal, the diagram in Figure 1.42 suggests that it is always possible to find a rotation of the prism in its plane that ensures that one of the two wavelengths will operate at minimum deviation when refracting at the input face of the first of the half-dispersing prisms. This means that it will enter the right angle prism normal to one of its faces, be turned exactly 90°, be presented to the second half-dispersing prism in minimum deviation, and hence exit the Pellin Broca prism deviated at exactly 90° to its initial direction.

A simple dispersing prism always deviates the longer wavelength less than the shorter wavelength. In a Pellin Broca prism, whether the longer wavelength is deviated more or less depends on the orientation of the prism. This is an important consideration when designing a high power Pellin Broca beam separator, as shown in Figures 1.43 and 1.44.

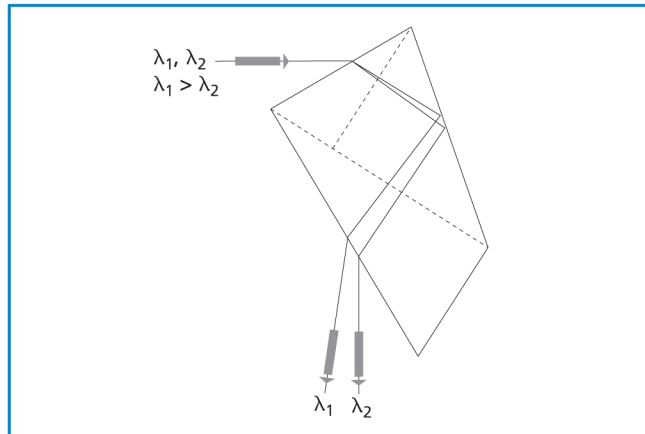


Figure 1.43 **Longer wavelength is deviated more than the shorter wavelength**

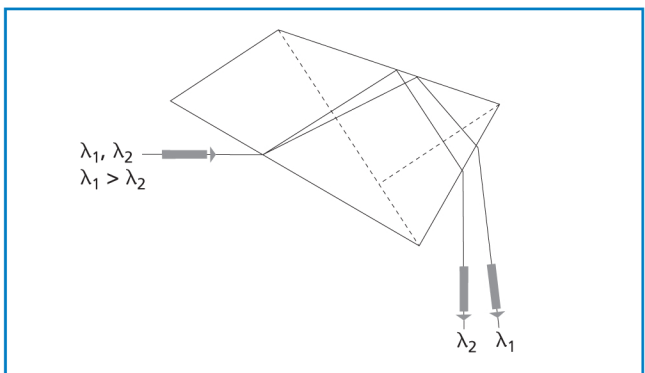


Figure 1.44 **Longer wavelength is deviated less than the shorter wavelength**

CVI Melles Griot offers Brewster angle Pellin Broca prisms in a number of sizes and materials. BK7 prisms are used in the visible and near IR, and is the least expensive. UV-grade fused silica Pellin Broca prisms are used from 240 nm to 2000 nm. Excimer-grade prisms are used in the 180-nm to 240-nm region. Crystal-quartz Pellin Broca prisms are specifically designed for high-power Q-switched 266-nm laser pulses at fluence levels of 50 mJ/cm². Fused silica prisms track (i.e., suffer internal catastrophic damage) above this fluence, probably due to self-focusing.