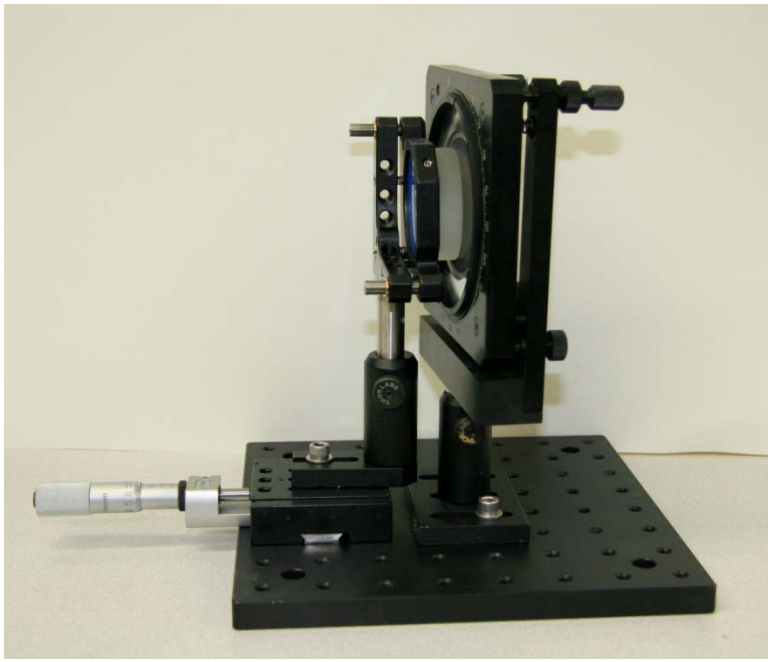
Polarization Rotator



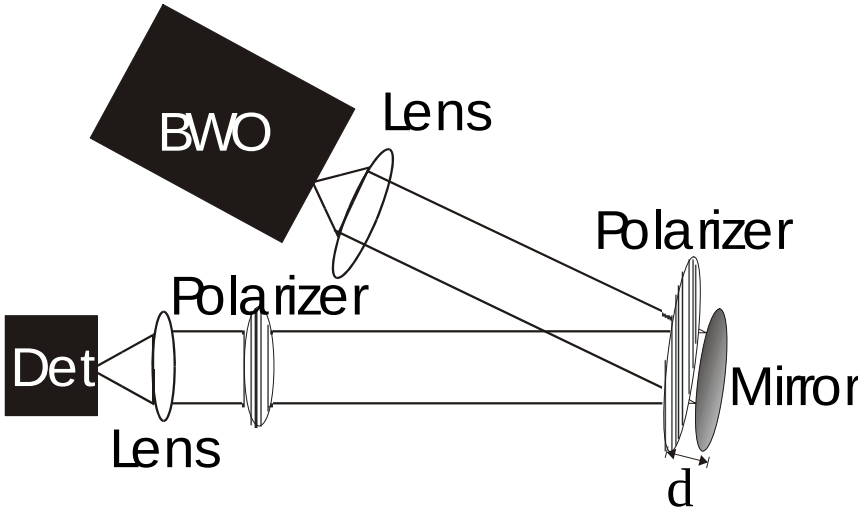
Product Description

The Polarization Rotator is a wire grid polarizer combined with a mounted mirror placed at an adjustable distance behind the polarizer. It is designed to take an incoming linearly polarized signal and adjust the polarization elliptically. Circular polarization at a given frequency can be established by adjusting the distance between the polarizer grid and the mirror. Changing the distance between polarizer and the mirror adjusts the additional path length traveled by the THz waves transmitted through the polarizer with normal polarization to the wire grid. The path length traveled by this polarization then is longer by twice the spacing distance (d) between the mirror and polarizer. It is still co propagating with the parallel component. For continuous wave sources such as BWO's this results in a phase difference between the components:

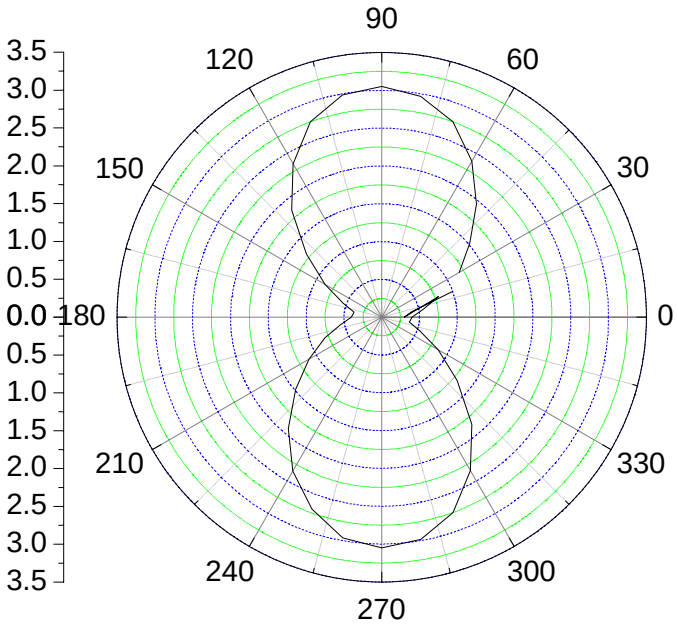
$\Delta\phi = 2\pi$ fractionalpart$(2d/\lambda)$

Data

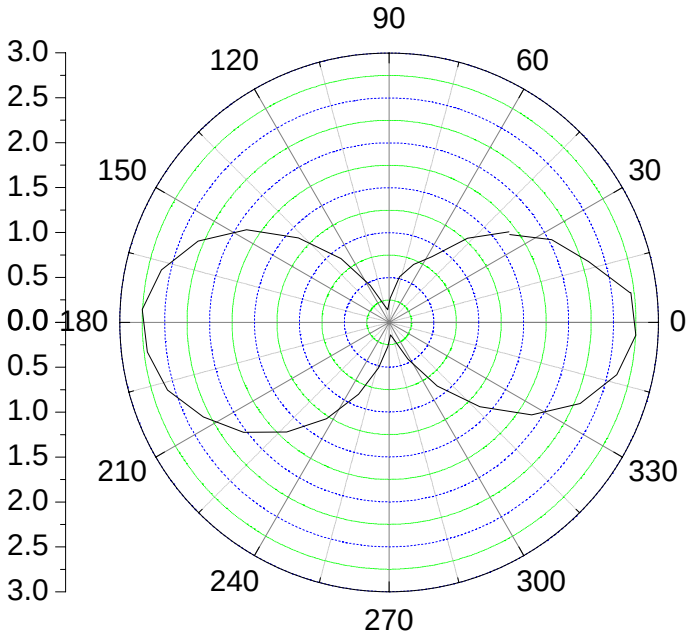
Two simple experiments were done demonstrating the effectiveness of this simple approach. The simpler experiment was to place a polarizer in the polarization rotated beam and detect the signal through this second polarizer at various angles of polarizer rotation, at a constant frequency, and using changes in the mirror-polarizer separating distance (d). Below the illustration data taken at 125 GHz (240 μm) is shown.



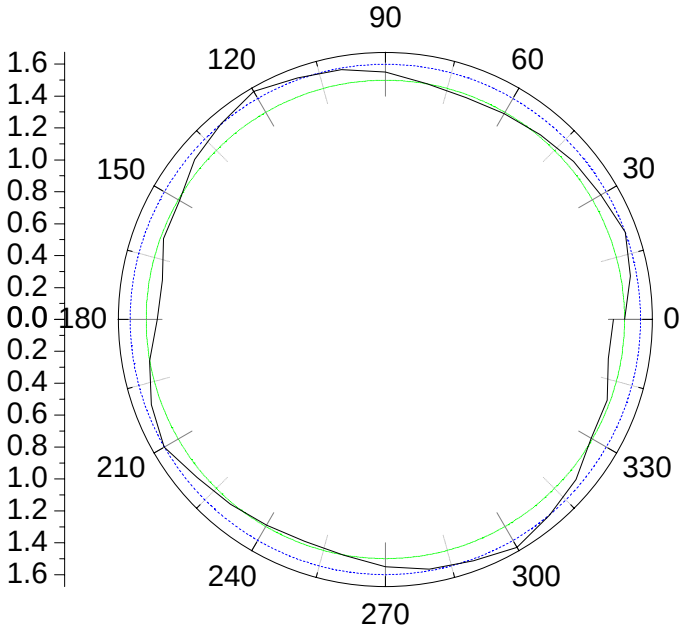
Plus 30μm – Linearly Polarized



Minus 30μm – Linearly Polarized



Close to circular polarized



Additionally, a phase spectrometer was constructed with the input from the polarization rotator adjusted so that 50% of the beam would pass down either side of the Mach-Zahnder interferometer at 102 GHz. Then the spectrometer was operated normally to obtain the phase relationship. The results are shown below the diagram.