



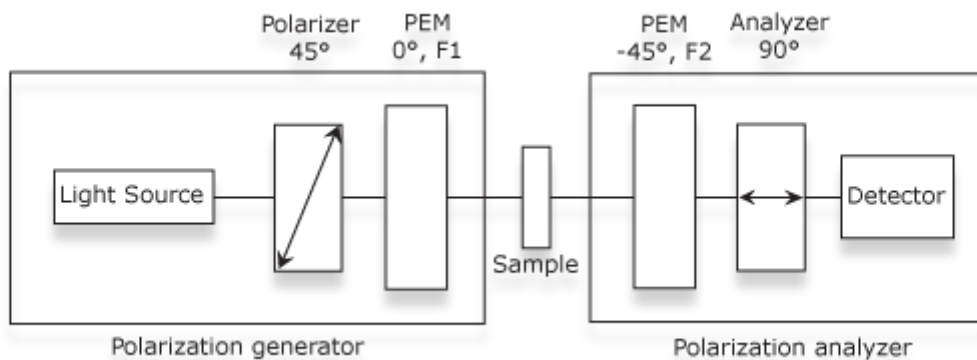
# Polarimetry

The measurement of polarization properties has been Hinds Instruments' specialty for over 30 years. Our scientists and engineers have worked with all kinds of polarimeters: polarimeters that measure Stokes vectors, Mueller matrices and enantiomeric composition of organic/pharmaceutical chemicals. In addition, the state of polarization and degree of polarization can be determined for many sample types, notably fiber optics. We make and sell complete polarimeter instruments as well as research grade components from which you can design your own polarimeter.

## Select your Polarimetric Application:

### 1. [Mueller Polarimetry](#)

The Mueller polarimeter is one of the two major types of polarimeters used in measuring polarization properties. While the Stokes polarimeter is usually referred to as a light-measuring instrument, the Mueller polarimeter can be viewed as a sample-measuring instrument. In a light polarization model, a sample can be represented by a 4x4 Mueller matrix. When all 16 elements of the Mueller matrix of a sample are determined, the polarimeter can be called a general Mueller polarimeter or a complete Mueller polarimeter. Otherwise, if all 16 elements are not addressed, it is called an incomplete Mueller polarimeter.



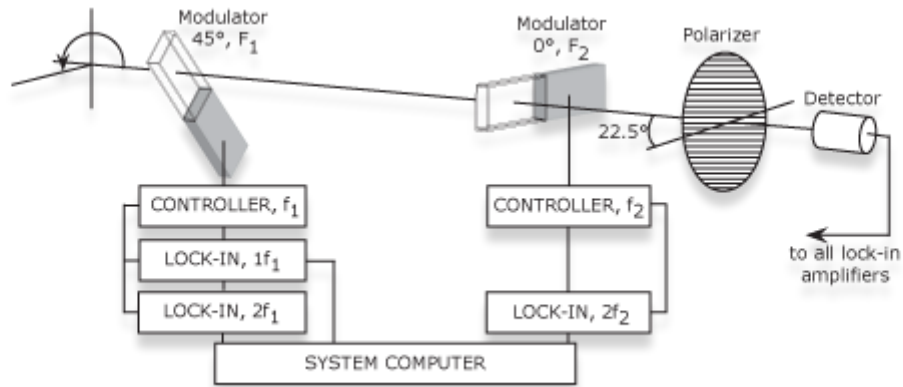
PEMs can be employed in Mueller polarimeters. For example, a light source, a polarizer (at 45 deg.) and a PEM at (0 deg.) will form a polarization generator; a second PEM (at -45 deg.) at a different modulating frequency, a second polarizer, or analyzer (at 90 deg.), and a photo-detector will form a polarization analyzer; a sample can be placed between the polarization generator and analyzer.

Such an instrument can simultaneously measure 9 of the 16 Mueller matrix elements of the sample. When the orientation of the polarizers and PEMs are varied, all 16 Mueller matrix elements of the sample can be measured.

## 2. Stokes Polarimetry

One method to represent light polarization is to use the Stokes vectors (I, Q, U, and V). A [dual PEM system](#) can be used to measure all four Stokes parameters simultaneously, thus to completely characterize the polarization state of light.

### SETUP

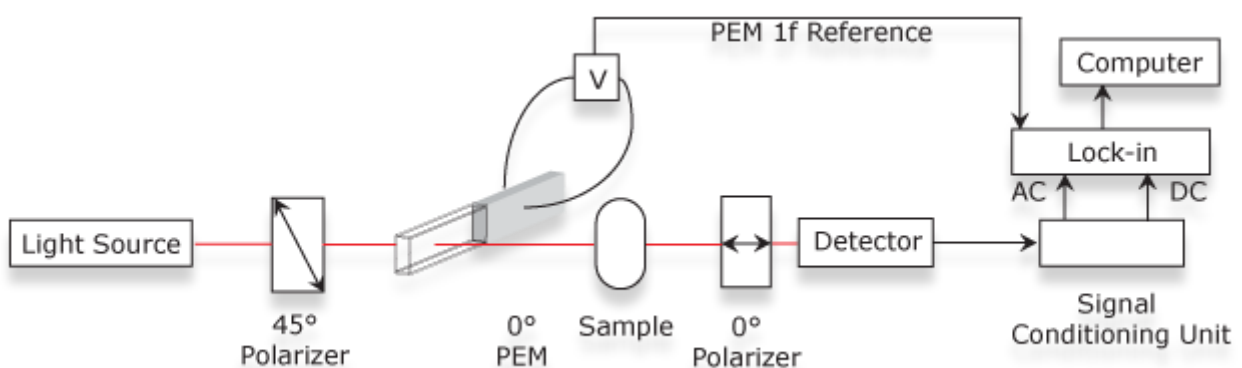


## 3. Optical Rotation

If linearly polarized light passes through a chiral media, for example a solution of chiral molecules, the polarization plane of the incident light will be rotated. This is called optical rotation (or natural optical rotation in order to distinguish this from Faraday rotation in a magnetic field).

Any phase difference (retardance) between the two circular components produces a rotation of the polarization plane.

### SETUP



Optical rotation has been measured using this setup at Hinds. High sensitivity for optical rotation (0.001 degree) has been achieved. The signal is detected at 2f.