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ACHROMATIC LINEAR RETARDER WITH TUNABLE RETARDANCE

This application note presents a **universal design and proof-of-concept of a tunable linear retarder of uniform wavelength response in a broad spectral range**. It consists of two half-wave retarders (HWR) between two quarter-wave retarders (QWRs), where the uniform retardance can be tuned continuously by simply rotating one of the HWRs.

A proof-of-concept of this design is built by using commercially available Fresnel rhomb retarders that provide retardation with almost wavelength uniformity in the visible and near infrared from 450 to 1550 nm. **The system is experimentally demonstrated to control the state of polarization of a supercontinuum laser.**

> “Precision spectral control of polarization is an important subject for many applications such as spectro-polarimetry, optical communications, biomedical optical imaging, military target identification, chemical analysis, and remote sensing.”

It has designed a tunable polarization rotator and a tunable linear retarder where the rotation angle and the retardance, respectively, are uniform with the wavelength and tunable upon rotating one of the central HWRs. The system can be used to generate a SOP that is maintained over a broad spectral range.

> “The proposed design can find applications whenever a uniform wavelength retardance other than the standard quarter-wave and half-wave values are required, or when the required uniform wavelength retardances need to be tunable.”

One possible example is the generation of higher-order polarization vector beams by using geometric phase elements such as q-plates. The higher-order vector beam generated by these elements depends critically on the input polarization state. The retarder proposed here can be used to tune the same input SOP for all wavelengths, thus producing the same higher-order vector beam. **It also outlines applications in ellipsometry, astronomy, and polarimetry, where a tunable wavelength-compensated retarder might be useful to improve current techniques**.

Below the link to the complete paper:

Opt.Lett. – 2018 – Achromatic linear retarder with tunable retardance

Image: courtesy of Preciseley Microtechnology Corp

Ronda Guglielmo Marconi 12. Parque Tecnológico 46980 Paterna - Valencia (Spain)
Tel +34 96 389 10 92 / Fax +34 393 12 95 / fyla@fyla.com / www.fyla.com