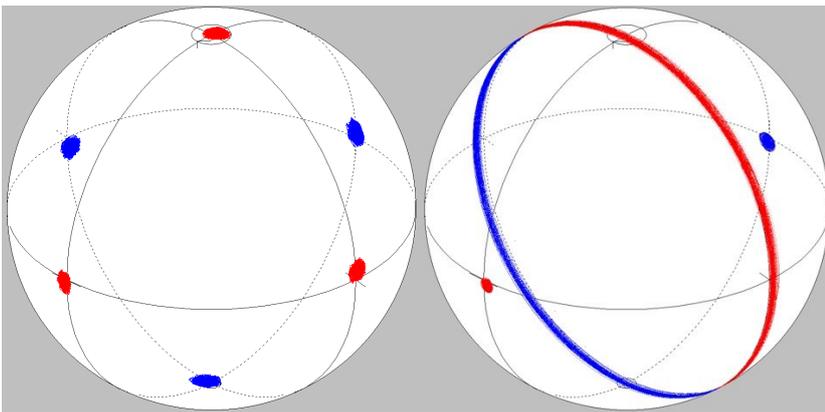


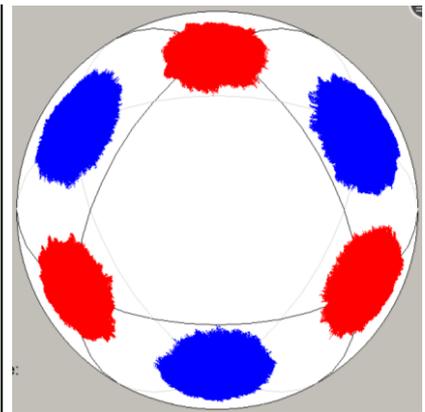
Polarization and phase control, usable for QKD

- **Worldwide unique product: Endless optical polarization and phase (difference) control**
- Not only an unknown variable incoming polarization is transformed into a fixed output polarization (2 degrees-of-freedom), but also the phase difference (3rd degree-of-freedom) between this polarization and its orthogonal is controlled, endlessly (without any interruption).
- **Indispensable** for any application where optical polarization and phase control are needed: General retarder with 3 and not just 2 deterministically controlled degrees-of-freedom, optical phased array, self-homodyne receiver with polarization beamsplitter for recovery of modulated signal and unmodulated LO with orthogonal polarizations and defined phase relation, coherent optical receivers with simplified electronic signal processing and ...
- **for fiberoptic quantum key distribution (QKD) based on BB84 or similar protocol implemented in the polarization domain**
- Pilot signals (0°, 45°)
 - in the frequency/wavelength domain (WDM) or
 - in the time domain (TDM), with complete pilot laser extinction and with clock recovery for QKD window timing. Very PMD-tolerant! Very advantageous.
- **Whole normalized Stokes space of the probe signal is stabilized.**
- **Endless tracking speed 20 krad/s** (typically)
- Speed scalable for TDM QKD where scattering has completely decayed

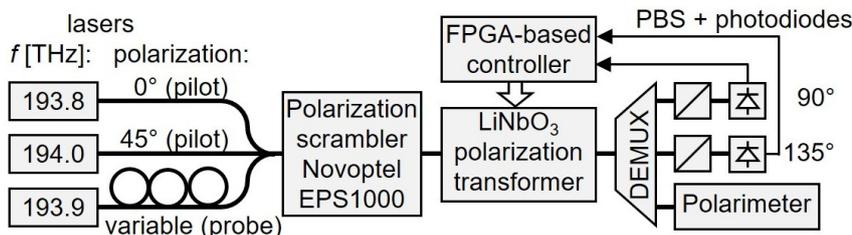


Stabilization of normalized Stokes space of the probe signal, under 20 krad/s polarization scrambling. Perfect for QKD with BB84

Traditional polarization control, does not work for QKD with BB84



Stabilization of normalized Stokes space of the probe signal, under 20 krad/s polarization scrambling, with 35 ps of PMD. Time division multiplex (TDM) version.



Corresponding setup for polarization and phase control with WDM pilot signals, see Electronics Letters, Vol. 49, No. 7, pp. 483-485, 2013

Below: PMD-tolerant setup with TDM pilot signals. Includes laser control PCBs for fast modulation with extreme extinction.

