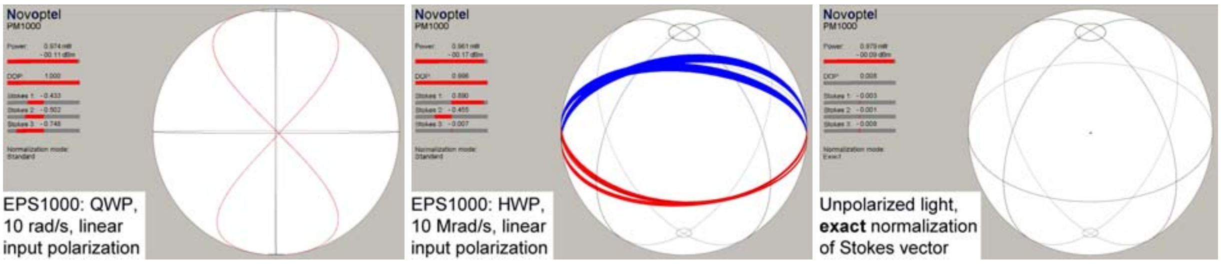
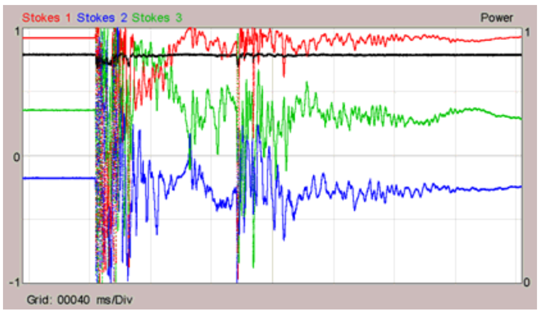


PM1000 Polarimeter

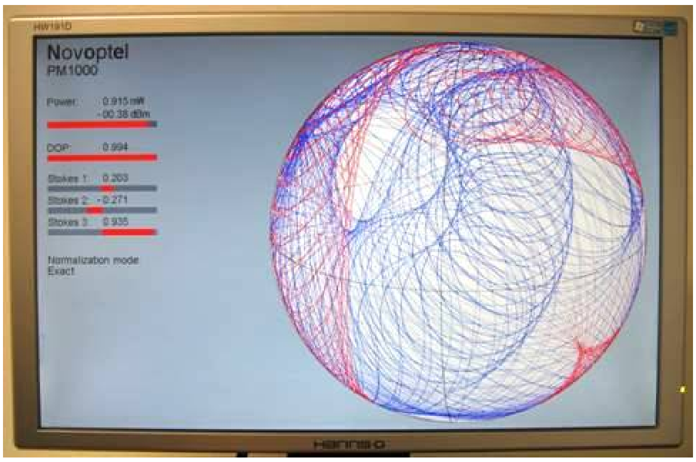
- Measurement of all 4 Stokes parameters, display on **Poincaré sphere** and in **oscilloscope mode**. Also available: Normalized Stokes vector, degree-of-polarization (DOP)
- Three choices for the normalization of Stokes parameters/vectors:
  - Standard: Normalized Stokes vectors are normalized to unit length. Regardless of power and DOP, they appear at the surface of the Poincaré sphere.
  - Exact: Normalized Stokes vectors are normalized only with respect to optical power. For DOP < 1 (or DOP = 0) they appear inside (or in the center of) the Poincaré sphere.
  - Non-normalized: Display of the non-normalized Stokes parameters. This means, DOP and optical power determine the length of the displayed S_1-S_2-S_3 Stokes vector.
- **100 MHz polarization state sampling frequency. 67 M polarization states can be recorded.**
- Averaging (10 ns, 20 ns, 40 ns, ... 2.68 s), triggering, gating.
- **Internal triggering on SOP events.** Pre- and post-trigger data is stored. Perfectly suited for **automated long-term assessment of polarization transients** and fluctuations.
- **Realtime Poincaré sphere display** on connected monitor (HDMI/DVI). **50 MHz live view, not a single sample is lost!**
- 100 MHz memory view, zoom in oscilloscope mode, screenshots, numeric display
- Full support of EPS1000 polarization scrambler/transformer and EPX1000 polarization controller/demultiplexer and scrambler/transformer for **Mueller matrix, Jones matrix, PDL and PMD measurement**. An EPS1000 or EPX1000 module can be plugged onto a PM1000 module.
- Power consumption: ~5 W (+5 V from included power supply 100-240 V)
- Available as a desktop unit, as a module card, and as an intellectual property (IP) core
- Realtime operation with Serial Peripheral Interface (SPI), trigger/gating input/output (BNC)
- **Can be used without extra computer.** Operation via control buttons of desktop unit or USB or SPI. Software with graphical user interface (GUI). Results can be displayed on monitor, by the GUI or by Matlab™. Software examples for Matlab™ and Labview™. File download can be automated.
- **C&L band operation**. Optional: Built-in tunable C&L band laser modules



EPS1000 polarization scrambler, characterized with various settings and PM1000 averaging times



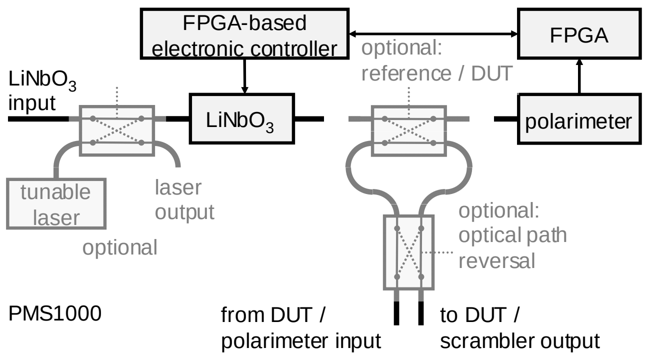
Configurable (1 rad/s ... >100 Mrad/s) internal trigger is used to record the polarization fluctuations caused by hitting a DCM cassette. Oscilloscope mode.



PM1000 desktop unit comes with Windows GUI. Can be connected to monitor (HDMI/ DVI, 1440 x 900 pixels, 60 Hz, e.g. 483 mm 19'') and used without extra computer!

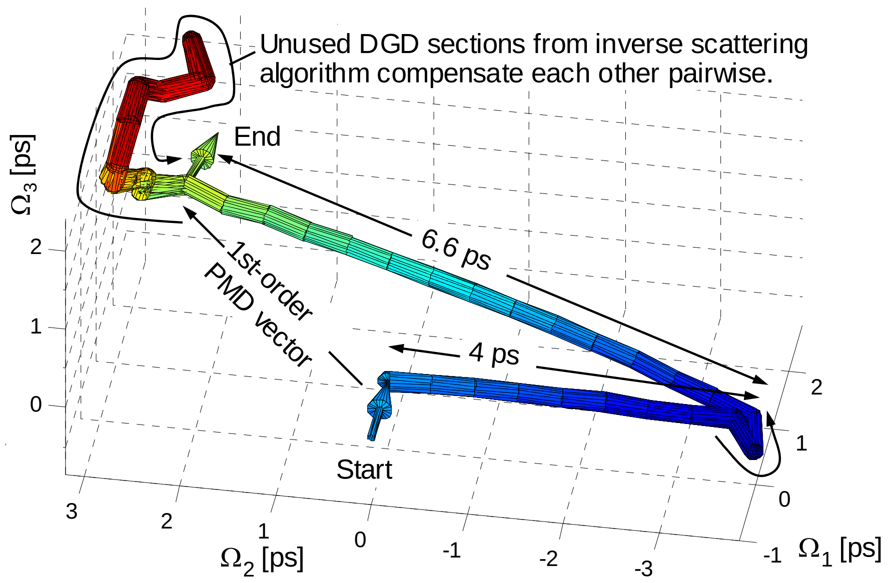
PMS1000 Polarimeter and Polarization Scrambler/Transformer

- Combination of the PM1000 polarimeter with the EPS1000 polarization scrambler/transformer.
- All functionalities and data of PM1000 and EPS1000
- Ideal for **synthesis of desired polarization states** and **device under test (DUT) polarimetry**
- Opto-mechanical 2x2 switch (optional) can connect output of $LiNbO_3$ polarization transformer directly to input of polarimeter. Insertion loss of each path is therby increased by ~0.5 dB (<1 dB).
- Another opto-mechanical 2x2 switch (optional) can exchange output of $LiNbO_3$ polarization transformer and input of polarimeter, to determine DUT reciprocity by backward measurement.
- Power consumption (w/o optional lasers): ~17 W (+5 V from included power supply 100-240 V)
- Desktop units (combined PMS1000 or separate EPS1000 & PM1000) or module cards
- Switching between PM1000 and EPS1000 via control buttons, or parallel operation via USB



PMS1000 for measurement of Mueller and Jones matrices and PMD of a device under test (DUT). Optional components are shaded. C&L band tunable laser modules are available. EPS1000 polarization scrambler/transformer and PM1000 polarimeter are individually accessible, even when they are combined into one unit.

- A number of polarization states is generated for the DUT. Subsequent calculations yield:
  - **Mueller matrix**
  - **Mueller-Jones matrix** (= the Mueller matrix made non-depolarizing) and **Jones matrix**
  - **Eigenmodes, retardation, mean loss, PDL** (= polarization-dependent loss)
  - Decomposition of Mueller and Jones matrices into sequences SBA + PPPS + SBA. Definitions: PPPS = horizontal **p**artial **p**olarizer and **p**hase **s**hifter. SBA = **S**oleil-**B**abinet **a**nalog = retarder having a retardation between 0 and π and eigenmodes anywhere on the S_2-S_3 great circle of the Poincaré sphere. An SBA does to horizontal polarization the same as a Soleil-Babinet compensator to circular polarization: mode conversion with adjustable phase shift.
- With **built-in tunable laser(s)** (optional) or available tunable laser(s), Mueller and Jones matrices can be measured as a function of optical frequency, and **PMD** is determined. Inverse scattering allows a **DGD profile** (= differential group delay profile) to be generated (JLT **21**(2003)5, p. 1198).



Measured DGD profile in the PMD vector space of two concatenated, arbitrarily oriented PMFs, with DGDs of 4 and 6.6 ps. Not only the total 1st-order PMD vector but also the structure of the DUT becomes apparent.

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