



20.04.2009 | Helmholtz Award for Menlo's CTO

The Helmholtz Award is one of the most important prizes in the field of Metrology, and is presented every two years by the Physikalisch-Technische Bundesanstalt (PTB). This year Tobias Kippenberg, Ronald Holzwarth and Pascal Del`Haye, scientists at Max Planck Institute of Quantum Optics will receive the Helmholtz Award.

Ronald Holzwarth, CTO at Menlo Systems, and his colleagues developed a monolithic, chip based optical frequency comb. A toroidal microresonator that is produced on a silicon chip can store light for a relatively

long period. This can lead to extremely high light intensities, i.e. photon densities, at which a great deal of nonlinear effects occur. And it is such a nonlinear 'Kerr effect' that makes it possible to realise a frequency comb: In a 4-photon process two light quanta of equal energies are converted to two photons of which the one light quantum has a higher energy, the other a lower energy than the original one. Here the newly produced photons can in turn interact with the original light quanta, thereby producing new frequencies. From this cascade there emerges a surprisingly broad spectrum of frequencies without any resort to amplification by an active laser medium, as is necessary in the conventional method.

This new type of frequency comb could be used in the future for optical frequency measurements and also for designing clocks of extremely high precision, or in optical telecommunications.

Link to the PTB press release:

<http://www.ptb.de/de/aktuelles/archiv/presseinfos/pi2009/pitext/pi090408.html>

Original publications:

Optical frequency comb generation from a monolithic microresonator

P. Del Haye, A. Schliesser, O. Arcizet, T. Wilken, R. Holzwarth, and T. J. Kippenberg.

Nature 450, 1214-1217, 27 December 2007.

<http://dx.doi.org/10.1038/nature06401>

Full Stabilization of a Microresonator Frequency Comb

Del`Haye, P., Arcizet, O., Schliesser, A., Holzwarth, R. & Kippenberg, T. J.

Physical Review Letters 101 (2008).

<http://dx.doi.org/10.1103/PhysRevLett.101.053903>