



## PRESS RELEASE

### 3. Prize Berthold Leibinger Innovationspreis 2006

**Dr. Michael Mei and Dr. Ronald Holzwarth  
Menlo Systems GmbH  
Martinsried, Germany**

#### **Compact Counter of Light**

**Precision measurement using light is standard practice today. However, a suitable field device to measure the very high frequency of the light itself was not available until recently because light oscillates extremely fast. The breakthrough came with the frequency comb. Dr. Michael Mei and Dr. Ronald Holzwarth developed this simple and very precise measuring method. These young scientists branched off from the Max-Planck Institute for Quantum Optics by founding Menlo Systems GmbH and successfully commercialized their technology: a fiber laser unit, which can measure time, distance and light spectra very precisely.**

The frequency comb can count and measure light oscillations with high precision – currently accurate up to 15 decimal points. Previous methods could only manage five or more orders of magnitude less than that. This invention is closely associated with the Nobel Prize for physics of 2005. Prof. Theodor W. Hänsch and Prof. John L. Hall received this highest scientific award for the development of laser-based precision spectroscopy. The frequency comb is part of that development.

Dr. Michael Mei and Dr. Ronald Holzwarth quickly recognized the importance of this innovation. Daring the risks, they founded Menlo Systems GmbH in Martinsried, Germany, in 2001 and efficiently developed their knowledge from fundamental research into a successful product. It was essential to design more manageable devices from those that previously filled entire rooms. Mei and Holzwarth did this by using fiber laser technology. They integrated frequency-stabilized, ultra-short pulse lasers and optical elements in a compact device that generates white laser light; a mixture of many precisely defined frequencies – the frequency comb. Today a handheld, fully-automated and user-friendly laser device is available that can measure the frequency of visible light with extreme accuracy. At the same time, the two scientists sought to transfer the technology to other laser systems and wavelength ranges.



The Menlo Systems fiber laser systems are used in many applications in both science and industry, in which the frequency comb delivers greater measuring performance or makes applications more comfortable and accurate. National institutes for calibration gage their high-precision laser equipment with Menlo Systems devices. Optical atomic clocks can be realized, which are three or more orders of magnitude higher in accuracy than the most precise cesium atomic clocks to date. The compact light counters could therefore enable precise positioning for satellite based navigation because the time accuracy determines the potential position resolution. It is also conceivable that it would be used in high-precision spectroscopy (i.e. biological substances).

Title of Work:  
Optical Frequency Comb Technique

Digital pictures of the prize winners and the awarded work are available at [www.leibinger-stiftung.de](http://www.leibinger-stiftung.de).