also describe future directions, including Internet protocols over DWDM and sub-rate multiplexing for efficient bandwidth utilization.

WW3 2:15pm

New electronically wavelength-switchable large channel count (up to 60 channels) 1.5 um laser sources for wavelength division multiplexing, *Nathaniel Joseph C. Libatique, Ravinder K. Jain, Univ. of New Mexico, USA.*

We describe our work on novel designs of various electronically wavelength-switchable 1.5 um fiber lasers based on readily available and inexpensive all-fiber components (i.e. Bragg gratings and fiber Fabry-Perot filters) and semiconductor-based fiber-pigtailed filters. The tunable lasers are characterized by large channel counts (up to sixty WDM 50 GHz channels) and rapid (microsecond and potentially sub-microsecond) wavelength tunability suitable for reconfigurable WDM optical networking applications.

WW4 2:30pm

A new generation of optical receivers based on adaptive detection, *Armando Nolasco Pinto, Univ. of Aveiro, Portugal.*

A new detection scheme, based on auto adjusting the receiver parameters, as response of system changes, is presented. By means of simulation it is shown that this scheme is very attractive to high-speed WDM optical networks. Timing jitter, inter-channels interactions, adding and dropping channels are degradation effects analyzed in detail.

WW5 2:45pm

Acousto-optic phased array Bragg cell MUX/DEMUX for DWDM application in optical communication, *Banmali S. Rawat, Yinghui Weng, Univ. of Nevada–Reno, USA.*

Basic concept and theoretical analysis of an acouto-optic cell array MUX/DEMUX for DWDM application in optical communication has been presented. These new type of MUX/DEMUX are very useful as ADD/DROP filters in optical networks. The main advantage of this particular MUX/DEMUX is that it can be changed from one channel system to another without any difficulty.

WW6 3:00pm

Optical demultiplexing using colloidal crystal waveguides, *Ivan Avrutsky, Vladimir Kochergin, Yang Zhao, Wayne State Univ., USA.*

We report the first experimental demonstration of demultiplexing capabilities of a two-dimensional waveguide grating composed by a monolayer colloidal crystal deposited on a top of a guide layer. The experiments are performed in 1550 nm wavelength region. The periodical structure with hexagonal symmetry is formed using self-arranged crystallization of colloidal particles.

WX 1:30pm–3:15pm Ballroom D

Optical Frequency Metrology and Precision Measurement 2

TBA, *Presider*

WX1 1:30pm (Invited)

Sub-dekahertz ultraviolet spectroscopy, *R. Rafac, W. Itano, K. Vogel, S. Diddams, C. Oates, A. Curtis, R. Fox, L. Hollberg, J. Berquist, NIST, USA; B. Young, Jet Propulsion Lab, USA.*

We describe an optical oscillator for probing the narrow S-D Hg+ transition (282 nm) that has frequency instability less than 3*10-16 for measurement times from 0.1 s to 25 s. We have developed a coherent, short-pulse laser and photonic fiber system toward measuring the frequency of this and other optical oscillators.

WX2 2:00pm (Invited)

Measuring the frequency of light with femtosecond laser pulses, *R. Holzwarth, J. Reichert, T. Udem, T.W. Haensch, Max Planck Inst. fuer Quantenoptik, Germany; J. C. Knight, W. J. Wadsworth, P.St.J. Russell, Univ. of Bath, UK.*

We have used a femtosecond frequency comb broadened in a photonic crystal fiber to realize a frequency chain that multipies a 10 MHz reference phase coherently in a single step into the optical region. By comparison with a similiar frequency chain that was used in a recent determination of the Hydrogen 1S-2S transition we set an upper limit to this approach of 5.1×10^{-16}.

WX3 2:30pm

Subfemtosecond measurement of group and phase delay between two photons, *David Branning, Alan Migdall, NIST, USA; Alexander Sergienko, Boston Univ., USA.*

We have used a modified two-photon interferometer to measure the group delay between orthogonally polarized photons in crystal quartz with a precision of 0.1 fs, while simultaneously measuring the phase delay with a precision of 8 attoseconds. The dispersion cancellation common to entangled two-photon interference does not occur here.

WX4 2:45pm

Clockwork for the measurement and comparison of optical frequency standards, *K.R. Vogel, S.A. Diddams, C.W. Oates, E.A. Curtis, R. Rafac, Th. Udem, J.S. Wells, B. Frech, W.D. Lee, R.W. Fox, J.C. Bergquist, L. Hollberg, NIST, USA.*

We use femtosecond lasers in combination with spectral-broadening in optical fibers to measure and compare optical frequency standards. The frequency of the mercury ion standard has been preliminarily measured relative to the calcium standard with statistical uncertainties approaching 10 Hz in 5 seconds. Progress towards all-optical clocks based on these standards will be presented.

WX5 3:00pm

Precision phase control of ultrawide bandwidth fs laser, *Jun Ye, David J. Jones, Steven T. Cundiff, John L. Hall, JILA/NIST and Univ. of Colorado, USA.*

With precision phase control of an ultra-wide bandwidth femtosecond laser comb, we demonstrate the transfer of the stability of a cw iodine-stabilized laser to millions of the comb lines covering more than one octave of the optical frequency spectrum. Delivery of an optical clock signal to the rf/microwave domain has also been implemented and demonstrated.

WY 1:30pm–3:15pm Ballroom E

Ultrafast Pulse Shaping and Measurement 2

TBA, *Presider*

WY1 1:30pm

Measuring and compressing the ultrabroadband continuum, *L. Xu, Mark W. Kimmel, Donald O'Shea, Patrick O'Shea, Rick Trebino, Georgia Inst. of Tech., USA; Jinendra K. Ranka, Robert S. Windeler, Andrew J. Stentz, Bell Lab., Lucent Tech., USA.*

We have developed new techniques for measuring and compressing the ultrabroadband pulses (1200-nm spectral width) generated from microstructure fiber. Combining an angle-dithered nonlinear crystal with cross-correlation FROG (XFROG) allows us to measure the spectral phase of this continuum, and combinations of prisms and lenses allow compensation of higher orders of phase distortion.

WY2 1:45pm

Measuring ultrafast blue pulses with downconversion SPIDER, *P. Londero, M.E. Anderson, C. Radzewicz, C. Iaconis, I.A. Walmsley, Univ. of Rochester, USA.*

We present measurements of the spectral amplitude and phase of weak ultrashort blue pulses from a frequency-doubled regenerative Ti:Sapphire amplifier, using an adaption of the SPIDER technique. The new method employs downconversion in a similar geometry to the conventional upconversion scheme, and does not require a well-characterized red reference.

WY3 2:00pm

Measurement of energy density and duration of ultrashort light pulses using liquid crystals, *A. De Luca, S.R. Nersisyan, N.V. Tabiryan, C. Umeton,*