Time	Session/Presentation	Session/Presentation
	Track 1	**Track 2**
	October 16	
8:00-10:00	**Registration**	
10:00-12:00	**Conference opening** **Plenary session:** **Evgeny M. Dianov "At the threshold of Peta-era"** **Valentin P. Gapontsev "New challenges of fiber laser technology"**	
12:00-12:30	**Coffee-break**	
12:30-14:00	**Session A1. Fiber-optic sensors – I** Session Chair – M.I. Belovolov	**Session B1. Optical fibers and components – I** Session Chair – M.E. Likhachev
12:30-13:00	**A1-1.** *(Invited)* **Fiber-optic sensor systems based on refractive index gratings** Vasiliev S.A. (1), Medvedkov O.I. (1), Gnusin P.I. (1) *Fiber Optics Research Center RAS* The review of the basic methods and technical solutions used for development of fiber-optic sensor systems based on refractive index gratings is presented. The main problems which appear at the engineering and operation of the systems are discussed. The design features and the most important characteristics of the sensors based on fiber gratings are considered on a number of specific examples from various scientific and technical applications, including the results obtained by the authors.	**B1-1.** *(Invited)* **Microstructured fibers with radiation leakage channels: strong single-mode propagation with improved bend resistance properties** Demidov V.V., Dukel`skii K.V., Shevandin V.S. *S.I. Vavilov Federal Optical Institute, Saint-Petersburg* A few types of microstructured fibers with radiation leakage channels are considered. The leakage was ensured by: core formation of 7 central elements in C6V-symmetry structure; cladding design with constant amount of holes (C12V-symmetry); cladding design with C3V-symmetry; core shifted from the centre for 1 or 2 steps in C6V-symmetry structure. Fitting the air content we have managed to obtain strong single-mode propagation with improved bend resistance properties.
13:00-13:15	**A1-2. Experience of development and application of fiber-optic telemetry monitoring of the complex object s state petroleum coke at the refinery** Simonov M.A. (1), Zarenbin A.V. (1), Vasiliev S.A. (2), Medvedkov O.I. (2), Kostiukov V.N. (3), Tarasov E.V. (3) *(1) FORC – Photonics, Moscow* *(2) Fiber Optics Research Center RAS, Moscow* *(3) Scientific Production Company DYNAMICS, Omsk* Presented topical issues of monitoring the state of objects coking of petroleum products. Shows the advantages fiber optics to solve problems of monitoring the state of objects coking of petroleum products. Submitted by fiber-optic telemetry complex (FoTC) production of innovative enterprise FORC-Photonics . Presented the results of introduction FoTC as a means of monitoring the state of the object of coking petroleum products at the refinery.	**B1-2. Low mode asymmetry highly birefringent microstructured fibers** Denisov A.N., Levchenko A.E., Semjonov S.L., Dianov E.M. *Fiber Optics Research Center RAS* We present the results of the experimental and numerical studies of the highly birefringent microstructured fibers (HB MSFs) with low mode asymmetry. HB MSFs with group birefringence up to 2.7*10-3 were fabricated, having almost equal mode sizes on two orthogonal coordinates. These HB MSFs can be coupled with circular core fibers or with circular laser beams without additional power losses.
13:15-13:30	**A1-3. Structural health monitoring of football arena using fiber optic sensors** Shelemba I. S. (1) Shishkin V. V. (1,2) Churin A. E. (1) *(1) Inversion-Sensor, Novosibirsk* *(2) Novosibirsk State University, Novosibirsk* Traditional methods for structural health monitoring of technically sophisticated objects, such as buildings with long-span structures, are not cost-effective due to their excessive complexity and high cost of the large amount of surveys. In this connection, an automated structural health monitoring system based on fiber optic sensors was proposed to create for the new stadium Zarya in Novosibirsk.	**B1-3. The mechanism of mode formation in hollow core microstructured fibers** Pryamikov A. D.(1), Biriukov A. S.(1) *(1) Fiber Optics Research Center RAS, Moscow* In this work the mechanism of mode formation in hollow core microstructured fibers (HCMFs) is considered based on an analyses of optical properties of different types of HCMFs. HCMFs are divided into two basic types: HCMFs with continuous rotational symmetry of the core – cladding boundary and the ones with discrete symmetry of the core – cladding boundary. The mechanisms of the air core mode formation and corresponding mechanisms of the loss formation turn out to be different due to different types of cylindrical harmonics interference in the air core.
13:30-13:45	**A1-4. Design and Simulation of Fiber Bragg Gratings** František Uherek(1), Jozef Chovan(1), Anton Kuzma (1), Gabor Patassy(2), Branislav Pikus(2), Jaromír Sukuba(2), Dušan Synak(2) *(1) Medzinárodné laserové centrum, Ilkovičova , 841 04 Bratislava* *(2) Sylex, s.r.o., Mlynské Luhy 35, 821 05 Bratislava* In this paper is described the design of FBGs for fiber sensors at wavelength 1550 nm and simulation of parameters on dependence of refractive index difference in the grating, type of refractive index change in the gratings, apodizing of refractive index along the fiber Bragg grating. Key worlds: photonic sensor, design, simulation, fiber Bragg grating	**B1-4. Optical properties of negative curvature hollow core fibers** A.F. Kosolapov, A.N. Kolyadin, A.D. Pryamikov, A.S. Biriukov *Fiber Optics Research Center RAS* A new design of the negative curvature hollow core fibers (NCHCF) has been proposed. The light transmission in spectral region from 0.3 to 7.9 μm through silica NCHCF is presented. It is shown that the optical loss of such fibers is less than the glass absorption by three orders of magnitude. Experimental results of chromatic dispersion measurements are presented.
13:45-14:00		**B1-5. Creation of second-order nonlinearity in microstructured silica fibers** Gladyshev A.V. (1), Yatsenko Yu.P. (1), Semjenov S.L. (1), Kazansky P.G. (2), Dianov E.M. (1) *(1) Fiber Optics Research Center RAS, (2) Optoelectronics Research Centre, Southampton, UK* Creation of second-order nonlinearity in microstructured fibers was investigated. It was shown that microstructure cladding with relative air holes diameter as large as $d/\Lambda=0.8$ do not prevent thermal poling process. Second-order nonlinearity as high as $\chi(2) \sim 0.035$ pm/V was demonstrated and further improvements are possible through optimization of poling conditions.
14:00-15:00	**Lunch**	

15:00-16:45	**Session A2. Fiber optic cables** Session Chair – Yu.T. Larin	**Session B2. Optical fibers and components – II** Session Chair – A.F. Kosolapov
15:00-15:15	**A2-1.** *(Invited)* **Production and consumption of telecommunication cables in the world and CIS countries** Meschanov G.I. (1) *(1) JSC All-Russian scientific research and development cable institute (JSC VNIIKP), Moscow* The world economy of development of telecommunication cables considers three groups of such cables: outdoors copper telecommunication cables, indoors copper telecommunication cables / LAN cables, fiber-optic telecommunication cables. The share of telecommunication cables in the total amount of cable production in 2012 made 17,6%. With development of fiber-optic communication systems in the last decades falling of consumption of cables of communication copper external installation began. So in comparison with 2000 the volume of their production fell three times and made in 2012 in copper consumption – 326 000 tons. At the same time, such tendency is not observed for indoors copper telecommunication cables.	**B2-1. Nonlinear spectral transformation of picosecond pulses in the multimode microstructured fibres** Biryukov A.S. (1), Leonov S.O. (2), Pasishnik A.S. (3), Pniov A.B. (2), Pryamikov A.D. (1), Shevandin V.S. (3) *(1) Fiber Optics Research Center RAS, Moscow (2) N.E. Bauman Moscow State Technical University (3) S.I. Vavilov Federal Optical Institute, Saint-Petersburg* Phase characteristics of microstructured waveguides with core diameter 8 μm and air filling fraction 0.9 theoretically determined. Experimentally supercontinuum was generated by pumping 1-2 m long fiber with pulses of Yb-laser (2.5 ps, 25 kW). As analysis shows, the supercontinuum formation is determined by four wave mixing and formation of isolated antistokes component (λ=650 nm) and subsequent generation of envelope shock waves with component at λ=600 nm.
15:15-15:30		**B2-2. Fabrication of microstructured fibers using an effect of pressure self-regulation in sealed holes** Semjonov S. L. (1), Denisov A. N. (1), Paltsev P. E. (2), Senatorov A.K.(1) *(1) Fiber Optics Research Center RAS, Moscow* *(2) Moscow Institute of Physics and Technology, Dolgoprudny* We present the results of the theoretical analysis and a series of experiments of drawing the microstructured fibers from a preform with sealed holes at the top end. It is shown that this method have specific features, including possibilities of drawing long-length microstructured fibers with stable internal structural parameters, high repeatability and easy to fabricate microstructured fibers with holes of different sizes.
15:30-15:45	**A2-2. Materials for optical cable production. Reconstruction and modernization of its manufacture** Vorontsov A.S. (1), Ovchinnikova I.A. (1), Tarasov D.A. (1) *(1) JSC All-Russian scientific research and development cable institute, Moscow* Nowadays optical cable (OC) market has a stable growth. This growth has a positive influence on OC manufacture. Different materials – optical fibers, polyethylene, polyvinyl chloride, steel and fiberglass rods, aramid yarns etc., are necessary for OC manufacture. However, there is a problem in OC manufacture – dependence on import of aforementioned materials. To solve this problem it is necessary to reconstruct and in some cases establish new productions of the materials. Russia has some achievements in this field.	**B2-3. Stability drawing of photonic crystal fibers in the non-isothermal conditions** Pervadchuk V.P. (1), Shumkova D.B. (1), Zhenetl A.R. (1), Derevyankina A.L. (1) *(1) Perm National Research Polytechnic University* Questions of sustainability drawing of photonic crystal fibers in the non-isothermal conditions. We obtain the linearized system of ordinary differential equations, an algorithm for the study of sustainability.
15:45-16:00	**A2-3. UNIFIED FIBER OPTIC CABLE CALCULATION PROGRAM** Larin Y.T. (1), Nikulin A.V. (2), Polimonov A.D. (3) *(1) VNIIKP, Moscow* *(2) JSC «NIKI» scientific & Technical Department of Separate Division at JSC «EWK», Kolchugino* *(3) JSC «EWK», Kolchugino* A unified program which makes it possible to calculate constructions and production modes for fiber optic cables as well as their cost as per the required input parameters and considering all possible construction options has been developed.	**B2-4. Acoustic sensitivity of the solid-core microstructured optical fiber** Turtaev S.N. Levchenko A.E. Belovolov M.I. *(1) Fiber Optics Research Center RAS, Moscow* Acoustic sensitivity of the solid-core microstructured optical fiber is investigated. Experimentally shown that its normalized response is ~ 6 dB higher than in case of the conventional fiber. This agrees well with the theoretically predication.
16:00-16:15	**A2-4. STRAIN STUDY OF TIGHT BUFFERED FIBER WITH UV-CURABLE COATING** Avdeev B.V. (1), Grechanov A.V. (2), Naumov A.N. (2), Solodyankin M.A. (2) *(1) JSC "Fosens", Moscow* *(2) JSC "Laser Solutions", Moscow* Report focused on the study of strain temperature dependence of UV-curable coated tight buffered optical fiber with use of brillouin-based temperature and strain analyzer.	**B2-5. Magneto-optics effects in mictrostructured optical fibers with a ferrofluidic filling** Agruzov P.M. (1), Pleshakov I.V. (1), Bibik E.E. (2), Shamrai A.V. (1) *(1) Ioffe Physical-Technical Institute of the Russian Academy of Sciences, Saint-Petersburg,* *(2) Saint Petersburg State Institute of Technology (Technical University), Saint-Petersburg* Magneto-optics effects in silica-core microstructured optical fibers with a magnetic fluid cladding are studied. The AC response of the magneto-optic element was observed, and its polarization, amplitude, and frequency characteristics were investigated in both transverse and longitudinal geometries.
16:15-16:30	**A2-5. Defending and identifying of optical fibers by design of optical cable** Boev Mikhail Zaripov Ildar Kim Eduard *OOO Evrocable 1 , Shchelkovo, Moscow region*	**B2-6. IR PCF (2.0-40.0 μm) modeling and fabrication.** Korsakov A.S., Vrublevsky D.S., Zhukova L.V., Korsakov V.S., Lvov A.E., Mankov P.A. *Ural federal university named after the first President of Russia B.N.Yeltsin* We performed structure computer simulation for IR PCF (2,0-40,0 μm) based on silver and monadic thallium halide solid solution crystals, requirement and possibility of simulation application being substantiated. The results are visually presented. We also carried out fundamental characteristic calculations for simulated IR fibers operating in single- and multi mode at 10,6 μm.

16:30-16:45	**A2-6. Determination of flame spread velocity during polymer insulated cable burning** Zamyatin I.A. (1) Larin Yu.T. (2) Holodnyy D.S. (3) *(1) VNIIKP-OPTIC Ltd.* *(2) VNIIKP OJSC* *(3) NRU MPEI* Mathematical model of optical cable burning is offered in the report. Dependences of heat release rate on cable diameter and the temperature of its burning were obtained based on the model. Mass velocity burnout under different burning conditions was calculated. The time of cable burnout was calculated depending on its design and geometry of cabling in a tunnel. Ranges of flame spread velocities are estimated for horizontal and vertical cabling in tunnels and in open laying.	**B2-7. PROSPECTS OF FIBER OPTICS INFORMATION SYSTEM** Kochergina T. A. (1), Iskhakova L. D. (1), Kalenov N. E. (2) *1) Fiber Optics Research Center RAS,* *2) Library for Natural Sciences RAS* The Fiber Optics Information System (IS) is described. IS aims to provide bibliographic information and access to the full texts of scientific papers from various electronic resources. The structure and content of IS are discussed. The system is of great interest to the fiber optics scientists, Ph.D students and specialists.
16:45-17:15	**Coffee-break**	
17:15-18:45	**Session A3. Fiber-optic sensors – II** Session Chair – O.B.Vitrik	**Session B3. Optical fibers and components – III** Session Chair – A.A. Rybaltovsky
17:15-17:30	**A3-1.** *(Invited)* **Distributed fiber optic sensors and systems for continuous monitoring of the important objects** Belovolov M.I. (1) *(1) Fiber Optics Research Center RAS*	**B3-1. Identification of nano- and microcrystalline inclusions in optical fibers and preforms by means of X-ray difraction and electronic microscopy** Iskhakova L.D. (1), Ermakov R.P. (1), Milovich Ph.O. (1), Mashinsky V.M. (1), Zlenko A.S. (1), Bufetov I.A. (1), Dvoretsky D.A. (1), Egorova O.N. (1) *(1) Fiber Optics Research Center RAS* Nano - and microcrystalline inclusions in optical fibers and performs were studied by means XRD, EDS, TEM and SEM. It is found that preforms of Bi:SiO2 contain inclusions of bismuth oxides at c(Bi) <0,1 at.% and at increase in its concentration appears metal bismuth. In germano-silicate preforms the composition of inclusions depends on c(Bi) and Ge/Bi ratio. In alumo-silicate fibers can crystallize quartz, cristobalite and cyanite Al2SiO5.
17:30-17:45		**B3-2. The optimisation of method for producing the silica active optical fiber preforms by sintering of powders oxides** Vel miskin V.V, Egorova O.N, Isupov D.S., Senatorov A.K., Chernook S.G., Semjonov S.L., Dianov E.M. *Fiber Optics Research Center RAS* We optimized our method for producing the silica active optical fiber preforms by sintering of powders oxides, which has been investigated and tested earlier. The new effective technique of reduction of optical and structural fluctuations in a obtained optical material was realized. The minimum level of optical background losses in the produced fibers (active core with 0.256 mol % Yb2O3 and 2.268 mol % Al2O3) was 76 dB/km at a wavelength 1,13 um.
17:45-18:00	**A3-2. Nonlinear effects in coherent OTDR** Gorbulenko V.V., Naniy O.E., Nesterov E.T., Treshchikov V.N. *T8 STC , Moscow* The influence of nonlinear effects (self-phase modulation, modulation instability and stimulated Raman scattering (SRS)) on the COTDR range was investigated experimentally and theoretically For pulses of 200 ns at a wavelength of 1550 nm and a peak power of 10 watts spectrum and temporal shape of generated Raman signal was measured experimentally.	**B3-3. MCVD method of fabrication and investigation of the refractive index of B2O3/F-Yb2O3-Al2O3-P2O5-SiO2 glasses with high content of Yb2O3** Gur yanov A.N. (1), Lipatov D.S. (1), Bubnov M.M. (2), Likhachev M.E. (2) *(1) G.G. Devyatykh Institute of Chemistry of High-Purity Substances RAS, Nizhniy Novgorod,* *(2) Fiber Optics Research Center RAS, Moscow* MCVD technique for simultaneous doping of silica glass with Yb2O3, B2O3/F, Al2O3, P2O5 has been developed. Two series of preforms have been produced: with the core based on Yb2O3-F-Al2O3-P2O5-SiO2 glass system and with the core based on Yb2O3-B2O3-Al2O3-P2O5-SiO2 glass system. Investigation of refractive index of multicomponent glasses was carried out. It has been found that in the softened F-Yb2O3-Al2O3-P2O5-SiO2 glass the solid phase reactions take place between the components forming bubbles which break glass homogeneity. It was found that the maximum concentration of Yb in Yb2O3-B2O3-Al2O3-P2O5-SiO2 glasses can reach more than 4 wt.% at Δn 0.002.
18:00-18:15	**A3-3. Semiconductir Fiber-Optic Laser Gyro with Optical Dithering** Gerasimov E.G., Prokofyeva L.P., Sakharov V.K., Sherbakov V.V. *ZAO Center of Fiber-Optic Data Transmission System (VOSPI)* We demonstrate the use of optical dithering in a semiconductor fiber-optic ring laser gyroscope. Based on intracavity phase modulation optical dithering suppress frequency locking and provides interference of multimode light in output. Measurement running extremes in the interference pattern allows us to define the direction and magnitude of the rotation speed. Sensitivity of the device is 10 ÷ 20o/ h. A possible mechanism of operation of the device in question is based on the interpretation of the effect frequency lock-in as an obstacle, and the need for laser gyro.	**B3-4. The Influence of Oxygen Partial Pressure in the Fabrication of Rare Earth-Doped Preforms Using Chelate Delivery System** Stanislav Čampelj(1), Borut Lenardič(1,2) *(1)Optacore d.o.o., Trpinčeva 39, Ljubljana, Slovenia* *(2)CO EN-FIST, Dunajska cesta 156, Ljubljana, Slovenia* In our work we used a chelate delivery system CDS-03 to fabricate preforms doped with rare earth ions. We have studied the influence of oxygen on the process and the distribution of ions in the core of the preform. Oxygen concentration has a crucial role in the consistent deposition of the RE oxides. The key factor is to achieve sufficient concentration of oxygen in the gaseous mixture prior to entering the hot zone. New design of the injection tube allows us to achieve sufficient oxygen concentration with lower oxygen flows, permitting fabrication of preforms with improved homogeneity and repeatability.

18:15-18:30	**A3-4. Fiber optic gyroscopes, inertial measurement units and strapdown inertial navigation systems based on them** Yu.N.Korkishko (1), V.A.Fedorov (1), V.E.Prilutskiy (1), V.G.Ponomarev (1), I.V.Morev (1), D.V.Obuhovich (1), S.V.Prilutskiy (1), S.M.Kostritskiy (1), I.V.Fedorov (1), A.I.Zuev (1), V.K.Varnakov (1) *(1) Optolink RPC LLC, Moscow* In the current work the series of devices developed and produced by RPC "Optolink" are discussed: single-axis fiber-optic gyroscopes SRS-2000, SRS-1000, SRS-501, SRS-200. three-axis gyroscopes TRS-500 and VOBIS, inertial measurement units IMU-500, IMU-501 and IMU-1000. The major components of FOGs and their impact on FOGs accuracy characteristics are discussed. The development of strapdown inertial navigation systems based on FOGs (SINS-500K, SINS-500M, SINS-501 and SINS-1000) and their test results in different areas of applications are also presented.	**B3-5. Optical propeties of silica glass fibers and preforms with Te:SiO2 core** Karatun N.M. (1), Zlenko A.S. (1), Mashinsky V.M.(1), Semenov S.L. (1), Iskhakova L.D. (1), Dianov E.M. (1) *(1) Fiber Optics Research Center RAS Moscow* Holey Te:Si02 core optical fibers were studied. A fiber preform was obtained by the FCVD method. The fibers were drawn in the oxygen and argon atmospheres in the holes. Broadband infrared luminescence peaking at 1495 nm with FWHM of 350 nm was observed for the fiber fabricated in the argon atmosphere . Drawing of the fiber in the oxyygen atmosphere resulted in the infrared luminescence suppression.
18:30-18:45	**A3-5. DEVELOPMENT OF FIBER-OPTIC GYROSCOPES WITH TWO FEEDBACK LOOPS** Kurbatov A.M. *Kuznetsov Research Institute for Applied Mechanics, Department of Center for Terrestrial Space Infrastructure Objects Exploiting* An overview is presented of development of different accuracy fiber optic gyroscopes in Kuznetsov Applied Mechanics Research Institute (Moscow). All devices utilize the same scheme of loop interferometer and processing electronics, differing only due to different lengths of fiber coils for different accuracy devices.	**B3-6. Yb-Er laser fiber with phosphate core and silica cladding** Velmiskin V.V.(1), Galagan B.I.(2), Denker B.I.(2), Egorova O.N(1), Kamynin V.A.(2)., Kurkov A.S.(2), Sadovnikova Ya.Ye.(2), Sverchkov S.E.(2), Semenov S.L.(1), Dianov E.M.(1). *(1) Fiber Optics Research Center, RAS,Moscow* *(2) A.V.Prokhorov General Physics Institute, RAS, Moscow Москва* The paper is devoted to fabrication and tests of an optical fiber with phosphate glass core in a silica cladding. The fiber preform was made by melting Yb, Er co-doped phosphate laser glass in a high-purity silica tube. 1.54 μm laser action was demonstrated under 1.06 μm pumping into Yb absorption band.
19:00	**Conference banquet**	
	October 17	
8:30-10:00	**Session A4. Fiber-optic sensors – III** Session Chair – A.V.Zarenbin	**Session B4. Optical fibers and components – IV** Session Chair – S.S. Aleshkina
8:30-8:45 8:45-9:00	**A4-1.** *(Invited)* **Fiber optic probes for nanotechnology** Vitrik O.B. *Institute for automation and control processes Far Eastern Branch of Russian Academy of Science. Vladivostok. Russia.* A technology of fabrication and characteristics of aperture and apertureless fiber-optical probes of a various configuration are presented. It is shown that use of an aperture probe based on the Fabri-Perot s fiber-optical interferometer, provides lateral and vertical spatial resolution, correspondingly, of λ/40 and λ/100 for systems of scanning near-field optical microscopy. It is shown that apertureless probes application in the systems of a laser ablyation provides controlled formation of sub-50 nanometer holes in optically thick layers of Au/Pd. This technology also allows to fabricate submicronic and nano structures with use of the multimode nanosecond laser, which are similar to what were received earlier with use of femtosecond lasers.	**B4-1.** *(Invited)* **Trends in optical fiber development for modern telecom projects** Akopov S.G. *OOO Corning SNG, Moscow* Latest progress of transmission systems practically in all segments of optical networks resulted in the focus shift of the process of fiber performances improvements and originated development of new fiber types for the areas, traditionally covered by the copper cables. In this paper we discuss a set of characteristics and application performances of advanced fibers, new non-standard fiber solutions, expanding the areas of optical communications.
9:00-9:15 9:15-9:30	**A4-2.** *(Invited)* **Fiber-optic sensors based on thermofluctuation-induced vibrations in micro-opto-mechanical resonant structures** Egorov F.A. (1) Potapov V.T. (1) *(1)Fryazino Branch of Kotel nikov Institute of Radio Engineering and Electronics RAS, Fryazino, Moscow region* Thermomechanical fluctuation-induced vibrations are studied in micro-opto-mechanical fiber-optic resonant SMS structures. The posibility of the design of passiv resonant (vibrofrequency) sensors with SMS-structure-based fiber-optic fransducers of physical parameters is demonstrated.	**B4-2.** *(Invited)* **Novel optical fibers for high-capacity coherent lightwave systems** Vitaly Mikhailov, Kasyapa Balemarthy, Robert Lingle, Paul Westbrook *OFS, USA* Novel types of optical firers for long haul lightwave systems were investigated both experimentally and using numerical simulations. In particular, we analyzed parameters of optical fibres with super large effective area (SLA) and ultra low loss (ULL) and compared their performance for 100 Gbit/s dense WDM coherent transmission. In addition, we presented Air-Core-Fibre transmission results for low latency applications in data centres.
9:30-9:45	**A4-3. High-frequency sensor of sound for registration communication signals of dolphins** Turtaev S.N. Belovolov M.I. (1) Ivanov M.P. (1) *(1) Fiber Optics Research Center RAS, Moscow* *(2) Saint Petersburg State University, Saint Petersburg*	**B4-3. Enhancement of radiation resistance of MCVD optical fibers** Kashaykin P.F.(2), Salgansky M.Y.(3), Tomashuk A.L.(1), Abramov A.N.(3), Hopin V.F.(3), Guryanov A.N.(3), Nishchtv K.N.(2), Dianov E.M.(1) *(1) Fiber Optics Research Center RAS* *(2) N.P. Ogarev Mordovia State University* *(3)G.G. Devyatykh Institute of Chemistry of High-Purity Substances RAS* Radiation-induced absorption (RIA) spectra have been measured in MCVD-produced undoped- and F-doped-silica-core fibers fabricated in the spectral range 1.1-1.7 micron in the process of gamma-irradiation to a dose of 8.1 kGy. The technological factors responsible for RIA have been established. As the result, the MCVD-regimes have been improved to reduce RIA by a factor of ~ 5, which has proven to be comparable with that of radiation-resistant fibers of the best world's producers. Further RIA reduction is shown to be possible.

9:45-10:00	**A4-4. CHARACTERIZATION OF DISTRIBUTED STRAIN FIBER OPTICAL SENSORS AND PARAMETERS MEASUREMENTS** Grechanov A.V., Karnaukh I.A. Naumov A.N., Solodyankin M.A. *JSC "Laser Solutions", Moscow* The method of characterization of distributed strain fiber sensors that used with Brillouin scattering analysis based sensing systems has been developed. Temperature and strain dependences of Brillouin frequency shift in the sensor cable have been measured. Temperature dependence of sensor cable tension has been measured.	**B4-4. Realization of reference measuring of radiation-induced optical loss based on properties of optical fiber SMF-28** Dolgov I.I.(1), Stepanov E.A.(1), Akopov S.G. (2), Ivanov G.A. (3) *(1) "Laboratory of Ivan Dolgov" Ltd., Lytkarino, Moscow Region* *(2) Corning SNG, Moscow* *(3) Fryazino Branch of Kotel nikov Institute of Radio Engineering and Electronics RAS, Fryazino, Moscow region*
10:00-10:30	**Coffee-break**	
10:30-12:30	**Session A5. Development and production of fiber optic devices, systems and components** Session Chair – S.L.Semjonov	**Session B5. Optical fibers and components – V** Session Chair – A.S.Biriukov
10:30-10:45	**A5-1. Design trends for Optical Fiber & Cables and Technologies Overview** Alain Giraud (1) *Nextrom SA, Le Tresi* The paper will present the evolution and regional specificities on telecom optical cables designs and the implications for cable manufacturing technologies. Telecom Optical fibers types, design trends, manufacturing technologies and future requirements will be also introduced.	**B5-1. The New Method of Electrooptic Characterization of the Integrated Optical Modulator** Zhuravlev A. A. (1), Bratishko S. A. (2), Pervadchuk V. P. (3) *(1) Perm Scientific Industrial Instrument Making Company, Perm (2) Perm State National Research University, Perm (3) Perm National Research Politechnic University, Perm* The paper pertains to the field of microwave photonics and computer-aided design of microwave devices. In this paper we propose a new method for calculating the electro-optical characteristics of the integrated optical intensity modulator for implementation in the computer-aided design of microwave devices.
10:45-11:00		**B5-2. NONISOTHERMAL SPUN-FIBER DROWING TRANSIENT MODEL** Pervadchuk V.P. Shumkova D.B. *Perm National Research Polytechnic University* We consider the joint task of stretching and twisting spun-fiber in non-isothermal conditions. The system of equations describing this process is based on the quasi-one dimensional model. The influence of various parameters on the extraction mode spun-fiber.
11:00-11:15	**A5-2. Developments in Specialty Fiber Drawing Technologies** Kevin Boll *Nextrom Oy, Finland*	**B5-3. Residual stresses in preform of stress applying part for for anisotropic quartz fiber with considering of technological imperfections of doping** Semenov N.V. (1), Trufanov N.A. (2) *Perm National Research Polytechnic University. Perm* Investigated the influence of the real doping profile of preform of stress applying part for anisotropic optical fiber Panda on distribution of residual stress field. Compared the results obtained in the axisymmetric formulation with a perfectly circular cross-sectional shape with the results of the plane problem, which takes into account the real shape of doped area.
11:15-11:30	**A5-3. Current developments of Optagear in rewinding fiber-optics contours** **Malinin A.A.** *Optogear Oy, Kuormatie 14, FI-03100 Nummela, Finland*	**B5-4. Investigation of the thermomechanical behavior of the fiber optic gyroscope docking module** Smetannikov O.Yu. Il inykh G.V. *(1) Perm National Research Polytechnic University* A boundary value problem of determining the quasi-static stress-strain state of the pigtail with variable temperature is solved. The physical models that take into account the complex rheological behavior of the materials of construction are used. The comparative estimation of two variants of docking port design from the point of view of Panda fibers polarization parameters thermal stability is realized.
11:30-11:45	**A5-4. Advanced concepts in specialty optical fiber preform fabrication** Borut Lenardic *Optacore d.o.o., Slovenia*	**B5-5. Evolution of technological stress fields in cylindrical stress applying rod for optical fiber Panda-type during annealing** Trufanov A.N. *(1) Perm National Research Polytechnic University, Perm, Russia* Investigated evolution regularities of the technological stress fields in the rod for preform of fiber Panda type during annealing. It is shown that the main reason of reducing the levels of the stress state is the relaxation, due to viscous deformation of silica glass in the temperature range of the glass transition. Identified the quantitative characteristics of stress relaxation in different process conditions of annealing.

11:45-12:00	**A5-5. New fast-switching method for IL (Insertion Loss) and PDL (Polarization Dependent Loss) spectra measurements** Kelly M., Malsam D. *Agilent Technologies R&D and Marketing GmbH und Co. KG, Бёблинген, Германия* *E-mail: dimitri_malsam@agilent.com*	**B5-6. Luminescence of Cr2+ in chalcogenic fibers with the core As2S3Ge with embedded crystals ZnS:Cr2+.** Zhuldybina M.V. (1), Karaksina E.V. (2), Koltashev V.V. (3), Plotnichenko V.G. (1,3) *(1) Moscow Institute of Physics and Technology (State University), Moscow* *(2) Institute of High-Purity Substances RAS, Nizhny Novgorod* *(3) Fiber Optics Research Center RAS, Moscow*
12:00-12:15		**B5-7. SAPPHIRE FIBER FOR INTERSTITIAL LASER THERAPY AND DIAGNOSTICS** Stryukov D.O.(1),Shikunova I. A.(1), Kurlov V. N.(1), *(1) Institute of Solid State Physics RAS, Chernogolovka,* To minimally invasive methods of laser interstitial therapy and diagnostics of the condition of biological tissues have shown active interest of specialists all over the world. This is due to the unique capabilities of optical methods for treatment of a number of deadly cancer. The use of sapphire fibers and development on their basis of new detectors contact type can significantly improve the accuracy and convenience of operation by combining diagnostic functions in localized volume of laser fluorescence therapy or destruction of revealed pathologies one tool.
12:15-12:30		**B5-8. The OTDR method for estimating the interaction of polarization modes in anisotropic optical fibers** Burdin V. V.(1), Konstantinov Yu. A. (1,2),Pervadchuk V. P. (1), Smirnov A. S. (1) *(1) Perm National Research Polytechnic University, Perm* *(2) Perm Research and Production Instrument Company, Perm* Anisotropic, polarisation-maintaining fibres have been studied using a reflectometer and integrated optic polariser. Reflectograms were recorded both with excitation only one polarization mode and with excitation both modes. The difference of reflectograms contains information about modes interaction.
12:30-13:00	**Coffee-break**	
13:00-14:15	**Session A6. Fiber-optic sensors – IV** Session Chair – S.A.Vasiliev	**Session B6. Optical fibers and components – VI** Session Chair – V.S.Shevandin
13:00-13:15	**A6-1. Method of research of the magneto-optical effect in BSO crystals and a magnetic field sensor based on it** Babaev O.G. (1) Matynin S.A. (2) Leonovich G.I. (3) *(1,2,3) Samara State Aerospace University named after academician S.P. Korolyov (SSAU), Samara* This paper presents a methodology of research of the magneto-optical Faraday effect in BSO crystals, proposed the construction of experimental stand, allowing to measure the value of magnetic field and quickly accuracy tune the emission polarizers.	**B6-1. Interference of normal modes as the cause of resonant losses in depressed-inner-cladding fibers** Vasiliev S.A.(1), Gnusin P.I.(1), Medvedkov O.I.(1), Dianov E.M.(1) *(1) Fiber Optics Research Center RAS* Based on the calculation of the fields and propagation constants of the modes of depressed-inner-cladding fiber, it has been shown that the resonant losses in this fiber type are caused by the interference of the normal modes of the fiber structure. The results obtained and their interpretation has allowed us to give a clear physical explanation for the phenomenon of mode interaction (coupling) , which is used in the frame of the coupled-mode theory to describe the energy exchange between different areas of complex waveguide structures.
13:15-13:30	**A6-2. Interference fiber-optic voltage sensor based on converse piezoelectric effect** Ivanov V.V. (1) Stepanov A.A. (2) *(1) Institute for Physics of Microstructures RAS, Nizhny Novgorod* *(2) OOO Intellectual systems NN , Nizhny Novgorod* An interference fiber-optic voltage sensor for high-voltage electric power lines is proposed and studied experimentally. The sensor is fiber Michelson interferometer with symmetric 3x3 coupler and Faraday mirrors. Sensor's transducers are piezoelectric (quartz) cylinders with telecom singlemode fiber winding which are converting voltage into interference phase. We report results of experimental study of metrological performance of the sensor, noise and fluctuations sources, as well as temperature dependence of sensor parameters.	**B6-2. Temperature dependences of phase and group birefringence in spun-fibers** Morshnev S.K.(1,2), Gubin V.P.(1,2), Przhiyalkovsky Ya.V.(1,2), Starostin N.I.(1,2) *(1)V.A.Kotelnikov Institute of Kadio Engineering and Electronics (Fryazino Branch) RAS, Fryazino (2) PROFOTECH CJSC , Moscow* The spectral method of measuring the beat length of the birefringence embedded in the spun-fiber is considered. It was found that the spun-fiber beat length is the geometric mean of the phase and group beat lengths. Temperature measurements both beat lengths and displacements of the spectrum as a whole allow to separate these birefringence types and to determine their dispersion. An experiment on the spun-fiber and the polarization maintaining fiber drown out from the same preform was carried out. The experimental results confirm the theory.
13:30-13:45	**A6-3. Reflection highvoltage sensor using electro-optic effect in quartz** Novikov M A (1), Svyatoshenko D A (2), Stepanov A A(2), Ustavschikov S S(1), Khyshov A Ю(1) *(1) Institute For Physics of Microstructures RAS, Nigny Novgorod,* *(2) OOO Intellectual Systems NN, Dzerginsk* Experimentally demonstrated model of fiber-optic remote reflective sensor for high voltages up to 220kV on the basis of the longitudinal electro-optic effect in crystalline quartz. Sensor is built on modulation scheme with compensation of PM fiber birefringence with a 45-degree Faraday rotator. In a range of 30kV experimentally demonstrated resolution of 20V in 5kHz band range.	**B6-3. Sensitivity of resonant losses in depressed-inner-cladding fiber to external influences** Gnusin P.I.(1), Vasiliev S.A.(1), Medvedkov O.I.(1) *(1) Fiber Optics Research Center RAS* Modifications of the spectrum of resonant optical losses arising in depressed-inner-cladding fibers owing to the interference of normal modes of the waveguiding structure have been investigated for different types of external influences (temperature change, fiber bending, refractive index of the surrounding medium, change of the fiber diameter). In particular, it has been experimentally shown that a reduction of the fiber diameter leads to a decrease of the resonant wavelength and an increase of the normal modes beat length, which is in a good agreement with calculations.

13:45-14:00	**A6-4. High birefringence spun fibers using in current sensors** Przhiyalkovskiy Y. V. (1, 2) Morshnev S. K. (1, 2) Starostin N. I. (1, 2) Gubin V. P. (1, 2) Boev A. I. (1, 2) *(1) CJSC Profotech, Moscow* *(2) V. A. Kotel nikov Institute of Radio Engineering and Electronics (Fryazino Branch), Fryazino, Moscow reg.* The evolution of the polarisation state of the broadband optical radiation, propagating through a spun high-birefringent fibre is studied. A theoretical model describing the polarisation state of the radiation in the spun fibre depending on the input polarisation parameters is developed. The model is based on the geometric analysis of the polarisation states of the spectral components of the radiation on the Poincare sphere. The modified scheme of the sensitive element for the current sensor is proposed. This sheme allows to use spun fibers with high birefringence without decreasing of interference pattern contrast of sensor.	**B6-4. Investigation of modal content of radiation in multilayer cylindrical W- fibers** Ulanov A. E.(1,2), Nikitov S. A.(1,2), Ustimchik V. E.(1,2), Chamorovskii Yu. K.(2) *(1) Moscow Institute of Physics and Technology, Dolgoprudny* *(2) Institute of Radio Engineering and Electronics of the Russian Academy of Sciences, Moscow* Simulation of properties propagating and leaky modes in multilayer cylindrical W-fibers were presented in this paper. It was shown that leaky modes might significantly influence on properties of radiation propagation into cylindrical W-fibers depending on structure. They should be taken into account in the study or designing of fiber.
14:00-14:15	**A6-5. Fiber-optic membrane-type magnetic field sensor** Matyunin S.A., Paranin V.D. *Samara State Aerospace University, Samara* The fiber-optic magnetic field sensor with magnetic membrane is offered. Measurement of a magnetic field is made on shift of reflected radiation spectrum. The optical resonator defining a spectral characteristic consists from surface of the lighter and a membrane. Sensors with a membrane from a nickel foil 2 and 8 microns thick and from polymeric magnetic films are investigated. Drift of the sensor characteristic caused by temperature and deformation changes of a membrane is noted. The method of compensation by means of a pulling membrane magnet is offered.	**B6-5. Low loss hybrid fiber with anomalous dispersion at 1 um wavelength** Aleshkina S.S.(1), Likhachev M.E.(1), Senatorov A.K.(1), Bubnov M.M.(1), Salaganskii M. Yu.(2), Guryanov A. N.(2) *(1)Fiber Optics Research Center of the Russian Academy of Sciences, Moscow* *(2)Institute of Hugh Purity Substances of Russian Academy of Sciences,Nizhny Novgorod* In this paper we designed and realized hybrid fiber where light is confined in the core due to mechanism of total internal reflection and mechanism of coherent Fresnel reflection simultaneously. Dual mechanism of light propagation allowed us to combine advantages of the different fiber types. Realized hybrid fiber had low optical loss (~6 dB/m), anomalous dispersion at 1.064 mm and it could be splice with standard step-index fiber. Usage of the hybrid fiber allowed us to compress chirp-pulses from 8 ps to 330 fs.
14:15-15:15	**Lunch**	
15:15-16:45	**Session A7. Fiber-optic communication – I** Session Chair – O.E. Nanii	**Session B7. Fiber lasers and amplifiers – I** Session Chair – A.S.Kurkov
15:15-15:30 15:30-15:45	**A7-1.** *(Invited)* **Prospective solutions for agile optical transport networking** Kogan S.S. *ZAO Alcatel-Lucent, Saint-Petersburg (Russia Federation)* In the report conceptual approach of the Alcatel-Lucent company related to the creation of flexible and scalable optical transport infrastructure for Software Defined Networking (SDN) and Cloud networks will be presented. The special attention is paid to granting to users of various services and applications with automation of connections over photonic (DWDM), electrical (OTN), as well as Ethernet (L2 switch) levels of the network, and also the theory and practice of introduction in the existing and future terabit transport networks of the optical channels with a capacity of 100G, 400G and above.	**B7-1.** *(Invited)* **Photonic-crystal fibers in ultrafast optics and biophotonics** Zheltikov A. M. *International Laser Center of M.V.Lomonosov Moscow State University, Moscow* Enhanced nonlinear-optical processes in waveguide modes of novel optical fibers offer unique opportunities for ultrafast optical science and lightwave technologies. Photonic-crystal fibers, where dispersion and nonlinearity can be tailored with a high precision through structure engineering, enable the creation of novel types of fiber-optic sources of ultrashort light pulses. Special strategies of micro- and nanostructuring of the core and the cladding of optical fibers help to realize efficient spectral and temporal transformation of laser pulses with input pulse widths from tens of nanoseconds down to several field cycles within the range of peak powers from hundreds of watts up to several gigawatts. This talk will provide a brief overview of applications of PCF sources and PCF-based solutions in nonlinear microspectroscopy, bioimaging, and photonics of few-cycle field waveforms.

15:45-16:00	**A7-2.** *(Invited)* **Development of coherent DWDM system with 25Tbit/c capacity** Treshchikov V.N. *T8 LTD, Moscow* Description of DWDM-system with a rate of 25 Tbit / s , which is being developed by T8, is presented in the report. The system is based on the use of 250 channels at 100 Gbit / s in the C + L spectral ranges. DP-QPSK modulation format in combination with a dense arrangement of the channels (33 GHz) provides high spectral and energy efficiency of DWDM-system. This ensures the maximum performance of the communication system (the product of distance and bandwidth).	**B7-2. Gyroscopic effect in the bi-directional mode-locked Er-doped fiber ring laser** Krylov A.A. (1), Chernykh D.S. (1), Popok V.A. (1), Ogleznev A.A. (2), Arutunan N.R. (3), Pozharov A.S. (3), Obraztsova E.D. (3), Dianov E.M.(1) *(1) Fiber Optics Research Center RAS, Moscow (2) "PNPPK" corporation, Perm (3) A.M. Prokhorov General Physics Institute RAS, Moscow* The Gyroscopic effect was successfully demonstrated in the bi-directional passively mode-locked Er-doped fiber ring laser. The laser generated stable soliton-type pulses in both clockwise (CW) and counterclockwise (CCW) directions of the fiber ring. In the first time to the best of our knowledge, we obtained its rotational sensitivity. In addition, we realized the possibility of zero beat-note frequency control via CW and CCW pulse parameteres variation. The long-term evolution of zero beat-note frequency was also measured.
16:00-16:15		**B7-3. Generation of inverse-modified solitons in mode-locked fiber lasers** Chernysheva M.A. (1), Krylov A.A. (1), Krjukov P.G. (1), Arutyunyan N.R. (2), Pozharov A.S. (2), Obraztsova E.D. (2), Rozhin A.G. (3), Turitsyn S.K. (3), Dianov E.M. (1) *(1) Fiber Optics Research Center RAS, Moscow, Russia (2) General Physics Institute RAS, Moscow, Russia (3) Aston University, Birmingham, UK* We have demonstrated generation of inverse-modified solitons in Erbium- and Thulium-doped fiber lasers mode-locked with single-walled carbon nanotubes with intracavity dispersion management by inserting high-nonlinear germanium-silicate fiber.
16:15-16:30	**A7-3. The Nonlinear Distortion and the Processing of the Phase-Modulated Signal in Fiber Optics Links.** Skidin A.S. (1,2) Redyuk A.A. (1,2) Shafarenko A. (3) Fedoruk M.P. (1,2) *(1) Institute of Computational Technologies SB RAS, Novosibirsk, Russia, (2) Novosibirsk State University, Novosibirsk, Russia, (3) University of Hertfordshire, Hatfield, United Kingdom.* The data about the nonlinear distortion of a phase modulated signal is obtained using the numerical modelling. The causes of this signal behaviour are explained. The advanced detection method that uses the features of the signal distortion is proposed. It reduces the rate of incorrectly detected symbols up to 30%.	**B7-4. CAVITY LENGTH STABILIZATION OF HYBRID MODE-LOCKED ULTRASHORT-PULSE ERBIUM-DOPED FIBER LASER** Lazarev V.A.(1) Sazonkin S.G.(1), Pniov A.B.(1), Leonov S.O.(1), Krylov A.A.(2), Arutunan N.R.(3), Pozharov A.S.(3), Obraztsova E.D.(3) *(1) Bauman Moscow State Technical University, Moscow (2) Fiber Optics Research Center RAS, Moscow (3) A.M. Prokhorov General Physics Institute RAS, Mocsow* In this paper we consider one of the implementation of fs-laser with CNT-film for mode-locking. Scheme of single-pulse, self-starting, stable mode-locked laser generation by appropriate polarization controllers adjustment is suggested. The mechanism of cavity length stabilization for a femtosecond fiber laser based on the pump source modulation is considered. Bandwidth of the feedback frequency stabilization system based on pump source modulation method is defined.
16:30-16:45	**A7-4. Compensating of nonlinear interaction of signals in high-speed VOLP a method of a nonlinear phase filtration** Bourdine V.A.(PSUTI), Grigorov I.V.(PSUTI) *(1) Povolzhskiy State University of Telecommunications and Informatics, Samara, (2) Povolzhskiy State University of Telecommunications and Informatics, Samara,* For the solution of a problem of compensation of nonlinear interaction of the next pulse signals at the exit of the fiber-optical line of transfer it is offered to use nonlinear phase filters. Such device needs to be realized in the form of the digital nonlinear filter and to arrange it at the exit of the reception optical module in front of the demodulator. Results of modeling and comparative estimates of a noise stability of system are given at existence and lack of the nonlinear filter.	**B7-5. RANDOM FIBER LASER BASED ON RAYLEIGH SCATTERING WITH DIRECT DIODE PUMPING** Babin S.A.(1,2)*, Dontsova E.I.(1), Kablukov S.I.(1) *(1) Institute of Automation and Electrometry SB RAS, Novosibirsk (2) Novosibirsk State University, Novosibirsk* In a gradient-index fiber directly pupmped by a high-power laser diode, a Raman lasing without any cavity has been first obtained, owing to the random distributed feedback provided by Rayleigh backscattering. The laser generates at wavelength of 980 nm for pumping at 938 nm. A radical improvement of the beam quality at such conversion has been demonstrated.
16:45-18:00	**Poster Session**	
	C-1. Fiber optic polarizer with small losses Mamaev Yu.A. *Institute of Applied Physics RAS, Nizhny Novgorod* The numerical calculation of the characteristics of fiber-optic polarizer with two dielectric layers (one of the layers is a residual part of the fiber cladding, and another - a resonant buffer layer) and optically thick metal film is shown that the use of metal with a real part of the complex refractive index is much less than unity (for example, Ag, Au, Cu) allows comparison with the film Al significantly reduce losses for passing TE0 wave with maintaining high extinction coefficients in the optimization of the thickness of the buffer layer	
	C-2. Sources of long-term DC-drift in optical modulators Ponomarev R.S. (1) Azanova I.S. (1) Volyntsev A.B. (1) *Perm State National Research Unuiversity, Perm* The research is devoted to the origins of long term dc-drift in integrated-optical amlitude modulator based on Mach-Zehnder interferometer. It is considered waveguide creation process and connected physical effects which are the possible reason of long-term dc-drift of proton exchanged waveguides.	

	C-3. The possibility of using programming methods during manufacture of optical fibers Malakhov V.A.(1), Malishev G.S.(1), Raevskii A.S.(1) *(1)Nizhny Novgorod State Technical University n.a. R.E.Alekseev, Nizhny Novgorod* The report is a PC software that allows you to: 1) to calculate the spectral dependence of the dispersion of the optical fiber (OF) according to the measured refractive index profile (RIP) preform. Algorithm of program is based on a multi-stage approximation of real RIP, each stage is assigned the value of the concentration of doping supplements, and 2) to solve the inverse problem - for a given spectral dependence of the dispersion of the OF to determine the type of RIP of preform. The program is adapted to the MCVD process technology and is designed to provide savings of material resources.
	C-4. Singlemodedness of an active hybrid fiber with small core-to-clad ratio Aleshkina S.S. (1), Likhachev M.E.(1), Bubnov M.M.(1), Yashkov M.V. (2), Salaganskii M.Yu. (2), Guryanov A. N.(2) *(1) Fiber Optics Research Center of the Russian Academy of Sciences, Moscow (2) Institute of Hugh Purity Substances of Russian Academy of Sciences, Nizhny Novgorod* Singlemodedness of the active hybrid fibers with small core-to-clad ratio was studied experimentally and theoretically. The studied fibers had the hybrid mode formed by Fresnel reflection, but confined due to total internal reflection from the outer low-index cladding that used for propagation of multimode pump.
	C-5. Spectral-type probe for near-field optical microscopy Kuchmizhak A.A. (1) Vitrik O.B. (1) Kulchin Yu.N. (1) *Institute of Automation and Control Processes of FEB RAS, Vladivostok* We studied numerically and experimentally the possibility of the development of a novel probe based on the fiber Fabry-Perot interferometer with an evanescent light source protruding directly toward the sample. It was shown that such probe provides a spatial resolution ~λ/40 for λ=1550 nm. The fabrication process of such a probe is described in detail.
	C-6. Nanostructuring of metal films by single ns-laser pulses focused through the fiber apertureless probe Savchuk A.G. (1), Kuchmizhak A.A. (1), Vitrik O.B. (1) *Institute of automation and control processes of FEB RAS, Vladivostok* We proposed a microsized apertureless dielectric probe (ADP) in the form of a section of the tapered optical fiber for surface laser modification of solid surfaces. It was shown both numerically and experimentally, that developed probe allows one to localize the laser pulse into the into a λ/2-spot. The formation of single and periodic nanoholes with the 35-nm wide minimal size in the 50-nm optically “thick” Au/Pd film was demonstrated.
	C-7. Few mode frequency-domain reflectometry for PON monitoring Alyushina S.G. (1), Morozov O.G. (2) *(1) Povoljski State University of Telecommunication and Informatics (Kazan branch) (2) Kazan National Research Technical University - Kazan Aircraft Institute* A new method for passive optical network monitoring is contrived. Method is based on the use of optical frequency domain reflectometry with a probing source made on frequency-tunable laser with feedback and a two-frequency radiation generator on a Mach-Zehnder modulator and fiber Bragg gratings, structured according to the Cantor set law used as labels and network branches temperature sensors.
	C-8. The use of fiber optics components in microwave photonic systems Morozov O.G. (1), Talipov A.A.(2) *(1) Kazan National Research Technical University - Kazan Aircraft Institute (2) Povoljski State University of Telecommunication and Informatic (Kazan Branch)* Photonic treatments of microwave radiosignals are based on procedures of measuring changes and comprising typically processes the modulation measuring, the dispersion discernment to transform frequency-amplitude and photodetection are the most promising, since they have significant advantages over radio engineering - a broad band of the measured frequency, low loss and immunity to electromagnetic interference, low weight, volume, ability to work in a wide range of climatic conditions. The problems of a number of case are discussed.
	C-9. Few mode techniques for interrogation of similar FBG in group Morozov O.G. (1,2) Nureev I.I. (1,2) *(1) Kazan National Research Technical University - Kazan Aircraft Institute (2) Povoljski State University of Telecommunication and Informatic (Kazan branch)* The methodical approach to structural minimization basing of fiber optic sensor nets for instrumental monitoring is stated in present paper. General statement of basing problem is considered. Methods and principles for its decision based on two frequency and two waves probing of similar fiber Bragg grating net’s sensors in group are offered.
	C-10. Prediction of differential mode delay diagrams on an equivalent refractive index profile Praporshchikov D.E. (1), Yablochkin K.A. (1) *(1) Povolzhskiy State University of Telecommunications and Informatics, Samara* In paper the algorithm of prediction of differential mode delay diagrams on the basis of calculation of an equivalent refractive index profile, allowing considerably to reduce time and material costs, is offered. The measurement technique is described. The estimation of adequacy of the offered algorithm is executed.
	C-11. Microstructure fibres for efficient second harmonic generation Yatsenko Yu. P., Semjonov S. L. *Fiber Optics Research Center RAS, Moscow* Optimal parameters of microstructure fibres were found for efficient second harmonic generation by thermal poling. Microstructure fibres were first fabricated for the second harmonic generation in accordance with the designed characteristics significantly exceeding the characteristics for polled step-index fibres.
	C-12. Based on climatic test results method for estimation of optical fiber strain distribution in loose tube cable Burdin V.A. *Povolzhsky state university of telecommunication and informatic* Based on climatic test results method for estimation of optical fiber strain distribution in loose tube optical cable is introduced in this paper. Experimental data of the optical cable delivery length climatic test and calculation of optical fiber stress and strain distributions are presented. This experiment confirms the possibility of using this method.
	C-13. IR crystal fibers with enlarged mode field diameter Vrublevsky D.S., Korsakov A.S., Zhukova L.V., Zhukov V.V., Isaev A.S. *Ural federal university named after the first President of Russia B.N.Yeltsin* We developed IR fibers (2,0-40,0 μm) with large mode field diameter expanded due to row of matrix rod inserts and proved the single-mode performance at 10,6 μm. We also calculated some fundamental characteristics for the fibers above as well as for multi-mode fibers based on silver and monadic thallium halide solid solution crystals. The nanostructure of single- and multi-mode fibers of the aforecited composition was also investigated.

	C-14. Access network modernization from xDSL to FTTH technology Limaskiy N.S. (1) Kirdey I.A. (1) *(1) Povolzhskiy State University of Telecommunications and Informatics, Samara* Described prerequisites of transition from existing xDSL technology to FTTH. Different ways of staged modernization for the access networks. Advantages obtained as a result.
	C-15. Fibre magnetooptic current sesnsor S.M. Kostritskii, V.P. Mitrokhin, Yu.N. Korkishko, V.A. Fedorov, V.E. Prilutskii, V.G. Ponomarev, I.V. Morev, A.A. Korzhukov, D.V. Obukhovich *RPC Optolink* We report about design of a novel Sagnac interferometer-type fibre-optic current sensor. The basic concept is the same as that of a closed-loop gyroscope using a depolarizer. Light travelling through the Sagnac loop clockwise or anti-clockwise is depolarized to prevent noise due to polarization. Using this scheme with counter-propagation of light, there is an opportunity to distinguish the Faraday phase shift and compensate the temperature dependences of linear birefringence and Verdet constant.
	C-16. Distributed sensor based on multimode optical fibers operating in a few-mode regime Bourdine A.V., Fedorov A.A., Tynkovan V.O., Baranov K.V., Chivilgin A.L. *Povolzhskiy State University of Telecommunications and Informatics (PSUTI), Samara* We present results of experimental approbation of proposed distributed sensor for mechanical action registration. It is based on analysis of a few-mode optical signal impulse response propagating in silica multimode optical fibers.
	C-17. MATHEMATICAL MODEL OF THE FIBER OPTIC GYROSCOPE FALSE INDICATIONS UNDER MECHANICAL IMPACTS Savin M.A., Galyagin K.S. *Perm National Research Polytechnical University, Perm* In this article described the sensitivity of the fiber-optic gyroscope under mechanical and thermal impacts with using a software STAR-CCM+. Mathematical model let define a drift of the fiber optic gyroscope under mechanical and thermal impacts on the shell of the fiber case. The results of practical testing algorithm of the method are presented.
	C-18. Phosphosilicate Raman Gain Fibers with Varying Core Concentration for Enhanced SBS Suppression Likhachev M.E. (1), Alexeev V.V. (1), Bubnov M.M. (1), Dianov E.M. (1), Salganskii M.Y. (2), Nagel J.A. (3), Temyanko V.L. (3), Norwood R.A. (3), Peyghambarian N. (3), Dobler J.T. (4). *(1) Fiber Optic Research Center of the Russian Academy of Sciences, (2) Institute of High Purity Substances of the Russian Academy of Sciences, (3) College of Optical Sciences, The University of Arizona, (4) ITT Exelis Geospatial Systems.* New SBS suppressed phosphosilicate Raman gain fibers are demonstrated with longitudinally varying core doping concentrations. Peak Brillouin gain is reduced by 6 dB over standard fibers resulting in a 2.4 dB increase in amplified power.
	C-19. Testing methods and the calculation the strength of earthquake-resistant optical fiber cables Koryakin A.G. Larin U.T. Masenzhnik Y.Z. *JSC VNIIKP* In work describes the main cases of laying fiber optic cables between buildings, pillars, bearing structural elements when exposed seismic waves on the basis of theoretical research performed to stationary modes of operation of electric cables (laying in the ground). Mechanical characteristics of optical cables were calculated for the cases of air layout without hesitation support elements of wind loads and loads of icing. The methods for reliability and seismic stability of optical cables has showed.
	C-20. STUDYING OF SEMICONDUCTOR LASER SPECTRUM WITH THE GIRES–TOURNOIS EXTERNAL RESONATOR Matyunin S.A., Paranin V.D., Udeneev A.M. *Samara State Aerospace University* The semiconductor laser spectrum with the external two-refractive resonator of Gires-Tournois is investigated. Existence of two main generated modes corresponding to resonances of ordinary and unusual waves is established. Effective management of a radiation spectrum without spectral filtration loss is shown. It is specified possibility of application of effect of two-mode generation in optical communication systems with super-dense spectral multiplexing.
	C-21. Statistical analysis of variability of loading rods manufacturing technological process Pervadchuk V.P. (1), Krukov I.I. (2), Davydov A.R. (1), Pesterev A.A. (2) *(1) Perm National Research Polytechnic University, Perm (2) Perm scientific-production company of instrument making, Perm* Statistical analysis of variability of loading rods manufacturing technological process for optical fibers is taking place here. All the controlling cards of average and standard deviations of parameters are made on all the studies of the process. Reasons of periodical variability of parameters are established.
	C-22. New method for design of transmission system equipment for transport telecommunication networks Andreev V.A., Burdin V.A., Dmitriev V.A., Teleshevskiy S.G., Shustanov V.Yu. *Povolzhskiy State University of Telecommunications and Informatics* In this work we consider the design modularity for equipment of transfer telecommunication networks. Modularity means the network element consist of several independent components (modules). They are fully designed, implemented and functionally independent. It provides the possibility of scaling according to user requirements. Realization of modularity design provides to simplify the construction of both hardware and software for network element. It decreases the cost of equipment, enhances reliability and network flexibility based on it.
	C-23. Remote optical cable test system for predictive strategy realization for maintenance of telecommunication network links Andreev V.A., Burdin V.A., Dmitriev E.V., Sivkov V.S. *Povolzhskiy State University of Telecommunications and Informatics* In this work remote fiber test systems (RFTS) for predictive strategy realization for maintenance optical cable of telecommunication networks are considered. We describe the problems of actualization and management of RFTS databases. Sample of hardware and software of RFTS realization is shown.
	C-24. Mathematical model of polarization characteristics of backscattered signal in optical fiber Dashkov M.V. *Povolzhskiy State University of Telecommunications and Informatics, Samara* In this paper the model of a POTDR signal taking into account a statistical property of beat length and correlation length variation, and also probing signal parameters is considered. Results of simulation are represented.
	C-25. Low dispersion multimode optical fibers with fluorosilicate cladding Dukelsky Knstantin Vladimirovich. *NITIOM Vavilov State Optical Institute,Saint Petersburg* The results on the development of a one-step MCVD production method of the multimode optical fibers with a fluorosilicate cladding are presented. The numerical aperture ≈ 0,16 providing an SiF4 gas as a carrier gas for the vapor SiCl4. The spectra of the optical losses of fibers in the spectral range of 0.8 - 1.5 μm and the effect of the diameter of the winding on the optical losses are shown. Smoothing stepped radial refractive index profile of the deposited layers of high-temperature homogenization and no central dip in this profile provided dispersion value ≤ 1,5 ps / m at a wavelength of 1 μm.

C-26. Effect of low refractive index layer on cross-talk in multi-core fiber.
Egorova O.N.(1), Semjonov S.L.(1), Dianov E.M.(1), Salganskii M.Y.(2), Koklushkin A.V.(3), Nazarov V.N.(3), Korolev A.E.(3), Kuksenkov D.V.(4), Mishkin V.P.(5), Nishev K.N.(5)
(1) Fiber Optics Research Center RAS, Moscow, Russia (2) Institute of Chemistry of high purity substances, Nizhny Novgorod, Russia (3) Corning Research Center, Saint Petersburg, Russia (4) Science & Technology Division, Corning Incorporated, Corning, NY, USA (5)Mordvinia State University, Saransk, Russia
We have studied the effect of low refractive index layer on cross-talk in multi-core fiber. At a given fiber design, existence of low refractive index layer between cores results in 20 dB crosstalk reduction measured with 1-km fiber length.

C-27. Combined cables with optical fibers and copper conductors
Sholudenko M.V., Abramov K.K., Podolskaya L.V.
JSC VNIIKP , Moscow
Combined cables consist of: - optical modules, with optical fibers; - star quads stranded from copper conductors with skin-foam-skin polyethylene insulation; - pais, stranded from copper conductor with solid polyethylene insulation; - aluminium tape, covered cable core; - outer polyethylene sheath. Combined cables are intended for work in optical information transfer system into optical fibers; and in analog and digital information transfer system into star quads, and in electrical installations of signaling and blocking at rated 380 V of alternating current with frequency of 50 Hz.

C-28. Application of polarization reflectometry for optical fiber monitoring systems
Burdin V.A., Dashkov M.V., Dmitriev E.V.
Povolzhskiy State University of Telecommunications and Informatics, Samara
In this paper the potential capability of application of the polarization reflectometry for optical fiber monitoring systems was examined. The technique for identification of several consistently located events in optical fiber was proposed and approved.

C-29. The charge-transfer state excitation as a general mechanism of the photodarkening effect in aluminosilicate fibers doped with ytterbium oxide.
Bobkov K.K. (1), Rybaltovsky A.A. (1), Umnikov A.A. (2), Guryanov A.N. (2), Likhachev M.E. (1), Bubnov M.M. (1), Dianov E.M. (1).
(1) Fiber Optics Research Center RAS, (2) Institute of Chemistry of High-Purity Substances RAS.
The photodarkening effect in aluminosilicate glass fiber preforms doped with ytterbium oxide Yb2O3 was investigated. The inducing of Yb2+ ions in the glass network irradiated by IR pump (915 nm) and UV eximer laser(193 nm) light was revealed by the fluorescence spectroscopy technique. A general mechanism of Yb2+ ions and oxygen-hole centers formation as a result of photoinduced excitation of Yb3+ charge-transfer state was found for both YAG:Yb crystal and aluminosilicate glass.

C-30. Application optical solitons for radio over fiber systems
Burdin V.A., Dashkov M.V., Volkov K.A.
Volga State University of Telecommunications and Informatics, Samara
In this paper the application of optical soliton in radio over fiber systems was considered. The result of simulation of RoF signal transmission in fiber optical line taking into account dispersion compensation parameters are represented.

C-31. Reflective high voltage sensor based on electrogiration effect
Novikov M.A.(1), Stepanov A.A. (2), Ustavschikov S.S. (1), Khyshov A.A. (1)
(1) Institute For Physics Of Microstructures, Nigny Novgorod (2) OOO Intellectual Systems NN , Dzerginsk
In this paper we propose a remote fiber-optic reflective sensor for high electric voltages measurement on the basis of electrogyration effect in lead tungstate crystal. In the crystals of this group of symmetry linear electro-optic and piezoelectric effect is forbidden, what makes possible measuring of ultra-fast electrical processes in nature and industry.

C-32. Polarization mode dispersion calibration artifact for strong coupled mode regime
V.V. Grigoriev, V.Ye. Kravtsov, A.K. Mityurev, S.V. Tikhomirov
All-Russian Scientific Research Institute for Optical and Physical Measurements (VNIIOFI), Moscow
The optical system for mode coupled polarization mode dispersion (PMD) artifact is described. PMD measurement results based on interferometric method for such an artifact are presented.

C-33. Bilateral comparison on chromatic dispersion measurements in optical fiber resume
V.V. Grigoriev, V.Ye. Kravtsov, A.K. Mityurev, S.V. Tikhomirov
All-Russian Scientific Research Institute for Optical and Physical Measurements (VNIIOFI), Moscow
The results of bilateral comparison on chromatic dispersion (CD) measurements in optical fiber for reference CD measurement apparatuses VNIIOFI and METAS are presented. The CD reference materials used for the comparison are described.

C-34. SINGLE-CHANNEL PHOTON DEVICES PROCESSINGS OF THE OPTICAL SIGNAL
Perepelitsyn Yu.N. (1) Zhavoronkov N.V. (2)
(1) Saratov Department of V.A. Kotelnikov Institute of Radio Engineering and Electronics of RAS, Saratov,
(2)Research Institute of Material Science and Technology (RIMST), Moskow, Zelenograd
Effects theoretical and the experimental researches related to working out and embodying of new type of photosensitive structures, intended for use as the active devices in single-channel photon processing devices of an optical signal are given.

C-35. Getting a dual-frequency radiation on the basis MODULATOR Mach-Zehnder and single-frequency lasers
Morozov O.G. (1) Talipov A.A. (1) Sadykov I.R. (1) Vasilets A.A. (1) Shevtsov D.I. (2)
1 Kazan State Technical University named after A.N. Tupolev, Kazan 2 Perm Scientific-Industrial Instrument Company, Perm
The study presents the results of an experiment on the generation of two-frequency laser radiation from a single-frequency modulator based on a Mach-Zehnder interferometer. In the study, received a two-frequency laser radiation with partial suppression of separation between the carrier and sideband frequencies 20 GHz.

C-36. Determination of specrtum of a fiber Bragg grating based two frequency reflectometry.
Denisenko P.E., Morozov O.G.
Kazan National Research Technical University named after A.N. Tupolev, Kazan
A photonic approach to realizing instantaneous measurement of spectrum of a fiber Bragg grating (FBG) based method of two frequency reflectometry is proposed and demonstrated. In the approach, using a Mach-Zender modulator biased at the minimum transmission point to generate symmetrical two frequency measurement signal. Accuracy of a spectrum FBG is depends on a value of microwave frequency signal modulated on an optical carrier in a Mach–Zehnder modulator.

C-37. Hierarchy of CWDM-channels from the point of view of radiation resistance
Dolgov I.I., Stepanov E.A.
"Laboratory of Ivan Dolgov" Ltd., Lytkarino, Moscow Region

C-38. Doping of silica glass by gaseous components in gas-phase processes of its receiving
Andreev A.G. (1), Dukelsky K.V.(2), Eronyan M. A.(2)
(1)Perm scientific-industrial instrument maring company,Perm. (2) NITIOM Vavilov State Optical Institute,Saint-Petersburg.
The processes of introduction in silica glass of fluorine, nitrogen and hydrogen are considered at production of optical fibers by a MCVD method. Mechanisms of their introduction in glass significantly differ. So, fluorine enters at a stage of its diffusive penetration into SiO2 nanoparticles, at the time of their heating in the atmosphere containing SiF4. Nitrogen doping being formed particles of SiO2 contain nitrogen, which unlike fluorine forms condenced phase with silicon. Hydrogen is included only into a matrix of glass.

C-39. Properties of optical fibers based on boronphosphorsilicate glass with bithmus dopant
Laptev A.Yu (1), Guryanov A.N (1), Melkumov M.A (2), Firstov C.V (2), Bufetov I.A (2).
(1)Institute of Chemistry of High-Purity Substances of RAS, N.Novgorod, (2) Fiber Optics Research Center of Ras, Moscow
The preforms of optical fibers based on boronphosphorsilicate glass, doped with bismuth oxide of different concentration, have been fabricated by MCVD method. The optical properties of optical fibers, produced on its basis, were investigated. Boronsilicate glasses with bismuth manifested weak luminescence. Addition of phosphorus increased luminescence in 1.2 - 1.3 μm range which makes it possible to assume amplification in this wavelength range.

C-40. Optimal control of a movable heat source in the MCVD process, taking into account all types of heat transfer
Pervadchuk V.P., Shumkova D.B.
Perm National Research Polytechnic University
For a distributed system, which describes the process MCVD, formulated the problem of optimal power control gas burner, a system of optimality in the form of a system of differential equations.

C-41. Mathematical model of a fiber-optical gyroscope for static system
Pavlov D.V.
ZAO ELSI, chair Physics of a firm body and microelectronics NOVGU to them Yaroslav the Wise, of V. Novgorod
In this work the mathematical model of a fiber-optical gyroscope of VG910Q is briefly described. For development of effective mathematical model the Simulink environment which is a part of MatLab was used. In imitating modeling virtual modules and the devices which behavioural model is most approached to real physical model are used.

C-42. The method of entering the polarized radiation into optical fiber Panda -type for studying it by polarization sensitive reflectometry
Konstantinov Yu. A. (1,2), Soldatov P. N. (2), Smirnov A. S. (1)
(1) Perm National Research Polytechnic University, Perm (2) Perm Research and Production Instrument Company, Perm
We present a technique designed to perform an angle alignment of polarization-maintaining fibers. This method consists of special algorithm which operates with images obtained using video camera, it calculates Pearson modified correlation coefficient for averaged brightness profiles. The maximum of obtained function shows the angle of axes misalignment.

C-43. Stable pulesed laser source for 1,55 mkm with fiber output for distributed fiber optic sensors and systems
Turtaev S.N. Belovolov M.I. (1) Levchenko A.E. (1) Paramonov V.M. (1) Popova M.S. (2)
(1) Fiber Optics Research Center RAS, Moscow
(2) Moscow Institute of Physics and Technology, Dolgoprudny

C-44. Multi-level amplitude modulation in optical connections between computers
Pavlova E.G. (1) Nanii O.E. (1,2)
(1) Moscow M.V. Lomonosov University, physics department (2) T8 STC
Numerical simulation revealed that the maximum data rate using the four-level amplitude (4-PAM) modulation format is 1.2 times greater than using binary amplitude (OOK) modulation format. For fixed transmission rate length of the lines based on multimode fibers can be increased 1.5 times. In optical connections between computers format 4-PAM may be preferable to traditional OOK format at a speed of more than 10 Gbit / s.

C-45. Fiber-based spectral and temporal transformation of femtosecond Yb fiber laser output
Durkin Y.V., Mitrofanov A.V., Sidorov-Birukov D.A., Zheltikov A. M.
International Laser Center of M.V.Lomonosov Moscow State University, Moscow
This work investigates the possibility of controlling the spectral and temporal characteristics of ytterbium-doped fiber laser system. Tuning the central frequency, spectrum width, pulse length, the contrast increasing are made by propagation of laser pulses through the highly nonlinear microstructured fiber and the PM fiber. The processes of formation of tunable broadband radiation in microstructured fibers was studied also technique and experimental setup for the characterization of ytterbium fiber lazer source pulses by Frequency-resolved optical gating were developed. The principle possibility of compression and tuning the wavelength of the fiber laser pulses in microstructured fiber were investigated.

C-46. Investigation of structure based on a double-cladding fiber section for applications as a sensor of various physical parameters
Zlodeev I.V. (1), Ivanov O.V. (2,1)
(1) Ulyanovsk State University (2) Ulyanovsk Branch of Kotel nikov Institute of Radio Engineering and Electronics of Russian Academy of Sciences
A fiber structure based on a section of double-cladding fiber SM630 spliced between two standard SMF-28 fibers is investigated. The mechanism of formation of dips in the spectra is discussed. The sensitivities of transmission spectra to bending, temperature, strain and refractive index of external medium are measured.

C-47. Determination of content of boron silicate matrix blanks for optical fibers by the method of x-ray microanalysis
Khiller V.V. (1), Marakulin A.V. (2), Minashina L.A. (2)
(1) Institute of Geology and Geochemistry Ural Branch of RAS, Yekaterinburg, (2) Russian Federal nuclear center - Russian research Institute of technical physics named after academician E.I. Zababakhin. Snezhinsk
The alloying of boron silicate matrix is widely used in the manufacture of optical preparations for the manufacture of special fiber preserving polarization, photosensitive, active, and others. With step-by-step forming of the structure of the fiber, it is important to study the distribution of alloying elements in the matrix of glass with a resolution of less than the thickness of layer. Electron probe microanalysis is applied to study the chemical composition.

C-48. Creation of broadband obolochechny materials for optical galoidno-serebryanny fibers
G. V. Polyakova, V.F.Golovanov, I.S.Lissitskiy, M. S. Kuznetsov, K.S.Zaramenskikh. (GIREDMET)
GIREDMET, Moscow
Monocrystals of halogenides of silver of AgCl-AgBr system are nontoxical, slightly soluble, transparent in visible and average IK of area of a range (0,35-30 microns). High plasticity allows to extrude a qualitative optical fiber with the satisfactory mechanical characteristics, suitable for use in medical devices. The problem of a cover is solved by creation of crystals of different structure of the same system. Components of AgCl-AgBr system form a continuous number of steady firm solutions. The deviation from a point of a minimum of system towards AgBr allows to receive a material with a smaller indicator of refraction. Varying structure of a core and a cover receive fiber with the set aperture of a leaving bunch. The technology of cultivation allowed to provide uniformity of obolochechny crystals.

C-49. Gradient crystals of halogenides of thallium – preparation for extrusion of broadband infrared fiber
V.F.Golovanov, I.S.Lisitsky, G. V. Polyakova, M.S.Kuznetsov, K.S.Zaramenskikh. (GIREDMET)
GIREDMET, Moscow
Crystals of halogenides of TlCl-TlBr and TlBr-TlI thallium – an optical material transparent from 0,4 to 50 Crystals of halogenides of TlCl-TlBr and TlBr-TlI thallium – an optical material transparent from 0,4 to 50 microns, suitable for extrusion of the broadband IK-fiber which use is complicated due to the lack of a reflecting cover. The technology, allowing to receive cylindrical preparation for extrusion with smooth change of an indicator of refraction on radius from forming to the center is developed. The effect is reached at the expense of an ion-diffusive exchange at the minimum violation of monocrystallinity.

	C-50. **Micro-structured holey fiber for low latency data transmission** *Egorova O.N.(1), Semjonov S.L.(1), Dianov E.M.(1), Koklushkin A.V.(2), Nazarov V.N.(2), Korolev A.E.(2), Kuksenkov D.V.(3)* (1) Fiber Optics Research Center RAS, Moscow, Russia (2) Corning Research Center, Saint Petersburg, Russia (3) Science & Technology Division, Corning Incorporated, Corning, NY, USA We fabricated low-latency multi-mode fiber with micro-structured core and cladding. The measured group index of fundamental mode was 1.35 at 1.55 μm. Optical losses at the level of 100 dB/km were measured in this fiber. The possible reason of high optical loss could be scattering at surface roughness from capillary waves at the inner surface of the holes.	
	October 18	
8:30-10:00	**Session A8. Fiber-optic communication – II** Session Chair – V.A.Burdin	**Session B8. Fiber lasers and amplifiers – II** Session Chair – S.A.Babin
8:30-8:45 8:45-9:00	**A8-1.** *(Invited)* **Mathematical Modeling of Nonlinear Photonics** Fedoruk M.P. *Novosibirsk State University* We present the review of the results of mathematical modeling of a number problems of nonlinear photonics.	**B8-1.** *(Invited)* **Optical discharge in fibers: 25 years of investigation** Bufetov I.A. *Fiber Optics Research Center RAS* Optical discharge in silica fibers propagating under the laser radiation is one of fundamental physical mechanisms that restrict the maximal power of radiation in optical fibers. Main features of this phenomenon were determined during 25 years after its first observation. It was shown that increase of the intensity of laser radiation changes the picture of the discharge propagation from slow burning regime to the detonation-like one.
9:00-9:15	**A8-2. The development of quantum cryptographic system based on the hardware platform of the foreign production** Gorbunov A.V. (1), Mamaev A.V. (2), Rumyantsev K.E. (1), Panushkin S.A. (2) *(1) Southern Federal University, Taganrog,* *(2) National Research Nuclear University MEPhI, Moscow* The report focuses on the problem of creating a prototype of quantum cryptographic system. Feature of the project is the use of a commercial quantum key distribution system for the analysis of its functionality and usingit as the hardware platform for the development of an improved system. Special attention is given to the identification and analysis of the weaknesses of the system associated with vulnerabilities in the technical implementation, analysis of its applicability in terms of geographical size of the country, as well as the integration of this development in a unified system of information security.	**B8-2.** *(Invited)* **Supercontinuum generation in the 2 micron range in the silica based fibers** Kurkov A.S. (1, 2), V.A. Kamynin V.A.(1). *(1) Prokhorov General Physics Institute, RAS* *(2) Photonics Laboratory of Perm Scientific Centre, RAS UD* We have investigated a supercontinuum generation in various types of the optical fibers and amplifiers Supercontinuum up to 2.7 micron was demonstrated for for a fiber with the germanium oxide concentration of 70 mol.%. Supercontinuum in the spectral range from 2000 to 2500 nm was obserbed in the Ho-doped fiber amplifier. For Tm-doped fiber amplifier supercontinuum spectru was lacated in the two wide spectral bands
9:15-9:30	**A8-3. Working reference standard for measurement instruments for dynamic parameters of laser radiation in fiber-optical systems** Bobrik V.I. (1), Zadvornov A.V., Korolev I.S., Tikhomirov S.V., Khatyrev N.P. (all - 2) *(1) FBU State Regional Standardization, Metrology and Testing in the Novosibirsk region , Novosibirsk, (2)FGUP All-Russian Research Institute for Optical and Physical Measurements , Moscow* On a collaborative work of FGUP VNIOFI and FBU Novosibirsk CSM was posed and solved the problem of creating the working standard for dynamic parameters measurements for fiber-optic systems. As part of this work was created by the working standard traceable to the National primary standard GET 90-85 and provides calibration on dynamic parameters as receiving and transmitting channels of protocol analyzers and similar measurements for interfaces STM-1 and STM-4 systems with synchronous digital hierarchy (SDH) .	
9:30-9:45	**A8-4. Ultra-long single-span fiber-optic links** Gainov V.V.(1), Lukinyh S.N.(1,2), Gurkin N.V.(1), Sleptsov M.A.(1), Treshchikov V.N.(1) *(1) OOO T8 STC , Moscow (2) Lomonosov Moscow State University, Department of Physics, Moscow* Experimental and theoretical investigations of unrepeated fiber-optic links are performed in this work. The possibilities of increasing the length of the single span using co- and counterpropagating raman pump and remotely pumped erbium-doped fiber amplifiers are considered. Parameters of amplifiers and their position inside the link are optimised in accordance to number of channels, type of fiber and transmission rate. Errorless transmission of two 100Gb/s spectral channels over 500 km is demonstrated in practice.	**B8-3. Holmium doped fiber lasers with special spectral characteristics** S.O. Antipov (1), V.A. Kamynin (1), A.S. Kurkov (1), A.V. Barannikov (2), O.I. Medvedkov (3), A.V. Marakulin (4), L.A. Minashina (4), K.S. Raspopin (5), S.I. Kablukov (6,7) *(1) General Physics Institute of the Russian Academy of Sciences, Moscow (2) Moscow Institute of Physics and Technology, Dolgoprudny (3) Fiber Optics Research Center RAS, Moscow (4) Russian Federal Nuclear Center VNIITF, Chelyabinsk (5) Inversion Fiber Co. Ltd., Novosibirsk (6) Institute of Automation and Electrometry, Siberian Branch of the Russian Academy of Sciences, Novosibirsk (7) Novosibirsk State University, Novosibirsk* For the first time a CW all-fiber holmium doped laser, tunable from 2.045 to 2.1 micron with an output power up to 3.1 W and slope efficiency of 32% was created. Furthermore, spectral region of holmium doped sources in a silica glass fiber was extended by 2.17 and 2.21 micron lasers with output power of 230 and 130 mW and slope efficiency of 5% and 3% respectively.

9:45-10:00	**A8-5. About dependence of externally modulated ultrabroadband analog microwave fiber link transmission coefficient on the parameters and operating power modes of the fiber link main parts** Volkhin Y. N. *JSC «Central Design Bureau of Automatics», Omsk* The estimation is provided for the requirements imposed to the parameters of the following components of analog fiber links: electro-optic modulators, light emitters and photodetectors. The possibility of achieving the positive coefficients by the microwave fiber links implemented with the existing commercially available components is proved.	**B8-4. Luminescence in ZnSe:Bi monocrystal** Philippovskiy D.V.(1), Plotnichenko V.G.(1), Sokolov V.O.(1), Firstov S.V.(1), Zhavoronkov N.V.(2), Davydov A.A.(2), Gavrishchuk E.M.(3), Rodin S.A.(3), Dianov E.M.(1) *(1)Fiber Optics Research Center RAS, Moscow (2)Research Institute of Material Science and Technology, Moscow (3)Institute of Chemistry of High-Purity Substances RAS, Nizhny Novgorod* Experimental and theoretical studies of spectral properties of monocrystalline ZnSe:Bi are performed. Two luminescence bands are observed: one near 0.65 μm and another wide near 1 μm. Computer modeling suggests that Bi-related defects as well as native defects are possible centers responsible for the luminescence.
10:00-10:30	**Coffee-break**	
10:30-12:00	**Session A9. Fiber-optic communication – III** Session Chair – O.G. Morozov	**Session B9. Fiber lasers and amplifiers – III** Session Chair – L.A. Mel'nikov
10:30-10:45 10:45-11:00	**A9-1.** *(Invited)* **Use of in-line fibre polarimeter in 100+ Gbit/s/channel coherent optical systems** Vitaly Mikhailov, Brayn Rabin, Paul Westbrook. *All from OFS labs* The in-line high-speed fibre polarimeter with self-reference calibration procedure for application in coherent telecommunication systems is presented. The use of the polarimeter as a light-label receiver in 100 Gb/s coherent system is experimentally demonstrated with 0 dB required OSNR for 10-3 BER at 100 Kframes/s/wavelength. We also experimentally demonstrated ability of the polarimeter to measure in-band OSNR for dual-polarization 100 Gbit/s QPSK signal.	**B9-1.** *(Invited)* **Tapered fibers for lasers and amplifiers** Filippov V.N. *Tampere University of Technology, Tampere* The present work is contains the experimental and theoretical study of light propagation, amplification and generation in the active tapered double optical fibers.
11:00-11:15	**A9-2. Accumulation of non-linear distortion in coherent DWDM-lines with dispersion compensation and without dispersion compensation** Novikov A.G. (1), Nanii O.E. (1,2), Treschikov V.N. (1), Ubaydullaev R.R. (1) *(1) T8 STC, Moscow, (2) Moscow M.V. Lomonosov University, physics department, Moscow* In coherent transmission lines at a rate of 100 Gbit/s without optical dispersion compensation and with a periodic chromatic dispersion compensation the dependence of required for error-free operation OSNR on the values of the signal power and length of line was experimentally measured. It is shown that the nonlinear distortion in the lines without dispersion compensation accumulate more slowly than in a dispersion-compensated lines.	**B9-2. 160W single-frequency laser based on active tapered double-clad fiber amplifier** A.I. Trikshev (1), A.S. Kurkov (1), V.B Tsvetkov (1), S.A. Filatova (2), J. Kerttula (3), V. Filippov (3), Yu.K. Chamorovskiy (4), O.G. Okhotnikov (3) *(1) Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia (2) Moscow State University of Instrument Engineering and Computer Science, Moscow, Russia (3) Optoelectronics Research Centre, Tampere University of Technology, Tampere, Finland (4) Institute of Radio Engineering and Electronics of the Russian Academy of Sciences, Moscow, Russia* We present CW single-frequency laser at 1062 nm with 160 W of total output power based on two stage fiber amplifiers. A GTWave fiber is used for the first stage of amplifier. A tapered double-clad fiber is used for the second stage of amplifier. The high output power is achieved owing to amplified spontaneous emission filtering and increased stimulated Brillouin scattering threshold inherent to the axially non-uniform geometry.
11:15-11:30	**A9-3. Optimization of the backbone DWDM-lines with diverse channels and spans** Kapin Yu.A., Novikov A.G., Pavlov V.N., Sleptsov M.A., Treschikov V.N., Ubaydullaev R.R. *T8 STC, Moscow* The problems of DWDM fiber-optic backbone with diverse channels (different formats and different modulation rate) optimization are examined. The constructing technique for optimal configuration of the fiber-optic links based on the experimentally obtained non-linear distortion accumulation regularities is presented.	**B9-3. Management of the spectral composition of optical radiation** Sholokhov E.M.(1), Lyashedko A.D. (1), Kurkov A.S.(1), Tsvetkov V.B. (1), *(1) Prokhorov General Physics Institute, Russian Academy of Sciences, Moscow.* Original scheme for the management of the spectral composition of optical radiation of single-frequency master oscillator using an acousto-optical modulator was developed. In the first experiments it was succeeded to realize management of spectral composition in the range from 3 MHz to 30 - 40 MHz. The line width of the optical spectrum was measured using a fiber ring interferometer with a resolution of 2.5 MHz.
11:30-11:45	**A9-4. The concept of ultrabroadband analog microwave fiber link implementation** Dubrovskaya A.A. *JSC «Central Design Bureau of Automatics», Omsk* The advantages and disadvantages of directly and externally modulated ultrabroadband microwave fiber link implementation methods are investigated. The ultrabroadband measurement system design is described where the system consists of the spectrum analyzer FSQ 40 and the ultrabroadband analog microwave fiber link having the length up to 100 m.	**B9-4. Numerical modeling of ultra-long fiber lasers with the ring cavity** Yarutkina I.A. (1,2), Shtyrina O.V. (1,2), Fedoruk M.P. (1,2), Turitsyn S.K. (2,3) *(1) Institute of Computational Technologies SB RAS, Novosibirsk (2) Novosibirsk State University, Novosibirsk (3) Aston University, Birmingham, UK* We present the modeling results of the ring cavity passively mode locked fiber laser with the total cavity length up to 2km. The dependence of generated pulse characteristics on the cavity length and the initial field distribution has been studied.

11:45-12:00	**A9-5. Space-division-multiplexing by multi-core fibers for large capacity transmission.** Egorova O.N.(1), Semjonov S.L.(1), Dianov E.M.(1), Pavlova E.G.(2), Nanii O.E.(2) (3), Treshchikov V.N.(3), Novikov A.G.(3) *(1)Fiber Optics Research Center RAS* *(2)Lomonosov Moscow State University* *(3)T8 RC* In this talk a review of research activities in space-division multiplexing using multi-core fibers and the effect of crosstalk on the bit-error-rate simulated using based on single-core fiber 25 Tb /s DWDM-system developed by T8 RDC will be presented. The results showed that the allowable level of crosstalk in communication link with 100 Gb /s per WDM-channel is less than -10 dB, which is achievable in multi-core fiber with 1000 km length.	**B9-5. Экспериментальное изучение временных свойств излучения волоконного ВКР-лазера** **Experimental investigation of temporal characteristics of radiation of a Raman fiber laser** Churkin D.V. (1), Gorbunov O.A. (2), Turitsyn S.K. (1), Babin S.A. (2) *(1) Aston Institute of Photonic Technologies, Aston University, Birmingham (2) Institute of Automation and Electrometry SB RAS, Novosibirsk* Temporal dependence of intracavity radiation of a Raman fiber laser was measured experimentally with resolution about 150 ps. Experimental setup allowed comparison of lasers with different fiber dispersion value. Presence of mode correlations of generated radiation was proved. Degree of correlation was calculated as function of generated power and fiber dispersion.
12:00-12:30	**Coffee-break**	
12:30-14:00	**Session A10. Fiber-optic communication – IV** Session Chair – S.K.Turitsyn	**Session B10. Fiber lasers and amplifiers – IV** Session Chair – V.N. Filippov
12:30-12:45 12:45-13:00	**A10-1.** *(Invited)* **Nonlinear distortions and nonlinear noise in coherent communication systems** Nanii O.E. *(1) Moscow M.V. Lomonosov Univercity, physics department* *(2) T8 STC* Nonlinear degradation of the optical signal under the influence of nonlinear effects in coherent DWDM links has been investigated experimentally and theoretically. It is shown that in the lines without chromatic dispersion compensation optical nonlinear signal degraded by nonlinear noise creation. In lines with a periodic dispersion compensation and in single-span lines signal degraded by nonlinear distortions which can be reduced by dispersion map optimization.	**B10-1.** *(Invited)* **Numerical models of fiber lasers** Melnikov L.A. *Saratov State Technical University named after Gagarin Yu.A., Saratov* Numerical models of fiber lasers, including cascade Raman lasers and erbium doped fiber lasers and the results of simulations are presented. The polarization phenomena and different optical turbulence effects are discussed.
13:00-13:15	**A10-2. Numerical modeling of soliton optical links based on advanced modulation formats** Yushko O.V. (1,2), Redyuk A.A. (1,2), Turitsyn S.K. (2,3), Fedoruk M.P. (1,2) *(1) Institute of Computational Technologies SB RAS, Novosibirsk (2) Novosibirsk State University, Novosibirsk, (3) Aston Institute of Photonic Technologies, Birmingham, UK* We model field transmission through optical link using Split-Step Fourier method. We demonstrate spectral efficiency limits of traditional fiber networks for high Signal-to-Noise-Ratio (SNR) values. Using soliton optical link and ASK/PSK (Amplitude and Phase Shift Keying) modulation formats we show ability to achieve high SNR values for high-speed and long-haul transmission.	**B10-2. Highly efficient Er-doped fiber amplifier with >100 W output power** Kotov L.V. (1,2), Likhachev M.E. (1), Bubnov M.M. (1), Medvedkov O.I. (1), Yashkov M.V.(3), Guryanov A.N. (3), Février S. (4,5), Lhermite J.(4), Cormier E.(4) *(1) Fiber Optics Research Center RAS, Moscow (2) Moscow Institute of Physics and Technology (state university), Dolgoprudny (3) Institute of High Purity Substances RAS, Nizhny Novgorod (4) CeLIA, Université Bordeaux 1, CNRS UMR 5107, Talence, France (5) XLIM, UMR 7252 CNRS - University of Limoges, Limoges, France* The results of double-clad Er-doped fiber design optimization for highly efficient continuous wave lasers and amplifiers are presented. We demonstrate all-fiber power amplifier for spectral range 1550-1620 nm with highest output power of > 100 W and highest pump conversion efficiency of 40 %
13:15-13:30	**A10-3. Hybrid gain-flattened and reduced power excursion scheme for distributed Raman amplification** Bednyakova A. A. (1,2), Fedoruk M. P. (1,2), Turitsyn S. K (1,3) *(1) Новосибирский государственный университет, г. Новосибирск, (2) Институт вычислительных технологий СО РАН, г. Новосибирск, (3) Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom* A novel design of hybrid (combining 1st and 2nd-order pumping) bi-directional Raman amplification scheme is proposed for simultaneous reduction of the signal power excursion and improving gain flatness over a wide spatial-spectral range of 60 km x 80 nm in C+L-bands. The advantage of the proposed scheme in comparison with conventional first-order distributed Raman amplification schemes was demonstrated.	**B10-3. 1.5 mJ all-fiber singlemode pulsed Er-doped fiber laser** Kotov L.V. (1,2), Likhachev M.E. (1), Bubnov M.M. (1), Medvedkov O.I. (1), Lipatov D.S.(3), Guryanov A.N. (3), Février S. (4,5), Lhermite J.(4), Cormier E.(4) *(1) Fiber Optics Research Center RAS, Moscow (2) Moscow Institute of Physics and Technology (state university), Dolgoprudny, Moscow (3) Institute of High Purity Substances RAS, Nizhny Novgorod (4) CeLIA, Université Bordeaux 1, CNRS UMR 5107, Talence, France (5) XLIM, UMR 7252 CNRS - University of Limoges, Limoges, France* Amplification of ns-pulses in a double-clad Er-doped fiber is presented. Using of Al2O3-P2O5-SiO2 glass matrix allows us to fabricate a 36 µm singlemode core doped with high amount of Er2O3 (optimum amplifier length in the double clad configuration was only 6.5 m) without significant efficiency drop. We believe that obtained pulse energy of 1.5 mJ is the highest energy ever reported for single mode fiber systems at 1.56 um.
13:30-13:45	**A10-4. Simulation of optical parametric amplification in a highly nonlinear fiber.** Tazba D.A. (1), Redyuk A.A. (1,2),Skidin A.S. (1,2),Fedoruk M.P. (1,2) *(1)Institute of Computational Technologies SB RAS, Novosibirsk, (2)Novosibirsk State University, Novosibirsk* The model of optical parametric amplification with single- and dual-pump in the highly nonlinear optical fiber is represented in this work. The optical signal transmission and its interaction with pump waves and idler waves are simulated by nonlinear Schroedinger equation. The dependence of gain spectrum on different system parameters is studied by numerical simulation.	**B10-4. SINGLE-FREQUECNY REGIME OF A SELF-SWEEPING YB-DOPED FIBER LASER** Lobach I.A. (1), Kablukov S.I. (1), Podivilov E.V. (1,2), Babin S.A. (1,2) *(1)Institute of automation and electrometry SB RAS, Novosibirsk, (2)Novosibirsk state university, Novosibirsk* Single-frequency regime of a self-sweeping Yb-doped fiber laser is demonstrated for the first time. The temporal dynamics of the laser intensity is a periodic sequence of pulse pairs. The output radiation is strongly polarized. The polarization state of the adjacent pulses is orthogonal to each other. Heterodyne method is used for single pulse linewidth measurement. The estimated value is less than 1 MHz. The self-sweeping laser is applied for high-resolution spectral characterization of FBG structures
13:45-15:00	**Lunch**	
15:00-16:00	**Closing Ceremony**	