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MESSAGE FROM NEIL B. GODICK

The Patriarch of Moscow and All Russia's Orthodox Church, Kirill, said he is skeptical about the idea of *political pluralism*.

"Political pluralism is not our idea, it is not a church idea," Patriarch Kirill said at a meeting with professors and students of Yerevan State University.

The Patriarch said he realized that this statement might cause violent criticism on the part of journalists.

"I will be straight with you: all these are toys, a fad, a passing thing. Today we think this is useful and we are playing with our toys," Patriarch Kirill said. "You can go on playing, but somebody must have a thought about unity which is above political parties," he added.

According to the Patriarch, divisions in society and "fragmentation of the public conscience" had been forming in Russia for 300 years, "and then it all came to a head as the revolution and civil war."

We do not intend for these reports to solve any need our readers may have. We do intend to keep everyone current on technology developments in Russia. If you would like any additional information on any of the developments reported – send us a note.

Mechanical muscle

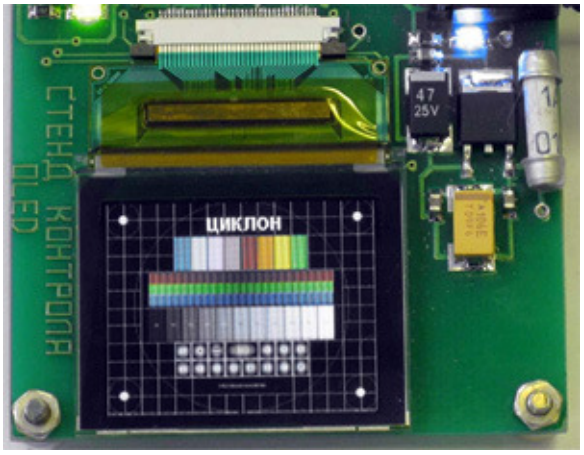
The Research Institute of Drive Control Systems (Stavropol) has found a new application for torus technologies. They have developed a torus able to perform mechanical work with compression, tension, or twisting forces. The torus is a surface generated by revolving a circle or an ellipse about an axis coplanar with the circle and not intersecting it. The torus pneumohydraulic engine is designed for locking devices in pipeline fittings. The device was named the *tore mechanical muscle*.

The muscle contains a shell filled with an energy carrier and made from an elastic material. The entire shell surface is reinforced with flexible inextensible threads with a linear pitch that deforms the shell without hermeticity losses. As the energy carrier's internal energy grows, the elastic shell warps. While the initial tore surface section is a strongly prolate ellipse, in the limiting position the tore section is a

	circle. Arising forces are absorbed by transverse reinforcement threads. Depending on the longitudinal reinforcement ring section shell's position deformation may take one of the following forms: a) inner diameter reduction; b) outer diameter increase; c) simultaneous reduction of the inner and increase of the outer diameter. #2010-04-079
Laser Detector	**The Institute of Nuclear Synthesis (Moscow)** has developed a laser detector that can, within a few minutes, detect and identify particularly dangerous pathogens. The determination method is based on measuring the microorganisms' 3D photoluminescence spectra while they are exposed to pulse-periodic laser radiation. The detector can be used for identifying environmental pollutants and for quickly preventing biological hazards.  The laser detector includes a PSX-100 (wavelength 248 nm) excimer laser, a multidimensional optical detector, a computer and software. The sample is placed in a quartz cuvette in the optical detector and exposed to UV radiation. The detector measures the sample's optical photoluminescence spectra. The bacteria's or proteins' spectra have unique features, which enable identifying an object within a few minutes. The software contains a reference spectra library for known biological object type with a definite concentration. Another software program compares the spectrum obtained with reference spectra and determines the pathogen or toxin present. Preliminary tests showed that the laser detector can identify microorganisms at a concentration as low as 1,000 cells in a milliliter, and proteins and amino acids at 1 ng/ml. The laser detector enables making direct measurements. It does not require preliminary setting, sample pre-treatment, or special reagents. It is small (700 × 300 × 400 mm). The power input is 300 W. Such characteristics make it possible to use the detector both in laboratories and in the field. #2010-04-080

Snake-like Robot	**Central Research Institute of Robotics and Technical Cybernetics (Saint-Petersburg)** has developed and manufactured a snake-like robot. The first pilot sample is a step toward developing a sufficiently multi-purpose robot adaptable to ambient conditions. If the snake-like robot is provided with an independent power source, it can move over stairs and vertical surfaces, and into openings that are quite narrow. It could be a useful tool for emergency operations (search for a leak source in a pipe or detecting survivors in collapsed mines or buildings/debris).  These robots may find their application under reduced gravitation, for example in space, in orbital stations or on other planets' surface. This has already been discussed with space industry representatives where it received a favorable response. #2010-04-081
Ununseptium – a New Chemical Element	Until recently there had been an empty space in Mendeleev' table between the 116th and 118th elements. A relatively long ununseptium isotope half-decay period confirms the hypothesis of the stability island in the sea of superheavy elements. As far back as 1950's, theoretical physicists predicted superheavy chemical elements' existence. However this could only be confirmed recently. This new element's production proves that, under experimental conditions, it is possible to obtain heavier chemical elements. Joint Institute for Nuclear Research (JINR, Dubna) obtained six atoms of the new element. The 117th element was synthesized as follows. Calcium-48 isotope nuclei accelerated on a U-400 cyclotron were used to bombard a berkelium-249 target. This produced a flow of reaction products. Among those were the new superheavy element nuclei. The calcium nucleus contains 20 protons and the berkelium nucleus has 97. As a result, the new element nuclei contain 117 protons. The idea and experimental synthesis method for the 117th element using berkelium-249 and calcium-48 isotopes were put forward by Yuri Oganesian (RAS member, lead scientist of JINR nuclear reactions laboratory) six years ago. JINR was also the first to synthesize new long-lived superheavy elements (numbers 113, 114, 115, 116 and 118). #2010-04-082

Balakin's Inexpensive Accelerator	Proton beam therapy (PBT) is now a generally recognized efficient cancer treatment method. Proton beams do not damage healthy tissues, while selectively destroying tumor cells. PBT's main disadvantage is the high equipment cost.  Researchers at RAS Lebedev Physical Institute (Moscow) have reduced the equipment's cost by several tens of times. Under Vladimir Balakin guidance a PBT unit with an inexpensive compact accelerator was developed. This makes it different from other PBT systems. A sample has been in operation at Massachusetts Institute of Technology for almost a year. A contract was signed with *McLaren Hospital* (Michigan) for erecting this equipment on the hospital's premises. In Russia, in 2010 this system was first used in a municipal hospital in the town of Protvino near Moscow. A similar system for the local medical center was commissioned at Ruzomberok (Slovakia). At Dimitrovgrad (Ulyanovsk region), preparations are in progress for building a new hi-tech Federal Center for Medical Radiology, which will include a proton therapy ward. #2010-04-083
New Russian Organic LEDs	Two organic LED technology areas are now being independently developed. They are based on applying either low-molecular or polymer organic light-emitting materials. Although the latter technology is several years behind the former in its development, it is simpler. Theoretically, the new device has some parameters' are superior to liquid-crystal displays. First, there is no need for screen illumination. This reduces the product's weight and size and energy consumption. Liquid crystal display filters absorb up to 70 % of light). Flexible polymer organic LED screens can be manufactured using the vacuum-free techniques to apply materials onto a substrate by jet printing methods. The new screens have high contrast and operation speed, quality color rendering, and potential to operate over a wide temperature interval.

	Tsiklon Central Research Institute (Moscow) has developed various organic electroluminescent materials. They were used for developing blue, green and red light-emitting structures. Organic LED structure layers were formed by vacuum thermal spraying at under 10^{-6} mm Hg. All the layers were deposited and organic LED structures were pressurized in a single process cycle in airtight boxes with a water vapor and oxygen content of not more than 1 ppm.  Since resistance to external influences is a significant parameter for organic LED devices, the displays were subjected to mechanical, climatic, and thermal tests. They reliably operate from –20 to +55 °C, under single impacts up to 150 g, and exposed to vibration within the 10-55 Hz range with multiple impacts up to 10 g. #2010-04-084
New Method for Growing Doped Lithium Niobate Crystals	Saint-Petersburg State University (Saint-Petersburg) has developed a new method for growing doped lithium niobate crystals. The technology produces ordered-structure crystals by using electric current. The doping admixture is an agent that changes crystal properties, e. g. their color. Corundum differs from ruby by having a doping agent (chromium) in its composition. For lithium niobate, this admixture is magnesium. The technique they patented makes it possible to control the crystallization process using an electric field. If one passes electric current through the crystal-melt boundary and controls its value, the lithium content in the crystal structure will increase. This produces a uniform distribution for the doping admixture. A more ordered structure was obtained with unique properties. It could be used in the terahertz range. The unique lithium niobate properties could be used to develop optical devices. In recent years, these crystals were used to make functional and digital integrated optical circuits. Among them were switching matrices, spectrum analyzers, microwave phase and amplitude modulators, and physical value sensors (mechanical

	motion transducers). #2010-04-085