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**Sultan B. Dabagov**

*Editor*

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# Contents

xi	<i>Conference Committees</i>
xiii	<i>Introduction</i>
xv	<i>Conference Photo</i>

---

## SESSION 1 COHERENT SCATTERING AND BREMSSTRAHLUNG

---

- 663401 **Coherent and incoherent processes and the LPM effect in oriented single crystals at high-energy** [6634-01]  
V. N. Baier, V. M. Katkov, Budker Institute of Nuclear Physics (Russia)
- 663402 **Coherent bremsstrahlung used for digital subtraction angiography** [6634-02]  
H. Überall, Catholic Univ. of America (USA)
- 663403 **Coherent scattering and radiation by relativistic electrons in crystals: proposals for SPARC** [6634-03]  
N. F. Shul'ga, National Science Ctr., Kharkov Institute of Physics and Technology (Ukraine)
- 663404 **Coherent bremsstrahlung in thick crystals radiation losses and photon multiplicity** [6634-04]  
A. P. Potylitsyn, I. S. Tropin, Tomsk Polytechnic Univ. (Russia)
- 663405 **Shape analysis of coherent bremsstrahlung for photon polarimetry** [6634-05]  
P. Grabmayr, Eberhard Karls Univ. Tübingen (Germany)
- 663406 **Multiple scattering effect on spectral, angular, and polarization characteristics of bremsstrahlung in a thin amorphous target** [6634-06]  
A. S. Fomin, S. P. Fomin, N. F. Shul'ga, National Science Ctr., Kharkov Institute of Physics and Technology (Ukraine)
- 663407 **Polarization bremsstrahlung from relativistic electrons for medium structure diagnostics** [6634-07]  
V. Astapenko, Moscow Institute of Physics and Technology (Russia); V. Khablo, P.N. Lebedev Physical Institute (Russia); A. Kubankin, N. Nasonov, Belgorod State Univ. (Russia); G. Pokhil, Moscow State Univ. (Russia); V. Polyansky, V. Sergienko, P.N. Lebedev Physical Institute (Russia); P. Zhukova, Belgorod State Univ. (Russia)

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- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

- 663408 **Novel effects stipulated by medium polarization at planar channeling positron bunch radiation** [6634-08]  
L. Gevorgian, L. Hovsepyan, Yerevan Physics Institute (Armenia)
- 663409 **Monochromatization of high-current nanosecond pulse source of x-ray bremsstrahlung** [6634-09]  
Y. N. Adischev, Tomsk Polytechnic Univ. (Russia); K. V. Afanasiev, Institute of High Current Electronics (Russia); A. V. Vukolov, A. P. Potylitsyn, Tomsk Polytechnic Univ. (Russia)
- 66340A **Spin dependence for transverse energy of channeled electrons** [6634-10]  
A. A. Babaev, Tomsk Polytechnic Univ. (Russia)
- 66340B **Scattering and radiation at beam-beam collisions** [6634-11]  
N. F. Shul'ga, D. N. Tyutyunnik, National Science Ctr., Kharkov Institute of Physics and Technology (Ukraine)
- 66340C **Anomalous density effect in polarization bremsstrahlung from relativistic electrons moving through a solid target** [6634-12]  
N. Gostishchev, N. Nasonov, P. Zhukova, Belgorod State Univ. (Russia)

---

## SESSION 2 CHANNELING AND CRYSTAL COLLIMATION

---

- 66340D **First experiments with bent crystals: halo evacuation from proton colliders using bent crystals** [6634-13]  
E. N. Tsyganov, Univ. of Texas Southwestern Medical Ctr., Dallas (USA) and The Joint Institute for Nuclear Research (Russia)
- 66340E **Fundamental channeling questions at ultra relativistic energies** [6634-14]  
R. A. Carrigan, Jr., Fermi National Accelerator Lab. (USA)
- 66340F **Crystal collimation as an option for the LHC** [6634-15]  
W. Scandale, CERN (Switzerland)
- 66340G **Variation of deflection efficiency with nuclear charge for relativistic ions in bent crystals** [6634-16]  
U. I. Uggerhøj, Univ. of Aarhus (Denmark)
- 66340H **Outlooks on the use of volume reflection effect in crystals at Protvino** [6634-17]  
I. A. Yazynin, A. G. Afonin, Yu. A. Chesnokov, V. I. Kotova, V. A. Maishev, IHEP (Russia); V. Guidi, Univ. of Ferrara, INFN (Italy); W. Scandale, CERN (Switzerland); M. Bavizhev, STA (Russia)
- 66340I **Channeling collimation studies at the Fermilab Tevatron** [6634-18]  
R. A. Carrigan, Jr., A. I. Drozhdin, R. P. Filler III, N. V. Mokhov, V. D. Shiltsev, D. A. Still, Fermi National Accelerator Lab. (USA)
- 66340J **Proton beam deflection using silicon crystal at the KEK proton synchrotron** [6634-19]  
S. Strokov, Hiroshima Univ. (Japan); V. Biryukov, Yu. Chesnokov, Institute for High Energy Physics (Russia); I. Endo, M. Iinuma, Hiroshima Univ. (Japan); H. Kuroiwa, T. Ohnishi, Venture Business Lab. (Japan); H. Sato, Hiroshima Univ. (Japan); S. Sawada, High Energy Accelerator Research Organization (Japan); T. Takahashi, K. Ueda, Hiroshima Univ. (Japan)

- 66340K **On the halo cleaning at the LHC by crystals** [6634-20]  
V. V. Tikhomirov, Belarusian State Univ. (Belarus)
- 66340L **Experimental apparatus to study crystal channeling in an external SPS beamline** [6634-21]  
S. V. Afanasiev, Joint Institute for Nuclear Research (Russia); A. G. Afonin, Institute for High Energy Physics (Russia); G. Ambrosi, P. Azzarello, INFN, Univ. degli Studi di Perugia (Italy); V. T. Baranov, Institute for High Energy Physics (Russia); S. Baricordi, INFN, Univ. degli Studi di Ferrara (Italy); R. Battiston, B. Bertucci, INFN, Univ. degli Studi di Perugia (Italy); D. Bolognini, Univ. dell'Insubria (Italy); W. J. Burger, INFN, Univ. degli Studi di Perugia (Italy); A. Carnera, INFN, Viale Univ. (Italy) and Univ. di Padova (Italy); G. Cavoto, Istituto Nazionale di Fisica Nucleare (Italy); Y. A. Chesnokov, Institute for High Energy Physics (Russia); P. Dalpiaz, INFN, Univ. degli Studi di Ferrara (Italy); G. Della Mea, INFN, Viale Univ. (Italy) and Univ. di Trento (Italy); A. S. Denisov, Petersburg Nuclear Physics Institute (Russia); D. De Salvador, INFN, Viale Univ. (Italy) and Univ. di Padova (Italy); M. Fiorini, INFN, Univ. degli Studi di Ferrara (Italy); L. Foggetta, Univ. dell'Insubria (Italy); Y. A. Gavrikov, Petersburg Nuclear Physics Institute (Russia); V. Guidi, INFN, Univ. degli Studi di Ferrara (Italy); S. Hasan, Univ. dell'Insubria (Italy); M. Ionica, INFN, Univ. degli Studi di Perugia (Italy); Y. M. Ivanov, V. G. Ivochkin, S. V. Kosyanenko, Petersburg Nuclear Physics Institute (Russia); V. I. Kotov, Institute for High Energy Physics (Russia); A. D. Kovalenko, Joint Institute for Nuclear Research (Russia); V. A. Maisheev, Institute for High Energy Physics (Russia); G. Martinelli, A. Mazzolari, E. Milan, INFN, Univ. degli Studi di Ferrara (Italy); R. Milan, INFN, Viale Univ. (Italy); A. A. Petrunin, Petersburg Nuclear Physics Institute (Russia); M. Prest, Univ. dell'Insubria (Italy); R. Santacesaria, Istituto Nazionale di Fisica Nucleare (Italy); W. Scandale, CERN-European Organization for Nuclear Research (Switzerland); V. V. Skorobogatov, Petersburg Nuclear Physics Institute (Russia); D. A. Still, Fermi National Accelerator Lab. (USA); V. M. Suvorov, Petersburg Nuclear Physics Institute (Russia); A. M. Taratin, Joint Institute for Nuclear Research (Russia); P. Valente, E. Vallazza, Istituto Nazionale di Fisica Nucleare (Italy); A. Vomiero, INFN, Viale Univ. (Italy) and INFN-CNR (Italy); I. A. Yaznin, Institute for High Energy Physics (Russia); P. Zuccon, INFN, Univ. degli Studi di Perugia (Italy)
- 66340M **Fabrication of devices for channeling-based high-energy micro-beams** [6634-22]  
A. Antonini, V. Guidi, G. Martinelli, E. Milan, INFN, Univ. degli Studi di Ferrara (Italy)
- 66340N **Silicon micromachining techniques as a tool to fabricate channeling-based devices** [6634-23]  
A. Antonini, M. Butturi, V. Guidi, G. Martinelli, A. Mazzolari, E. Milan, INFN, Univ. degli Studi di Ferrara (Italy)
- 66340O **Ion channeling and implantation into Cu (100) and Cu<sub>3</sub>Au (100)** [6634-24]  
A. M. Rasulov, Tashkent Univ. of Information Technology at Ferghana (Uzbekistan)

---

**SESSION 3 RELATIVISTIC CHANNELING AND RELATED PHENOMENA**

- 66340P **Parameters of the crystalline undulator and its radiation for particular experimental conditions** [6634-25]  
A. V. Korol, A. V. Solov'yov, W. Greiner, Johann-Wolfgang-Goethe-Univ. (Germany)
- 66340Q **Effects of transverse periodic perturbation on channeling radiation** [6634-26]  
J. George, A. P. Pathak, Univ. of Hyderabad (India)

- 66340R **Spectral and polarization characteristics of relativistic electron radiation in crystals** [6634-27]  
V. B. Ganenko, V. I. Truten, N. F. Shul'ga, National Science Ctr., Kharkov Institute of Physics and Technology (Ukraine)
- 66340S **Planar channeling radiation from electrons in quartz** [6634-28]  
B. Azadegan, W. Wagner, J. Pawelke, L. Sh. Grigoryan, Forschungszentrum Rossendorf (Germany)
- 66340T **Orientation dependence of multiple scattering for relativistic particles in a crystal: computer experiments** [6634-29]  
V. I. Efremov, Yu. L. Pivovarov, Tomsk Polytechnic Univ. (Russia)
- 66340U **Channeling experiments at DAFNE BTF for the development of a crystal undulator for positrons** [6634-30]  
L. Quitnieri, B. Buonomo, INFN, Lab. Nazionali di Frascati (Italy); S. B. Dabagov, INFN, Lab. Nazionali di Frascati (Italy) and P.N. Lebedev Physical Institute (Russia); G. Mazzitelli, INFN, Lab. Nazionali di Frascati (Italy); P. Valente, Istituto Nazionale di Fisica Nucleare (Italy)
- 66340V **Electromagnetic dissociation of relativistic weakly bound nuclei under channeling in crystals** [6634-31]  
Yu. L. Pivovarov, V. A. Dolgikh, Tomsk Polytechnic Univ. (Russia)
- 66340W **Radiation damage, range distribution and site location measurements by channeling technique for Ar, Kr, Xe in Ni after implantation and annealing** [6634-32]  
G. D. Tolstolutskaia, I. E. Kopanetz, I. M. Neklyudov, National Science Ctr., Kharkov Institute of Physics and Technology (Ukraine)

---

**SESSION 4 NOVEL SOURCES: PXR, CHERENKOV, COMPTON/THOMSON, FEL, AND PLASMA**

- 66340X **Light sources based on relativistic electron and ion beams** [6634-33]  
E. G. Bessonov, P.N. Lebedev Physical Institute (Russia)
- 66340Y **Photon production by charged particles in narrow optical fibers** [6634-34]  
X. Artru, C. Ray, Univ. Claude Bernard Lyon 1, IN2P3, CNRS (France)
- 66340Z **Forward diffracted parametric X radiation from a thick Tungsten single crystal at 855 MeV electron energy** [6634-35]  
H. Backe, W. Lauth, A. F. Scharafutdinov, P. Kunz, Johannes Gutenberg-Univ. Mainz (Germany); A. S. Gogolev, A. P. Potylitsyn, Tomsk Polytechnic Univ. (Russia)
- 663410 **Status of the electron beam transverse diagnostics with optical diffraction radiation at FLASH, DESY** [6634-36]  
E. Chiadroni, M. Castellano, Lab. Nazionali di Frascati, INFN (Italy); A. Cianchi, Univ. degli Studi di Roma Tor Vergata (Italy); K. Honkavaara, Univ. Hamburg (Germany); G. Kube, Deutsches Elektronen-Synchrotron (Germany)
- 663411 **Advanced applications of PXR at LEBRA, Nihon University** [6634-37]  
Y. Hayakawa, K. Hayakawa, M. Inagaki, T. Kuwada, A. Mori, K. Nakao, K. Nogami, Nihon Univ., Funabashi (Japan); T. Sakae, Nihon Univ., Matsudo (Japan); T. Sakai, I. Sato, Nihon Univ., Funabashi (Japan); Y. Takahashi, Nihon Univ., Tokyo (Japan); T. Tanaka, Nihon Univ., Funabashi (Japan)

- 663412 **Simulation of the PXR and CBS spectra radiated by non-relativistic electrons in thin crystals** [6634-38]  
K. G. Batrakov, Institute for Nuclear Problems (Belarus); I. D. Feranchuk, Belarusian State Univ. (Belarus); O. M. Lugovskaya, S. N. Sytova, Institute for Nuclear Problems (Belarus)
- 663413 **Effect of harmonics coherence in resonant transition radiation** [6634-39]  
L. Gevorgian, Yerevan Physics Institute (Armenia)
- 663414 **Properties of x-ray Cherenkov radiation produced by charged particles in Si/Mo multilayers** [6634-40]  
M. A. Aginian, L. A. Gevorgian, K. A. Ispirian, M. K. Ispiryan, Yerevan Physics Institute (Armenia)
- 663415 **Numerical simulation of a parametric x-rays (PXR) source** [6634-41]  
A. S. Lobko, O. M. Lugovskaya, Belarusian State Univ. (Belarus)
- 663416 **Angular distribution of coherent transition radiation from 6 MeV electron beam** [6634-42]  
V. A. Cha, Tomsk Polytechnic Univ. (Russia); B. N. Kalinin, Research Institute for Nuclear Physics (Russia); E. A. Monastyrnev, Research Institute of Semiconductor Devices (Russia); G. A. Naumenko, Research Institute for Nuclear Physics (Russia); A. P. Potylitsyn, Tomsk Polytechnic Univ. (Russia); G. A. Saruev, Research Institute for Nuclear Physics (Russia); L. G. Sukhikh, Tomsk Polytechnic Univ. (Russia)
- 663417 **Enhanced parametric x-ray emission from grazing incident electrons** [6634-43]  
A. S. Lobko, Belarusian State Univ. (Belarus); N. Nasonov, Belgorod State Univ. (Russia); H. Park, M. Piestrup, Adelphi Technology, Inc. (USA); P. Zhukova, Belgorod State Univ. (Russia)
- 663418 **Diffraction in forward direction of parametric x-ray radiation from relativistic particles of moderate energy** [6634-44]  
A. V. Shchagin, Kharkov Institute of Physics and Technology (Ukraine)
- 663419 **X-ray production and high energy physics experiments with carbon nanotubes** [6634-45]  
K. A. Ispirian, R. K. Ispiryan, Yerevan Physics Institute (Armenia)
- 66341A **On possible source of x-rays from a proton accelerator** [6634-46]  
M. D. Bavizhev, R. M. Goshokov, V. V. Skubarev, Karachaevo-Circassian State Technological Academy (Russia)
- 66341B **Coherent effects in x-ray radiation by multi-charge clusters for nano-objects diagnostics** [6634-47]  
V. Grishin, Moscow State Univ. (Russia)
- 66341C **Coherent sub-millimeter undulator radiation from modulated electron beam** [6634-48]  
A. Shamamian, L. Gevorgian, Yerevan Physics Institute (Armenia)

- 66341D **Status of the SPARX FEL project** [6634-49]  
 C. Vaccarezza, D. Alesini, M. Bellaveglia, S. Bertolucci, M. E. Biagini, R. Boni, M. Boscolo, M. Castellano, A. Clozza, L. Cultrera, G. Di Pirro, A. Drago, A. Esposito, M. Ferrario, D. Filippetto, V. Fusco, A. Gallo, A. Ghigo, S. Guiducci, M. Migliorati, L. Palumbo, L. Pellegrino, M. Preger, C. Sanelli, M. Serio, F. Sgamma, B. Spataro, A. Stella, F. Tazzioli, M. Vescovi, C. Vicario, Istituto Nazionale di Fisica Nucleare (Italy); F. Ciocci, G. Dattoli, A. Doria, F. Flora, G. Gallerano, L. Giannessi, E. Giovenale, G. Messina, P. L. Ottaviani, G. Parisi, L. Picardi, M. Quattromini, A. Renieri, C. Ronsivalle, ENEA C.R. (Italy); S. Cialdi, C. Maroli, V. Petrillo, M. Romè, L. Serafini, L. Catani, E. Chiadroni, A. Cianchi, C. Schaerf, P. Musumeci, Istituto Nazionale di Fisica Nucleare (Italy); F. Alessandria, A. Bacci, F. Broggi, C. De Martinis, D. Giove, M. Mauri, Istituto Nazionale di Fisica Nucleare, LASA (Italy); L. Ficcadenti, M. Mattioli, A. Mostacci, Univ. degli Studi di Roma La Sapienza (Italy); P. Emma, Stanford Linear Accelerator Ctr. (USA); S. Reiche, J. Rosenzweig, Univ. of California, Los Angeles (USA)
- 66341E **Future seeding experiments at SPARC** [6634-50]  
 L. Poletto, G. Tondello, Univ. degli Studi di Padova (Italy); S. De Silvestri, M. Nisoli, G. Sansone, S. Stagira, Politecnico di Milano (Italy); P. Musumeci, M. Petrarca, M. Mattioli, Istituto Nazionale di Fisica Nucleare (Italy); M. Labat, O. Tcherbakoff, M. Bougeard, B. Carré, D. Garzella, G. Lambert, H. Merdji, P. Salières, CEA Saclay, DSM/DRECAM (France); M. E. Couprie, Synchrotron SOLEIL (France); D. Alesini, M. Biagini, R. Boni, M. Castellano, A. Clozza, A. Drago, M. Ferrario, V. Fusco, A. Gallo, A. Ghigo, M. Migliorati, L. Palumbo, C. Sanelli, F. Sgamma, B. Spataro, S. Tomassini, C. Vaccarezza, C. Vicario, Lab. Nazionali di Frascati, INFN (Italy); L. Serafini, Istituto Nazionale di Fisica Nucleare (Italy); S. Ambrogio, F. Ciocci, G. Dattoli, A. Doria, G. P. Gallerano, M. Germano, L. Giannessi, E. Giovenale, I. Spassovsky, M. Quattromini, A. Renieri, C. Ronsivalle, V. Surrenti, P. L. Ottaviani, S. Pagnutti, M. Rosetti, A. Dipace, E. Sabia, ENEA C.R. (Italy)
- 66341F **Novel types of ionizing radiation sources at LNF-PLASMONX facility** [6634-51]  
 D. Giulietti, Univ. degli Studi di Pisa, INFN (Italy); A. Giulietti, L. Gizzi, P. Tomassini, IPCF, CNR (Italy); L. Serafini, V. Petrillo, Istituto Nazionale di Fisica Nucleare (Italy); C. Vaccarezza, M. Ferrario, Lab. Nazionali di Frascati, INFN (Italy); P. Oliva, S. Stumbo, Univ. degli Studi di Sassari, INFN (Italy) and Lab. Nazionali di Frascati, INFN (Italy); P. Delogu, Univ. degli Studi di Pisa, INFN (Italy); U. Bottigli, Univ. degli Studi di Siena, INFN (Italy); S. Bertolucci, M. Calvetti, Lab. Nazionali di Frascati, INFN (Italy)
- 66341G **Scaling laws of a free electron laser based on a Thomson source** [6634-52]  
 L. Serafini, A. R. Rossi, V. Petrillo, C. Maroli, A. Bacci, INFN, Univ. degli Studi di Milano (Italy)
- 66341H **Optimization and control of bright, ultrafast laser driven x-ray sources** [6634-53]  
 L. A. Gizzi, A. Giulietti, D. Giulietti, P. Koester, IPCF, CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); L. Labate, IPCF, CNR (Italy); T. Levato, IPCF, CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); F. Zamponi, T. Kämpfer, I. Uschmann, E. Förster, R. Sauerbrey, IOQ Institut für Optik und Quantenelektronik (Germany)
- 66341I **Production of temporally flat top UV laser pulses for SPARC photo-injector** [6634-54]  
 M. Petrarca, P. Musumeci, M. C. Mattioli, Univ. degli Studi di La Sapienza (Italy); C. Vicario, G. Gatti, A. Ghigo, INFN, Lab. Nazionali di Frascati (Italy); S. Cialdi, I. Boscolo, Istituto Nazionale di Fisica Nucleare (Italy)



- 66341J **Production of plasma channels in gas-jets** [6634-55]  
A. Gamucci, IPCF, CNR (Italy), Univ. di Pisa (Italy), and Istituto Nazionale di Fisica Nucleare (Italy); M. Galimberti, IPCF, CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); D. Giulietti, IPCF, CNR (Italy), Univ. di Pisa (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); L. A. Gizzi, IPCF, CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); T. Hosokai, The Univ. of Tokyo (Japan); L. Labate, IPCF, CNR (Italy) and INFN, Lab. Nazionali di Frascati (Italy); C. Petcu, National Institute for Lasers, Plasma and Radiation Physics (Romania); P. Tomassini, A. Giulietti, IPCF, CNR (Italy) and Istituto Nazionale di Fisica Nucleare (Italy)

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**SESSION 5 CHANNELING: X-RAYS AND X-RAY OPTICS**

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- 66341K **X-ray propagation in carbon nanotubes** [6634-56]  
P. A. Childs, S. Y. Ong, D. C. Herbert, Univ. of Birmingham (United Kingdom); W. I. Milne, K. B. K. Teo, N. G. Shang, L. Gangloff, Univ. of Cambridge (United Kingdom); A. D. Smith, CCLRC, Daresbury (United Kingdom); A. G. O'Neill, Univ. of Newcastle (United Kingdom)
- 66341L **Carbon nanotube cold cathodes for miniature x-ray tubes** [6634-57]  
V. Sessa, Univ. degli Studi di Roma Tor Vergata (Italy); A. Ciorba, Univ. degli Studi di Roma La Sapienza (Italy); A. Fiori, M. Lucci, S. Orlanducci, E. Tamburri, M. L. Terranova, Univ. degli Studi di Roma Tor Vergata (Italy); G. Cappuccio, D. Hampai, CNR ISMN (Italy); S. Cialdi, Univ. di Milano, INFN (Italy); M. Rossi, Univ. degli Studi di Roma La Sapienza (Italy)
- 66341M **A spherical compound refractive lens to control x-ray beams** [6634-58]  
G. Cappuccio, Istituto per lo Studio dei Materiali Nanostrutturati, CNR (Italy) and INFN, Lab. Nazionali di Frascati (Italy); S. B. Dabagov, Istituto Nazionale di Fisica Nucleare (Italy) and P.N. Lebedev Physical Institute (Russia); D. Hampai, Istituto per lo Studio dei Materiali Nanostrutturati, CNR (Italy) and INFN, Lab. Nazionali di Frascati (Italy); Yu. I. Dudchik, F. F. Komarov, Belarusian State Univ. (Belarus)
- 66341N **X-ray polycapillary characterization and 3D imaging properties** [6634-59]  
D. Hampai, Istituto per lo Studio dei Materiali Nanostrutturati, CNR (Italy) and Univ. degli Studi di Roma Tor Vergata (Italy); G. Cappuccio, Istituto per lo Studio dei Materiali Nanostrutturati, CNR (Italy) and INFN, Lab. Nazionali di Frascati (Italy); G. Cibir, INFN, Lab. Nazionali di Frascati (Italy); S. B. Dabagov, INFN, Lab. Nazionali di Frascati (Italy) and P.N. Lebedev Physical Institute (Russia); V. Sessa, Univ. degli Studi di Roma Tor Vergata (Italy)
- 66341O **Scattering of electron bremsstrahlung ( $E_\gamma = 11.8$  MeV) at ultra-small angles** [6634-60]  
G. R. Alimov, National Univ. of Uzbekistan (Uzbekistan); M. A. Kumakhov, Institute for Roentgen Optics (Russia); A. T. Muminov, T. M. Muminov, National Univ. of Uzbekistan (Uzbekistan); B. S. Osmanov, A. N. Safarov, Samarkand State Univ. (Uzbekistan); V. V. Skvortsov, National Univ. of Uzbekistan (Uzbekistan); R. D. Suleymanov, Samarkand State Univ. (Uzbekistan); U. S. Salikhbaev, Institute of Nuclear Physics (Uzbekistan)
- 66341P **Tests on diamond films as current amplifiers for photocathodes** [6634-61]  
I. Boscolo, S. Cialdi, L. Cultrera, D. Cipriani, Univ. di Milano, INFN (Italy); S. Orlanducci, A. Fiori, V. Sessa, M. L. Terranova, Univ. degli Studi di Roma Tor Vergata, INFN (Italy)



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## Introduction

The "Channeling" (International Conference on Charged and Neutral Particles Channeling Phenomena) series are the conferences devoted to new developments in the field of coherent and incoherent scattering of hadrons and leptons (protons, ions, electrons, muons and related antiparticles) in matter of various periodicity structures from the viewpoint of fundamental studies as well as applications. The organization of these conferences based on the traditions of the related successful meetings in Europe, America and Asia (including URSS and former URSS states' conferences) started more than 30 years ago.

The first meeting of the new series, the "Channeling 2004" workshop (Frascati, November 2–6, 2004), was organized by the National Laboratories of Frascati (INFN LNF). A special proceedings volume of SPIE (Proc. of SPIE, Vol. 5974, 2005) devoted to the "Channeling 2004" has been issued. By the subjects discussed and by the number of participants and contributions, the workshop and subsequent activity have shown growing interest to collaboration within the international and INFN projects. That is why in July 2006, the "Channeling 2006", the second international conference of these series, was again held in Frascati bringing together world-renowned scientific groups in channeling research.

Electromagnetic radiation by relativistic electrons and positrons traversing periodic fields, such as coherent bremsstrahlung, channeling radiation, transition radiation, parametric X-radiation, etc., representing a variety of processes of classical/quantum electrodynamics and atomic physics, attracts the attention of researchers from many laboratories throughout the world specializing in accelerator physics, radiation physics, nuclear physics, materials science, biology and medicine. New radiation sources of that origin, being complementary to conventional sources based on synchrotron radiation, undulator radiation, free electron lasers, and Thomson scattering sources, can deliver powerful photon beams of coherent radiation reshaping the landscape of radiation science and its applications.

Channeling of charged particles in periodic crystals (monocrystals, complex crystals, nanostructures, etc.) has the potential to handle the beams: bent crystal channeling may result in beam steering at accelerators providing in such a way the opportunity for beam extraction or collimation; by periodical variation in the continuous potential of a crystallographic plane, crystal can act as a rather effective compact undulator; channeling becomes a very promising instrument for cooling and accelerating muons, for production of positron, etc.

Channeling also works as a useful method to control X-ray and  $\gamma$  radiations for efficient beams deflection over the large angles at very short distances allowing in such a way the radiation intensity of existing sources to be increased in orders of the value (capillary/polycapillary optics, X-ray waveguides). Propagation of

charged particles in crystals and propagation of photons/neutrons in capillary systems, even if strongly different by nature, have much in common, as both can be described within the frame of channeling theory.

This volume, which includes the reports within five main sessions of the conference, is a collection of recent results on charged and neutral particles, coherent phenomena of propagation in structures of various sizes, and periodicities obtained by the leading researches at different world centers together with historical reviews by pioneers of crystal channeling collimation, coherent bremsstrahlung, and channeling radiation. The volume represents a unique opportunity for the wide interdisciplinary community to gain information about current and future research in the field of coherent/incoherent scattering of radiations in strong fields (crystals, undulators, nanoporous materials, capillaries, etc.), and, in particular, for young scientists who have interest in undertaking new investigations following the foreseen development of the next generation photon sources, as well as an important opportunity to learn new international initiatives in the physics of radiation interaction in matter and related studies.

I would like to thank the participants for their effective work during the conference sessions as well as for their important contributions to this volume. On behalf of the Organizing Committee, I am particularly grateful to our main sponsors: HADRON PHYSICS I3-EU Project (coordinator Prof. Carlo Guaraldo), CARE HHH-CERN (Switzerland), P.N. Lebedev Physical Institute RAS (Russia), Unisantis S.A. (Switzerland) and Institute of Nanostructured Materials (Italy), for the fruitful cooperation and support in organizing the "Channeling 2006". Special acknowledgments are to the administration of INFN LNF (Prof. Sergio Bertolucci and Prof. Mario Calvetti) and Comune di Frascati (Dr. Francesco Paolo Posa and Dr. Amedeo Frascatani) contributed to the success of the meeting by the continuous support of our initiatives. I sincerely appreciated the effective collaboration by Prof. Luigi Palumbo and Dr. Giorgio Cappuccio, co-chairs of the "Channeling 2006", Mrs. Donatella Pierluigi, secretary of the conference, and the SPIE Russia Chapter.

**Sultan B. Dabagov**

*In memory of*

**Jens Lindhard**

*for his significant contribution to physics of charged particles channeling in crystals.*



International Conference on Charged and Neutral Particles Channeling Phenomena II  
"Channeling 2006" Attendees

