



St. Petersburg State University

23rd International School-Conference

Magnetic resonance and its applications

Book of Abstracts



Spinus

30 March – 3 April 2026

Saint Petersburg, Russia

SAINT PETERSBURG STATE UNIVERSITY
Department of Nuclear Physics Research Methods

23rd International School-Conference

**MAGNETIC RESONANCE AND ITS APPLICATIONS.
SPINUS**

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<i>Ivan Mershiev, Galina Kupriyanova</i> ¹⁴ N NQR STUDY OF UREA CITRATE AND UREA SUCCINATE COCRYSTALS.....	107
<i>D.A. Mizyulin, A.V. Egorov</i> THE EFFECT OF HYDROGEN-DEUTERIUM ISOTOPIC SUBSTITUTION ON THE MOLECULAR MOBILITY IN AQUEOUS SOLUTIONS OF EUROPIUM NITRATE BY MOLECULAR DYNAMICS SIMULATIONS	108
<i>Dmitrii Mizulin, Kirill Nerinovski, Azamat Samadov, Marina Shelyapina, Irina Zvereva and Vitalii Petranovskii</i> T ₁ -T ₂ CORRELATION FOR PROBING ACIDITY OF MICROPOROUS AND MICRO-/MESOPOROUS ZEOLITES.....	109
<i>L.Yu. Nefedov, M.A. Vovk, L.V. Plotnikova, E.V. Charnaya, A.D. Garifullin, A.Y. Kuvshinov, S.V. Voloshin</i> ³¹ P NMR STUDIES OF BLOOD SERUM TAKEN FROM PATIENTS WITH MULTIPLE MYELOMA.....	110
<i>Kirill Nerinovski</i> APPLICATION OF ¹ H AND ¹⁷ O NMRD TO HYDRATION OF METALLOPROTEINS...	111
<i>Nichugovskiy A.I., Cheshkov D.A.</i> FACILITATING TOTAL LINESHAPE ANALYSIS: FOMA & ANATOLIA-X	112
<i>Yury V. Bogachev, Anastasiya V. Nikitina</i> EPR OF MAGNETIC IRON OXIDE NANOPARTICLES FOR BIOMEDICAL DIAGNOSTICS	113
<i>Iliia A. Pilipenko, Olga Y. Ozerova, Sergey V. Makarenko</i> THE APPLICATION OF NMR SPECTROSCOPY FOR IDENTIFICATION OF THE STRUCTURES OF 6-METHYL-2-NITRO-3-(TRICHLOROMETHYL)-2,3-DIHYDRO-4H-FURO[3,2-C]PYRAN-4-ONE AND ITS DEHYDROCHLORINATION PRODUCT	114
<i>Anastasia V. Rakova, Oksana V. Aganova, Aydar R. Yulmetov, Vladimir V. Klochkov</i> INTERACTION OF LOVASTATIN WITH TRANSITION METAL IONS BY NMR SPECTROSCOPY AND MOLECULAR DYNAMICS SIMULATIONS.....	115
<i>Andrey M. Rochev, Vladimir M. Mikushev, Elena V. Charnaya</i> NATURE OF ⁷⁵ As SPIN-LATTICE RELAXATION IN A GaaS SEMI-INSULATOR SINGLE CRYSTAL.....	116
<i>David I. Rozin, Vasilii V. Pelipko, Kirill A. Gomonov</i> SPECTRAL FEATURES OF SUBSTITUTED 2-(NITROMETHYL)PENTANONES CONTAINING AN ASYMMETRIC CARBON ATOM	117
<i>Sabina A. Seyidova, Minaver J. Ibrahimova, Lioza S. Akhmedova, Oktay Ch. Agalarov</i> EXTRACTION PURIFICATION OF TRANSFORMER OIL USING A DEEP EUTECTIC SOLVENT: FTIR EVALUATION OF PROCESS EFFICIENCY.....	118

NATURE OF ^{75}As SPIN-LATTICE RELAXATION IN A GaAs SEMI-INSULATOR SINGLE CRYSTAL

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High resistance of the order of $10^8 \Omega\text{cm}$ in semi-insulator GaAs crystals, both in clean undoped and in intentionally doped samples, is associated with deep electron traps. The intrinsic EL2 defects are the most known such electron centers. Interaction of electron centers with ligand nuclei combined with spin diffusion produces an effective route of nuclear spin-lattice relaxation in solids [1]. The character of this interaction specifies the rate and evolution with temperature of the contribution of electron centers to total spin-lattice relaxation of host nuclei.

Recently, it was shown for two gallium isotopes in an undoped semi-insulator GaAs crystal [2] that within the temperature range from 80 to 300 K there is a pronounced contribution to spin-lattice relaxation due to electron centers, which was comparable to the contribution of relaxation due to gallium spin-phonon coupling. Surprisingly, the obtained results unambiguously demonstrated the quadrupole character of the interaction between electron centers and gallium nuclei. Here we report the NMR studies of ^{75}As spin-lattice relaxation in the same GaAs sample. The contribution to relaxation of electron centers was segregated. In contrast to the results for gallium, the interaction of electron centers with the ligand ^{75}As nuclei was found to have a mixture character being a combination of electric quadrupole and magnetic dipole effects. This agrees with studies carried out in [3], which confirmed the more effective superhyperfine coupling between the EL2 centers and arsenic nuclei.

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