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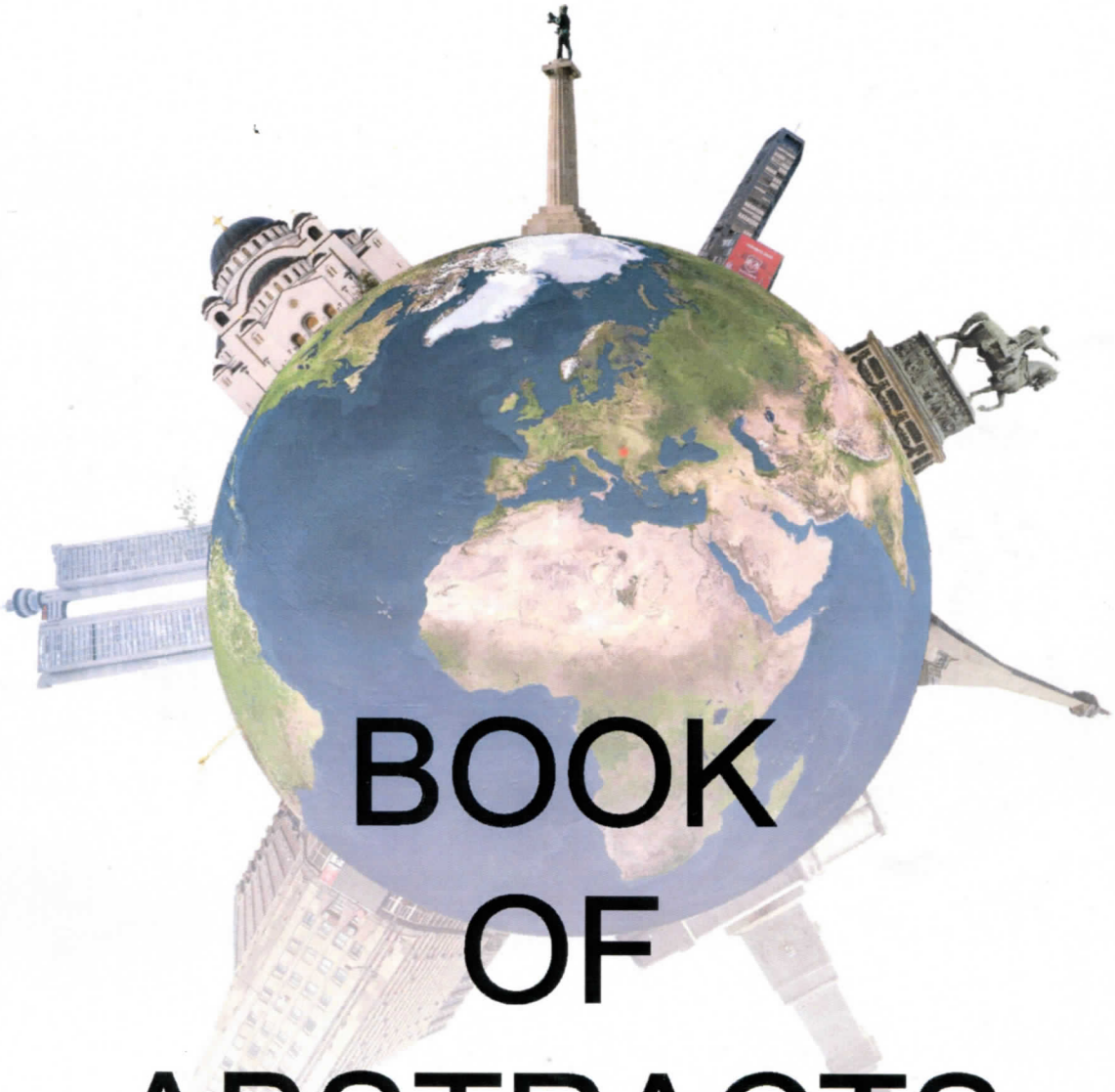

BOOK OF ABSTRACTS

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International School and Conference on Photonics

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Belgrade, Serbia

ABSTRACTS OF TUTORIAL, KEYNOTE AND INVITED LECTURES AND CONTRIBUTED PAPERS

Editors

Jovana Petrović, Milutin Stepić and Ljupčo Hadžievski

Vinča Institute of Nuclear Sciences

Belgrade, Serbia

Belgrade, 2011

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ISBN 978-86-7306-110-8

Technical assitence
Marija Petrović
Petra Beličev
Aleksandar Daničić
Srđan Čortan

Publisher
Vinča Institute of Nuclear Sciences
Mike Petrovića Alasa 12-14, P.O. Box 522
11001 Belgrade, Serbia

Printed by
Printing office of the Vinča Institute of Nuclear Sciences

Number of copies
160

Our results limit the validity domain of the classic model, offering, at the same time, the possibility of obtaining thermal memory properties using PA effects at frequencies above the critical one.

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Analysis of Fluorescence Emission Intensity and Lifetime of Rhodamine B in Ethanol and Tetrahydrofurane solvents

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A number of earlier reports have examined the fluorescence emission of the laser dye Rhodamine B [1-5]. A nonlinear absorption of Rhodamine B in methanol and water has been investigated extensively [6]. Srinivas et al. [6] performed also lifetime measurements of the first excited state of Rhodamine B in water and methanol and they observed that the fluorescence lifetimes were much smaller in water (about 1.4 ns) than in methanol (about 2.6 ns).

M. Fikry et al. [3] described the fluorescence characteristics of the thin film samples of Rhodamine B when polymethylmethacrylate (PMMA) is used as a host medium, as well as Rhodamine B dissolved in ethanol and tetrahydrofurane (THF). In this paper, using the Time Resolved Laser Induced Fluorescence (TR-LIF) spectroscopy, we have extended the study presented in [3], analyzing the fluorescence lifetime of Rhodamine B in ethanol and THF solvents, including the effect of solution concentration.

The time resolved fluorescence emission spectra of Rhodamine B in ethanol and tetrahydrofurane solvents were acquired using a streak camera (Hamamatsu model C4334-01). Pulsed light excitation is provided by a tunable Nd-YAG OPO laser system (Vibrant model 266 made by Opotek, Inc.). The OPO is excited with the fourth harmonic of the Brilliant laser at 266 nm. The output level at 266 nm is 50 mJ, with pulse duration of about 5 ns and repetition rate of 10 Hz. After passing through the OPO pulse length could be reduced to around 1 ns, the energy is about 5 mJ. The output of the OPO can be continuously tuned over a spectral range from 320 nm to 475 nm.

A detailed description and some of the preliminary results of our experimental set up are published recently [7-9].

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Crossover resonances in Cs vapor confined in micrometric-thin cell

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The development of a new type of cell for atomic spectroscopy, so called Extremely Thin Cell (ETC, with thickness of a few microns and less) was first demonstrated by D. Sarkisyan et al. [1]. The most important characteristic of this type of cell is the anisotropy of its dimensions: typically, the transversal dimensions are about four orders of magnitude larger than the cell thickness. Due to this space anisotropy and to the very small cell thickness atoms confined in the cell can be distinguished in respect to their velocity component along the laser beam direction of propagation. The cell thickness is in order of the irradiating light wavelength, which for Cs D_2 – line is λ=852 nm.

Recently it has been demonstrated [2] that in the ETC absorption and fluorescence spectrum, the single beam spectroscopy of the open atomic transitions shows interesting features, especially when increasing the cell thickness up to almost 3 micrometers. When laser irradiating the ETC strongly saturates the atomic transition, one observes dips in the fluorescence and absorption profiles. The dips have a width smaller than that of the sub-Doppler profile of the hyperfine transition.

In this work we present our recent experimental results related to further enhanced cell thickness, comparing ETC with thickness of about 5μm (precisely 6λ) with a cell with thickness ~19μm (22λ). We demonstrate that for the cell with thickness 6λ, in the absorption and fluorescence profiles a narrow velocity selective optical pumping deep appears when irradiating three $F_g = 3 \rightarrow F_e = 2, 3, 4$ hyperfine transitions by resonant laser light. F_g denotes the quantum number of the ground state and F_e - the exited state of Cs D_2 – line. We also show that for this cell the crossover resonances are not observable in the explored irradiating intensity range. While using the cell with thickness 22λ we also observe velocity selective optical pumping deeps at the hyperfine transition centers, in addition some crossover resonances are already present having better contrast in thin cell reflection spectrum.

analytical expressions obtained that are shown to allow one to estimate in principle the extinction, reduced-scattering and absorption coefficients and the g-factor of the investigated media.

The investigations performed and the results obtained are important for the development of new methods and techniques for more accurate determination of the optical parameters of turbid media such as tissues and experimental tissue-like phantoms. They would also be useful in the process of establishing the laws governing the radiative transfer inside the optically investigated biological objects.

ACKNOWLEDGEMENTS
This work has been supported in part by the Bulgarian National Science Fund under contract DO 02-112/08. One of the authors (IB) is thankful to the World Federation of Scientists (WFS) and the World Laboratory, Geneva, Swiss for the financial support.

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Comparison of beetroot extracts originating from several sites using Time Resolved Laser Induced Fluorescence Spectroscopy

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Beetroot (*Beta Vulagris*) juice contains a large number of fluorophores which can fluoresce [1, 2]. Betanin ($C_{24}H_{27}N_2O_{13}$) makes up 75-95% of the total colouring matter found in the beet root, therefore it is used as a natural food coloring agent [3]. There is a growing interest in beet root extracts analysis, see [4] and references therein. On the other hand, there is only limited information about beetroot obtained without sample preparation and/or extraction of components from sample.

In this work we continue our study presented in [5], analyzing and comparing beet root extracts originating from several sites, using time resolved laser-induced fluorescence (TR-LIF) technique to measure fluorescence of samples at different excitation wavelength (340-475 nm) and for different sample dilutions. The fluorescence signals were detected without any special treatment of the red beet juice. The measurements can be a useful tool to provide information on changes in juice constituents, and can be used to compare varieties of beetroots. Fluorescence excitation-emission spectroscopy is also applied in this study to characterize the fresh juice of beetroot.

The time resolved fluorescence emission spectra of beetroot extract were acquired using a streak camera (Hamamatsu model C4334-01). Pulsed light excitation is provided by a tunable Nd-YAG OPO laser system (Vibrant model 266 made by Opotek, Inc.). The output of the OPO can be continuously tuned over a spectral range from 320 nm to 475 nm.

A detailed description and some of the preliminary results of our experimental set up are published recently [5-7].

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Study of the thermal denaturation of S-layer protein from *Lactobacillus salivarius*

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S-layer proteins display intrinsic self-assembly property, forming monomolecular crystalline arrays [1, 2], which have been identified as outermost structures of the cell envelope in many organisms [3, 4]. The biological functions of S-layer proteins are not completely understood. It is assumed that S-layer proteins act as protective coats, cell shape determinants, molecular and ion traps, adhesion sites for exoenzymes, as well as structures involved in cell adhesion and surface recognition [1, 2].

It is known that the S-layer protein subunits are non-covalently linked to each other, as well as to the supporting cell wall, and can be disintegrated into monomers by denaturing agents or by cation substitution [1]. Using circular dichroism (CD) spectroscopy, in this work, we have studied the thermal denaturation of an S-layer peptide, extracted from *Lactobacillus salivarius*.

The far and near UV CD spectra of the S-layer peptide have been collected and the temperature dependence of the circular dichroism in the far and near UV spectral domains has been analyzed. The variable temperature results show that the secondary and tertiary structures of peptide change irreversibly due to the heating of the sample. After the cooling of the heated sample, the secondary and tertiary structures are partially recovered.

We have also found that the peptide unfolding depends on the sample concentration and on the rate of change temperature. Taken together, these properties concerning the thermal behavior of the S-layer protein could be important for a better understanding of the protein structure and function.