A COMPARATIVE STUDY OF SOME RUSSIAN, RUSSIAN SCHOOL (LIPPOVAN) AND ROMANIAN POPULAR ICONS OF NINETEENTH CENTURY

Octavian G. Duliu[1,2], Dorina Claudia Samoilescu (Sister Serafima)[3,4], Maria M. Manea[5], Daniela Stan[5], Bogdan Constantinescu[5], Otilia-Ana Culicov[2,6], Inga Zinicovscaia[2,5], Marina V. Frontasyeva[2]

[1]*University of Bucharest, Faculty of Physics, Department of Structure of Matter, Earth and Atmospheric Physics and Astrophysics, 405 Atomistilor Str, 077125 Magurele, (Ilfov), Romania*
[2]*Joint Institute for Nuclear Research, 141980, Dubna, Russian Federation*
[3]*University of Bucharest, Faculty of Physics, Doctoral School in Physics, 405 Atomistilor Str, Bucharest-Magurele (Ilfov), RO-077125, Romania*
[4]*Dintr-un Lemn Monastrery, 247195 Francesti, Valcea County, Romania*
[5]*Horia Hulubei National Institute for Physics and Nuclear Engineering, 30 Reactorului Str, 077125 Magurele (Ilfov), Romania*
[6]*National Institute R&D in Electrical Engineering ICPE-CA, 313, Splaiul Unirii, 030138 Bucharest, Romania*
e-mail: o.duliu@fizica.unibuc.ro

The results of a comparative study of seven wooden Orthodox icons are presented and discussed. All icons are from the collections of two monasteries: Antim Monastery in Bucharest and Dintr-un Lemn Monastery in Valcea. Two of them are from Russia (most probable Suzdal', the first half or the XIXth century), other three are painted in the Russian style but produced in the Lippovan (starovery) Northern Dobrogea and Danube Delta Russian community in Romania and two are most likely from Wallachia.

Several noninvasive investigation techniques such digital radiography (DR) and UV photography (UVP), X-ray fluorescence (XRF), Fourier-Transform Infrared (FT-IR) and Raman spectroscopy, as well as the invasive epithermal neutron activation analysis (ENAA) were used.

DR and UVP highlighted some details of the painting layer as well as of the wooden base – allowing to identify some of the of pigments used, *i.e.* white lead, vermillion and red lead. XRF and FT-R spectroscopy were useful in investigating the inorganic pigments such as lead white, zinc white, titanium white, yellow chrome, green malachite, realgar, vermilion and ultramarine. All icons showed a similar FT-IR spectra, confirming the use of egg yolk as a binder, characteristic for tempera technique commonly used in the nineteenth century. At its turn, ENAA evidenced the presence of As and Hg as main components of the red color while the presence of Sr together with Ca (correlation coefficient of 0.724 at $p < 0.05$) suggests the use of gypsum for the preparatory layer.

All results allow to estimate the icons ages as no earlier than 19th century. The presence of titanium white (a pigment used beginning with 1919 in Europe) suggests some icons were later restored or partially repainted.

Excepting style, no major differences were found, indicating the existence of common traditions in the use of pigments in liturgical paintings.