

**3rd CONGRESS OF PHYSIOLOGICAL SCIENCES OF SERBIA  
WITH INTERNATIONAL PARTICIPATION**

**MOLECULAR, CELLULAR AND INTEGRATIVE BASIS  
OF HEALTH AND DISEASE:  
TRANSDISCIPLINARY APPROACH**

Organized by  
*Serbian Physiological Society*  
Co-organized by  
*Military Medical Academy*  
*Faculty of Medical Sciences, University of Kragujevac*

Under the auspices of  
*Federation of European Physiological Societies (FEPS)*  
*International Union of Physiological Sciences (IUPS)*  
*International Society for Pathophysiology (ISP)*  
*International Academy of Cardiovascular Sciences (IACS)*



**ABSTRACT BOOK**

Belgrade, Republic of Serbia  
October 29-31, 2014

CIP - Каталогизacija у публикацији  
Народна библиотека Србије, Београд

612(048)

616-092(048)

**CONGRESS of Physiological Sciences of Serbia  
with International Participation (3 ; 2014 ;  
Beograd)**

Molecular, Cellular and Integrative Basis  
of Health and Disease : transdisciplinary  
approach : abstract book / 3rd Congress of  
Physiological Sciences of Serbia with  
International Participation, Belgrade,  
October 29-31, 2014 ; organized by Serbian  
Physiological Society, co-organized by  
Military Medical Academy [and] Faculty of  
Medical Sciences, University of Kragujevac ;  
[urednici Dragan Đurić i Vladimir  
Jakovljević]. - Beograd : Društvo fiziologa  
Republike Srbije, 2014 (Kragujevac : Skver).  
- 220 str. ; 24 cm

Na nasl. str.: under the auspices of  
Federation of European Physiological  
Societies (FEPS), International Union of  
Physiological Sciences (IUPS), International  
Society for Pathophysiology (ISP) [and]  
International Academy of Cardiovascular  
Sciences (IACS). - Tiraž 400.

ISBN 978-86-904799-7-9

1. Društvo fiziologa Republike Srbije  
(Beograd)

a) Физиологија - Апстракти b) Патолошка  
физиологија - Апстракти

COBISS.SR-ID 210592012

# RELATIVE WAVELET ENERGY AS A MEASURE OF THE MAGNETIC FIELDS EFFECTS ON THE NEURONAL POPULATION ACTIVITY IN MORIMUS FUNEREUS (COLEOPTERA, CERAMBYCIDAE) ANTENNAL LOBE

Kesić S<sup>1</sup>, Spasić S<sup>2,3</sup>, Stojadinović G<sup>1</sup>, Petković B<sup>1</sup>, Todorović D<sup>4</sup>

<sup>1</sup>*Department of Neurophysiology, Institute for Biological Research "Siniša Stanković", University of Belgrade, Belgrade, Serbia,* <sup>2</sup>*Department for Life Sciences, Institute for Multidisciplinary Research, University of Belgrade, Belgrade, Serbia,* <sup>3</sup>*Singidunum University, Belgrade, Serbia,* <sup>4</sup>*Department of Insect Physiology and Biochemistry, Institute for Biological Research "Siniša Stanković", University of Belgrade, Belgrade, Serbia.*

Based on a wavelet analysis, this study introduces the relative wavelet energy (RWE) as a new measure for classification of the frequency bands of neuronal population activity in insects. The RWE is used to explore the effects of static magnetic field (SMF, 2 mT) and extremely low frequency magnetic field (ELF MF, 50 Hz, 2 mT) on longhorn beetle antennal lobe neuronal activity. To study the influence of SMF and ELF MF on the neuronal population activity, the experiments were performed on adult longhorn beetles *Morimus funereus* (Coleoptera, Cerambycidae). Our study, based on a wavelet analysis of the local field potentials (LFPs), showed for the first time that the effects of prolonged and repeated exposure to the ELF MF on the LFPs were irreversible. Compared to the control, the RWE of 4-8 Hz frequency band was increased after repeatedly applied sine ELF MF (SnMF)/square ELF MF (SqMF). On the other hand, the RWE of slower oscillations (1-2 Hz) was significantly decreased after repeated exposures to both applied ELF MF waveforms. The SqMF decreased the fastest 64-128 Hz frequency band. However, exposure to the SMF didn't have any effects on the neuronal population activity. This study, successfully demonstrated new and useful application of the RWE method for classification of the frequency bands and measuring the effects of SMF and ELF MF on the neuronal population activity in *M. funereus* antennal lobe.