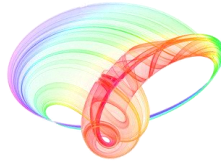


Book of abstracts



PHOTONICA2019

The Seventh International School and Conference on
Photonics, 26 August – 30 August 2019, Belgrade, Serbia

& Machine Learning with Photonics Symposium
(ML-Photonica 2019)



& ESUO Regional Workshop



& COST action CA16221



Editors: Milica Matijević, Marko Krstić and Petra Beličev

Belgrade, 2019

ABSTRACTS OF TUTORIAL, KEYNOTE, INVITED LECTURES,
PROGRESS REPORTS AND CONTRIBUTED PAPERS

of

The Seventh International School and Conference on Photonics
PHOTONICA2019, 26 August – 30 August 2019, Belgrade, Serbia

and

Machine Learning with Photonics Symposium

and

ESUO Regional Workshop

Editors

Milica Matijević, Marko Krstić and Petra Beličev

Technical Assistance

Danka Stojanović and Goran Gligorić

Publisher

Vinča Institute of Nuclear Sciences

Mike Petrovića Alasa 12-14, P.O. Box 522

11000 Belgrade, Serbia

Printed by

Serbian Academy of Sciences and Arts

Number of copies

300

ISBN 978-86-7306-153-5

PHOTONICA2019 (The Seventh International School and Conference on Photonics-www.photonica.ac.rs) is organized by Vinča Institute of Nuclear Sciences, University of Belgrade (www.vinca.ac.rs), Serbian Academy of Sciences and Arts (www.sanu.ac.rs), and Optical Society of Serbia (www.ods.org.rs).



Institute of Nuclear Sciences Vinča



Serbian Academy of Sciences and Arts



Optical Society of Serbia

Other institutions that helped the organization of this event are: Institute of Physics Belgrade, University of Belgrade (www.ipb.ac.rs), School of Electrical Engineering, University of Belgrade (www.etf.bg.ac.rs), Institute of Chemistry, Technology and Metallurgy, University of Belgrade (www.ihtm.bg.ac.rs), Faculty of Technical Sciences, University of Novi Sad (www.ftn.uns.ac.rs), Faculty of Physics, University of Belgrade (www.ff.bg.ac.rs), and Faculty of Biology, University of Belgrade (www.bio.bg.ac.rs). Joint event “Machine learning with Photonics Symposium” has been co-organized with programme partners H2020-RISE-CARDIALLY, H2020 – MULTIPLY and H2020-EID-FONTE.

PHOTONICA2019 is organized under auspices and with support of the Ministry of Education, Science and Technological Development, Republic of Serbia (www.mpn.gov.rs). PHOTONICA2019 is supported and recognized by OSA - The Optical Society (www.osa.org), Integrated Initiative of European Laser Research Infrastructures Laser Lab-Europe (www.laserlab-europe.eu) and European Physical Society (www.eps.org).



Ministry of Education, Science and Technological Development of the Republic of Serbia



The support of the sponsors of PHOTONICA2019 is gratefully acknowledged:



Localized modes in two-dimensional octagonal-diamond lattices

M. G. Stojanović¹, M. Stojanović Krasić², M. Johansson³,

I. A. Salinas⁴, R. A. Vicencio⁴ and M. Stepić¹

¹*Vinča Institute of Nuclear Sciences, Belgrade, Serbia*

²*Faculty of Technology, University of Niš, Leskovac, Serbia*

³*Department of Physics, Chemistry and Biology, Linköping University, Linköping, Sweden*

⁴*Departamento de Física and MIRO, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile*

e-mail: mirjana.stojanovic@vin.bg.ac.rs

Two-dimensional octagonal-diamond (OD) atomic lattices have been explored in recent times to study phenomena related to topological phase transitions induced by spin-orbit interaction and gauge fields [1], and magnetic phases and metal-insulator transitions with Hubbard interaction [2, 3]. It can lead to the appearance of nontrivial nearly flat band states with particular topological properties [4]. Here we study the octagonal-diamond photonic lattice formed of linearly coupled waveguides, proposed by [4] as a possible experimental realization of an artificial flat-band system.

We investigated analytically and numerically the existence and stability of linear and nonlinear localized modes in a two-dimensional OD lattice. The primitive cell consists of four sites, linearly coupled with each other with the same coupling constant, including two diagonal couplings. The eigenvalue spectrum of the linear lattice consists of two flat bands and two dispersive bands [4]. The upper dispersive band intersects the upper flat band in the middle of the Brillouin zone, as well as the second flat band at the end of the Brillouin zone. In the linear case, there are two types of localized linear solutions, which are composed of eight sites each, having either monomer (+ - + - + - + -) or dimer (+ + - - + + - -) staggered phase structure [4]. In the presence of Kerr nonlinearity, both focusing and defocusing, compacton-like solutions [5] may exhibit instabilities due to intersections of the upper dispersive band and the flat bands. We also discuss the possibility of finding soliton solutions in the frequency gaps occurring between the flat bands and the isolated dispersive bands.

REFERENCES

- [1] M. Kargarian, G. A. Fiete, Phys. Rev. B 82, 085106 (2010).
- [2] Y. Yamashita et al., Phys. Rev. B 88, 195104 (2013).
- [3] A. Bao et al., Sci. Rep. 4, 6918 (2014).
- [4] B. Pal, Phys. Rev. B 98, 245116 (2018).
- [5] R. A. Vicencio, M. Johansson, Phys. Rev. A 87, 061803(R) (2013).