

Curriculum Vitae

Hrvoje Buljan
Department of Physics
University of Zagreb
Bijenička cesta 32
10000 Zagreb, Croatia

E-mail: hbuljan@phy.hr
cell: ++385 98 998 1902
fax: ++385 1 468 0336

DATE OF BIRTH

October 17th 1972

POSITIONS

- Associate Professor; Department of Physics, University of Zagreb, Croatia, (2009-)
- Assistant Professor; Department of Physics, University of Zagreb, Croatia, (2004-2008)
- Postdoctoral Fellow; Technion, Israel Institute of Technology, Israel, (2002-2004)

EDUCATION

- University of Zagreb, Croatia , Ph.D. in Physics, (August, 2002);
PhD thesis title: “*Topological properties and measures of chaotic maps with the restricted domain*”;
Supervisor: Prof. V. Paar
- University of Zagreb, Croatia, undergraduate education;
Thesis title: “Application of Base with a Core in the Interacting Boson-Fermion Model”;
Supervisor: Prof. V. Paar
- High-school:
Senior year: South Lyon High, South Lyon, Michigan, USA
Freshmen-Junior: MIOC, Zagreb, Croatia

AWARDS AND FELLOWSHIPS

- Lady Davis Foundation Fellow (2003)
- Rector’s award; awarded by the Rector of the University of Zagreb for the best student work entitled “Principles of quantum mechanics in double barrier resonant tunneling” (1995)

TEACHING AND TEAMWORK EXPERIENCE

- Teaching experience. As a professor, I teach several courses at the undergraduate and graduate level (Electromagnetic Waves and Optics, Nonlinear Phenomena in Physics, Nonlinear Optics, Nonlinear Continuum Systems). I was a TA for four years while working on a PhD thesis at the University of Zagreb. I have taught groups of 10-30 undergraduate students in physics classes (Classical Mechanics, Introductory Quantum Mechanics, Nonlinear Phenomena). I supervised the students and graded their work.
- Teamwork experience. I have actively participated in the research group of Moti Segev, at the Technion in Israel. The group consists of mainly experimentalists; I participated as a theorist within this group of approximately 10 people.

PRINCIPAL INVESTIGATOR OF RESEARCH PROJECTS

- PI of a research project *Nonlinear phenomena and wave dynamics in photonic systems* (Grant No:119-0000000-1015) funded by the Croatian Ministry of Science (MZOS)
- PI of a Croatian-German research project (with Dr. Thomas Gasenzerom, Institut for Theoretical Physics, Heidelberg, Germany) funded by DAAD and MZOS

PROFESSIONAL ACTIVITIES

- Referee for:
 - Physical Review Letters
 - Physical Review A
 - Physical Review E
 - Optics Letters
 - Optics Express
 - Optics Communications
 - Journal of the Optical Society of America
 - Physics Letters A
 - Europhysics Letters
 - Journal of the American Chemical Society
- Referee for grant proposals, ESF, Croatian Ministry of Science.

PUBLICATIONS

(40) D. Jukic, S. Galic, R. Pezer, and H. Buljan, "Lieb-Liniger gas in a constant-force potential,"
arXiv:1005.3660v1 [cond-mat.quant-gas] (2010), submitted

(39) O. Bahat-Treidel, O. Peleg, H. Buljan, and M. Segev, "Breakdown of Dirac dynamics in honeycomb lattices due to nonlinear interactions,"

arXiv:1004.1913v2 [physics.optics] (2010), submitted

(38) J. Radic, V. Bacic, D. Jukic, M. Segev, and H. Buljan, "Anderson localization of a Tonks-Girardeau gas in potentials with controlled disorder," submitted

(37) D. Jukic and H. Buljan, "Reflection of a Lieb-Liniger wave packet from the hard-wall potential," arXiv:0911.0260v1 [cond-mat.quant-gas] (2009); New Journal of Physics, accepted for publication (2010).

(36) M. Jablan, H. Buljan, and M. Soljagic
"Plasmonics in graphene at infra-red frequencies,"
Phys. Rev. B 80, 245435 (2009);
selected for the January 11, 2010 issue of Virtual Journal of Nanoscale Science & Technology.

(35) K. Lelas, D. Jukic, and H. Buljan,
"Ground state properties of a one-dimensional strongly-interacting Bose-Fermi mixture in a double-well potential,"
Phys. Rev. A 80, 053617 (2009);
selected for the December 2009 issue of Virtual Journal of Atomic Quantum Fluids.

(34) R. Pezer, T. Gasenzer, and H. Buljan,
"Single-particle density matrix for a time-dependent strongly interacting one-dimensional Bose gas,"
Phys. Rev. A 80, 053616 (2009);
selected for the December 2009 issue of Virtual Journal of Atomic Quantum Fluids.

(33) D. Jukic, B. Klajn, and H. Buljan,
"Momentum distribution of a freely expanding Lieb-Liniger gas,"
Phys. Rev. A 79, 033612 (2009).

(32) D. Jukic, R. Pezer, T. Gasenzer, and H. Buljan,
"Free expansion of a Lieb-Liniger gas: Asymptotic form of the wave functions"
Phys. Rev. A 78, 053602 (2008).

(31) B. Gumhalter, A. Siber, H. Buljan, and T. Fauster,
"Nonadiabatic dynamics of electron scattering from adsorbates in surface bands"
Phys. Rev. B 78, 155410 (2008).

(30) L. Levi, T. Schwartz, O. Manela, M. Segev, and H. Buljan,
"Spontaneous pattern formation upon incoherent waves: From modulation-instability to steady-state"
Optics Express 16, 7818 (2008).

(29) H. Buljan, R. Pezer, and T. Gasenzer,
"Fermi-Bose transformation for a time-dependent Lieb-Liniger gas"
arXiv:0907.1444 [cond-mat] (2007); accepted to Phy. Rev. Lett. (2008).

(28) H. Buljan, K. Lelas, R. Pezer, and M. Jablan,
"Single-particle density matrix and the momentum distribution of dark "solitons" in a

- Tonks-Girardeau gas"
Phys. Rev. A 76, 043609 (2007).
- (27) R. Pezer and H. Buljan,
"Momentum distribution dynamics of a Tonks-Girardeau gas: Bragg reflections of a quantum many-body wave packet"
Phys. Rev. Lett. 98, 240403 (2007).
- (26) M. Jablan, H. Buljan, O. Manela, G. Bartal, and M. Segev,
"Incoherent modulation instability in a nonlinear photonic lattice"
Optics Express 15, 4623 (2007).
- (25) H. Buljan, O. Manela, R. Pezer, A. Vardi, and M. Segev,
"Dark stationary matter waves via parity-selective filtering in a Tonks-Girardeau gas"
Phys. Rev. A 74, 043610 (2006).
- (24) O. Manela, G. Bartal, M. Segev, and H. Buljan,
"Spatial supercontinuum generation in nonlinear photonic lattices"
Opt. Lett. 31, 2320 (2006).
- (23) R. Pezer, H. Buljan, G. Bartal, M. Segev, and J.W. Fleischer,
"Incoherent white-light solitons in nonlinear periodic lattices"
Phys. Rev. E 73, 056608 (2006).
- (22) O. Cohen, H. Buljan, T. Schwartz, J.W. Fleischer, and M. Segev,
"Incoherent solitons in instantaneous nonlocal nonlinear media"
Phys. Rev. E 73, 015601(R), (2006).
- (21) G. Bartal, O. Cohen, O. Manela, M. Segev, J.W. Fleischer, R. Pezer, and H. Buljan, "Observation of random-phase gap solitons in photonic lattices"
Opt. Lett. 31, 483 (2006).
- (20) H. Buljan, M. Segev, and A. Vardi
"Incoherent matter-wave solitons and pairing instability in an attractively interacting Bose-Einstein condensate"
Phys. Rev. Lett. 95, 180401 (2005).
- (19) R. Pezer, H. Buljan, J.W. Fleischer, G. Bartal, O. Cohen, M. Segev, "Gap random-phase lattice solitons,"
Optics Express 13, 5013 (2005).
- (18) H. Buljan, G. Bartal, O. Cohen, T. Schwartz, O. Manela, T. Carmon, M. Segev, J.W. Fleischer, D.N. Christodoulides,
"Partially coherent waves in nonlinear periodic lattices"
Stud. Appl. Math. 115, 173 (2005).
**Invited paper
- (17) G. Bartal, O. Cohen, H. Buljan, J.W. Fleischer, O. Manela, M. Segev,
"Brillouin zone spectroscopy of nonlinear photonic lattices"
Phys. Rev. Lett. 94, 163902 (2005).

**See commentary on this article in the Physics Update section of Physics Today, May 2005 issue.

(16) J.W. Fleischer, G. Bartal, O. Cohen, T. Schwartz, O. Manela, B. Freedman, M. Segev, H. Buljan, N.K. Efremidis,
"Spatial photonics in nonlinear waveguide arrays"
Optics Express 13, 1780 (2005).

(15) O. Cohen, G. Bartal, H. Buljan, T. Carmon, J.W. Fleischer, M. Segev, and D.N. Christodoulides,
"Observation of random-phase lattice solitons"
Nature (London) 433, 500 (2005).

(14) T. Schwartz, T. Carmon, H. Buljan, and M. Segev,
"Spontaneous pattern formation with incoherent white light"
Phys. Rev. Lett. 93, 223901 (2004).

**See commentary on this article in the Physics Update section of Physics Today, December 2004 issue.

(13) T. Schwartz, J.W. Fleischer, O. Cohen, T. Carmon, H. Buljan, and M. Segev,
J. Opt. Soc. Am. B 21, 2197 (2004).

(12) T. Carmon, H. Buljan, and M. Segev,
"Spontaneous pattern formation in a cavity with incoherent light"
Opt. Express 12, 3481 (2004).

(11) H. Buljan, O. Cohen, J.W. Fleischer, T. Schwartz, M. Segev, Z.H. Musslimani, N.K. Efremidis, and D.N. Christodoulides,
"Random-phase solitons in nonlinear periodic lattices"
Phys. Rev. Lett. 92, 223901 (2004).

(10) H. Buljan, T. Schwartz, M. Segev, M. Soljačić, D.N. Christodoulides,
"Polychromatic partially spatially incoherent solitons in noninstantaneous Kerr nonlinear medium"
J. Opt. Soc. Am. B 21, 397 (2004).

(9) H. Buljan, A. Šiber, M. Soljačić, T. Schwartz, M. Segev, and D.N. Christodoulides,
"Incoherent white light solitons in logarithmically saturable noninstantaneous nonlinear medium"
Phys. Rev. E 68, 036607 (2003)

(8) H. Buljan, M. Soljačić, T. Carmon, and M. Segev
"Cavity pattern formation with incoherent light"
Phys. Rev. E 68, 016616 (2003)

(7) H. Buljan, M. Segev, M. Soljačić, N.K. Efremidis, D.N. Christodoulides,
"White-light solitons"
Opt. Lett. 28, 1239 (2003).

- (6) H. Buljan and V. Paar,
"Parry measure and the topological entropy of chaotic repellers embedded within chaotic attractors"
Physica D 172, 111 (2002).
- (5) H. Buljan, A. Šiber, M. Soljačić, M. Segev,
"Propagation of incoherent white light and modulation instability in noninstantaneous nonlinear media"
Phys. Rev. E 66, R035601 (2002).
- (4) A. Šiber and H. Buljan
"Quantum states and specific heat of low density He gas adsorbed within carbon nanotube interstitial channels: Band-structure effects and potential dependence"
Phys. Rev. B 66, 075415 (2002).
- (3) H. Buljan and V. Paar,
"Naturally invariant measure of chaotic attractors and the conditionally invariant measure of embedded chaotic repellers"
Phys. Rev. E 65, 036218 (2002).
- (2) H. Buljan and V. Paar,
"Many hole interactions and the average lifetimes of chaotic transients that precede controlled periodic motion"
Phys. Rev. E 63, 066205 (2001).
- (1) V. Paar and H. Buljan
"Bursts in the chaotic trajectory lifetimes preceding controlled periodic motion"
Phys. Rev. E 62, 4869 (2000).

Other publications:

- (2) G. Bartal, O. Cohen, H. Buljan, O. Manela, J.W. Fleischer, and M. Segev,
"Brillouin zone spectroscopy of photonic lattices"
Optics and Photonics News, Special December Issue, (2005).
- (1) T. Carmon, H. Buljan, M. Soljačić and M. Segev,
Optics and Photonics News, Special December Issue, (2003).

Invited talks:

- (1) "Partially coherent waves in nonlinear systems,"
Workshop on Mathematical Study of Multi-Scale problems,
13-14 July 2004, Rehovot, Weizmann, Israel.
- (2) "Random-phase lattice solitons,"
International Symposium: Topical Problems of Nonlinear Wave Physics,
2-9 August 2005, St. Petersburg - N. Novgorod, Russia.

- (3) "Incoherent matter-wave solitons,"
Minerva Workshop on Quantum Atom Optics,
Oct 30 - Nov 3, 2005, Eilat, Israel.
- (4) "Partially coherent optical- and matter-waves in periodic lattices,"
Nonlinear Dynamics of Acoustic Modes in Finite Lattices: Localization,
Equipartition, Transport,
5-8 December 2006, Dresden, Germany.
- (5) "Partially coherent optical- and matter-waves in photonic structures/optically
induced potentials,"
Coherent Nonlinear Optics of Artificial Media,
14-16 December 2006, Lisbon, Portugal.
- (6) "Momentum distribution dynamics of a Tonks-Girardeau gas: Bragg reflections of
a quantum many-body wave packet,"
Ruperto Carola Simposion Ultracold Quantum Gases
18-20 July 2007, Heidelberg, Germany.
- (7) "Quantum many-body dynamics in a Tonks-Girardeau gas,"
Laser Pulse Shaping and Coherent Control of Molecules,
26-31 August 2007, Brijuni, Croatia.
- (8) "Quantum dynamics of a Tonks-Girardeau gas,"
5th Meeting of the Croatian Physical Society
05-08 October 2007, Primošten, Croatia.
- (9) "Nonequilibrium dynamics of 1D Bose gases within the Lieb-Liniger and Tonks-
Girardeau models",
38th Winter Colloquium on The Physics of Quantum Electronics
06-10 January 2008, Snowbird, Utah, USA
- (10) "Nonequilibrium dynamics of 1D interacting Bose gases within the framework of
exactly solvable models", Discrete Optics and Beyond, Bad Honnef, Germany May
2008.

Invited seminars / colloquia

- (1) Institute of Physics, Zagreb, Croatia, 28. 10. 2004.
- (2) Institute of Theoretical Physics, Heidelberg, Germany, 08. 02. 2006.
- (3) Department of Mathematics, University of Zagreb, Zagreb, Croatia, 10. 04. 2006.
- (4) Ben-Gurion University of the Negev, Beer-Sheva, Israel, 03. 01. 2007.
- (5) Kirchof Institute of Physics, Heidelberg, Germany, 15. 02. 2007.
- (6) Friedrich-Alexander-University of Erlangen-Nuremberg, February, 2007

(7) Max-Planck-Institut für Physik komplexer Systeme, Dresden, Germany, 19. 03. 2007.

(8) Institute of Physics, Zagreb, Croatia, May 2007.

(9) Physikalisches Institut, Universität Heidelberg, Germany, 25. 07. 2007.
(colloquium)

(10) Journal Club at the Kirchof Institute of Physics, Heidelberg, Germany, February, (2008).