

# Árpád Lukács

## List of publications

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### Research papers

#### Refereed

- 2023 D. Ciurla, P. Forgács, Á. Lukács, and T. Romańczukiewicz, *Negative radiation pressure in Bose-Einstein condensates*, *Phys. Rev.* **E 109**, 014228, [arXiv:2307.02925](#) [[nlin.PS](#)]
- 2023 B.M.A.G. Piette and Á. Lukács, *Near-miss bi-homogenous symmetric polyhedral cages*, *Symmetry* **2023**, 15, 1804, Repositories: Optimisation using simulated annealing, Data
- 2023 B.M.A.G. Piette and Á. Lukács, *Near-miss symmetric polyhedral cages*, *Symmetry* **2023**, 15, 717, Code: Optimisation using simulated annealing, Symmetry groups and labelling, Data
- 2022 J. Erdmanis, Á. Lukács, Yu.V. Nazarov, *Drastic effect of weak interaction near special points in semiclassical multiterminal superconducting nanostructures*, *Phys. Rev.* **B 106**, 125422, [arXiv:2107.14105](#) [[cond-mat.mes-hall](#)]
- 2022 R. Trényi, Á. Lukács, P. Horodecki, R. Horodecki, T. Vértesi, and G. Tóth, *Multicopy metrology with many-particle quantum states*, *New Journal of Physics*, *accepted for publication*, [arXiv:2203.05538](#) [[quant-ph](#)]
- 2022 Á. Lukács, R. Trényi, T. Vértesi, and G. Tóth, *Optimizing local Hamiltonians for the best metrological performance*, [arXiv:2206.02820](#) [[quant-ph](#)]
- 2021 P. Forgács and Á. Lukács, *Charge screening in the Abelian Higgs model*, *Eur. Phys. J.* **C 81**, 243, [arXiv:2011.01634](#) [[hep-th](#)]
- 2020 P. Forgács and Á. Lukács, *On non-topological solitons in Abelian gauge theories coupled to  $U(1) \times U(1)$  symmetric scalar fields*, *Phys. Rev.* **D 102**, 076017, [arXiv:2008.09844](#) [[hep-th](#)]
- 2020 P. Forgács and Á. Lukács, *Electroweak strings with dark scalar condensates and their stability*, *Phys. Rev.* **D 102**, 023009, [arXiv:1909.07447](#) [[hep-ph](#)]
- 2018 J. Erdmanis, Á. Lukács, and Y.V. Nazarov, *Weyl discs: theoretical prediction*, *Phys. Rev.* **B 98**, 241105(R) (2018), [arXiv:1805.03678](#) [[cond-mat.mes-hall](#)]
- 2017 P. Forgács and Á. Lukács, *Stabilisation of semilocal strings by dark scalar scalar condensates*, *Phys. Rev.* **D 95**, 035003, [arXiv:1612.03151](#) [[hep-th](#)]
- 2016 P. Forgács and Á. Lukács, *Vortices and magnetic bags in Abelian models with extended scalar sectors and some of their applications*, *Phys. Rev.* **D 94**, 125018, [arXiv:1608.00021](#) [[hep-th](#)]
- 2016 P. Forgács and Á. Lukács, *Vortices with scalar condensates in two-component Ginzburg-Landau systems*, *Phys. Lett.*, **B 762**, 271-275, [arXiv:1603.03291](#) [[hep-th](#)]
- 2016 Á. Lukács, *“Half a proton” in the BPS Skyrme model*, *J. Math. Phys.*, **57**, 072903, [arXiv:1603.01305](#) [[hep-th](#)]

- 2016 T. Ioannidou and Á. Lukács, *Time-Dependent BPS Skyrmions*, *J. Math. Phys.*, **57**, 022901, [arXiv:1601.03048 \[hep-th\]](#)
- 2015 P. Forgács, Á. Lukács, and F.A. Schaposnik, *Non-Abelian Vortices with a Twist*, *Phys. Rev. D* **91**, 125001, [arXiv:1504.05129 \[hep-ph\]](#)
- 2013 P. Kovács, Á. Lukács, J. Váróczy, Gy. Wolf, and M. Zétényi, *Baryon octet and decuplet phenomenology in a three-flavor extended linear sigma model*, *Phys. Rev. D* **89**, 054004, [arXiv:1311.5991 \[hep-ph\]](#)
- 2013 P. Forgács, Á. Lukács, and T. Romańczukiewicz, *Plane waves as tractor beams*, *Phys. Rev. D* **88**, 125007, [arXiv:1303.3237 \[hep-th\]](#)
- 2009 P. Forgács and Á. Lukács, *Instabilities of twisted strings*, *JHEP* **12** (2009) 064, [arXiv:0908.2621 \[hep-th\]](#)
- 2008 Gy. Fodor, P. Forgács, Z. Horváth, and Á. Lukács, *Small amplitude quasi-breathers and oscillons*, *Phys. Rev. D* **78**, 025003, [arXiv:0802.3525 \[hep-th\]](#)
- 2008 P. Forgács, Á. Lukács, and T. Romańczukiewicz, *Negative radiation pressure exerted on kinks*, *Phys. Rev. D* **77**, 125012, [arXiv:0802.0080 \[hep-th\]](#)
- 2005 V. Czimmer, M. Vasúth, and Á. Lukács, *An analytic approach to the late ISW effect in a  $\Lambda$  dominated universe*, *Int. J. Mod. Phys. A* **20** 7233-7240, [arXiv:astro-ph/0503347](#)
- 2005 V. Czimmer, M. Vasúth, Á. Lukács, and Z. Perjés, *Covariant linear perturbations in a concordance model*, *Int. J. Mod. Phys. A* **20** 5671-5677, [arXiv:gr-qc/0501009](#)

### Proceedings

- 2021 P. Forgács and Á. Lukács, *Some recent results on Q-balls and screening in the Abelian Higgs model*, In: Yu.L. Dokshitzer, P. Lévai, Á. Lukács, and J. Nyiri (eds.), *Gribov-90 Memorial Volume: Field Theory, Symmetry, and Related Topics*, Proceedings of the Memorial Workshop Devoted to the 90th Birthday of V.N. Gribov, World Scientific, Singapore.
- 2016 P. Forgács, Á. Lukács, and F.A. Schaposnik, *Twisted non-Abelian vortices*, In: Yu.L. Dokshitzer, P. Lévai, and J. Nyiri (eds.), *Gribov-85 Memorial Volume: Exploring Quantum Field Theory*, Proceedings of the Memorial Workshop Devoted to the 85th Birthday of V.N. Gribov, World Scientific, Singapore, *Int. J. Mod. Phys. A* **31**, 1645046.
- 2013 Á. Lukács, *Twisted Strings in Extended Abelian Higgs Model*, In: A. Zichichi (ed.), *What is Known and Unexpected at LHC*, Proceedings of the International School of Subnuclear Physics, Erice-Sicily, Italy, 29 August – 7 September 2010, World Scientific, Singapore.
- 2010 G. Fodor, P. Forgács, Z. Horváth, and Á. Lukács, *Almost periodic localized states: oscillons and oscillatons*, In: N. Carlevaro, R. Ruffini, and G.V. Vereshchagin (eds.), *Proceedings of the 3rd Stueckelberg Workshop on Relativistic Field Theories*, Cambridge Science Publishers, Cambridge, UK.
- 2005 Z. Perjés and Á. Lukács, *Canonical quantization and black hole perturbations*, In: Jerzy Lukierski and Dmitri Sorokin (eds.), *Fundamental Interactions and twistor-like methods - XIXth Max Born Symposium*, *AIP Conf. Proc.* **767**, 306, [arXiv:gr-qc/0503108](#).

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### Theses

- 2010 *Localised solutions and their perturbations in field theory*, ELTE Eötvös Loránd University, Budapest, supervisor: Prof. Péter Forgács, degree: PhD (Physics)

- 2007 *Perturbations of solitons*, ELTE Eötvös Loránd University, Budapest, supervisors: Prof. Péter Forgács and Prof. Gisbert Stoyan, degree: MSc (Mathematics)
- 2004 *Canonical quantum gravity*, ELTE Eötvös Loránd University, Budapest, supervisor: Prof. Zoltán Perjés, degree: MSc (Physics)

## Conference talks, seminars

- 2022 *Stability analysis of electroweak-dark strings*, Geometric models of nuclear matter, Kent, Canterbury, UK
- 2022 *Q-balls: something old, something new, with components one and two (invited talk)*, Solitons, (non-)Integrability, Geometry, Kraków, Poland
- 2021 *Non-topological solitons in Abelian gauge theories coupled to  $U(1) \times U(1)$  symmetric scalar fields*, ACHT 2021, online
- 2020 *Q-balls in a  $U(1)$  gauge theory coupled to  $U(1) \times U(1)$  symmetric scalars*, Solitons at Work Seminar, online
- 2020 *The stability of electroweak-dark strings*, Theoretical Physics Seminar, UPV/EHU, Leioa, Spain
- 2019 *Weyl discs*, Department of Quantum Nanoscience, TU Delft, The Netherlands
- 2019 *Preserving numerical algorithms*, FOSDEM 2019, Brussels, Belgium
- 2018 *Weyl discs*, seminar of the Dept. Theor. Phys., Technical University, Budapest, Hungary
- 2018 *Weyl discs*, Wigner Inst. Solid State Physics seminar, Budapest, Hungary
- 2017 *Stabilisation of semilocal strings by dark scalar condensates (invited talk)*, Solitons: Integrability, Duality and Applications, Sao Paulo, Brazil
- 2016 *Semilocal-dark strings*, ACHT 2016, Čakovec, Croatia
- 2015 *Plane waves as tractor beams*, Seminar talk at the Department of Theoretical Physics, University of Szeged, Hungary
- 2015 *Some properties of BPS skyrmions*, ACHT 2015, Leibnitz, Austria
- 2015 *Twisted non-Abelian vortices*, Solitons: Topology, Geometry, and Applications, Thessaloniki, Greece
- 2015 *Twisted non-Abelian vortices*, Progress in Fluid/Gravity Correspondence, Thessaloniki, Greece
- 2014 *Plane waves as tractor beams*, International School of Subnuclear Physics, Erice, Sicily
- 2014 *Plane waves as tractor beams*, 78. DPG-Frühjahrestagung, Berlin, Germany
- 2013 *Are tractor beams possible?*, Seminar talk at the Department of Pure Mathematics, University of Leeds, UK
- 2013 *Are tractor beams possible?*, Seminar talk at the Roland Eötvös University, Budapest, Hungary (Particle Physics seminar)
- 2013 *Are tractor beams possible?*, Seminar talk at the Wigner RCP, Budapest, Hungary
- 2012 *Negative Radiation Pressure: Simple Models*, Non-Perturbative Methods in Quantum Field Theory, 5th Spring Workshop in Theoretical Particle Physics, 11-13 April 2012, Szombathely, Hungary
- 2012 *Cosmic strings*, Seminar talk at the Konkoly Thege Miklós Astronomical Observatory, Budapest, Hungary

- 2011 *The force acting on the Aharonov–Bohm solenoid*, Mathematical Physics day in honour of the 70<sup>th</sup> birthday of Tamás Matolcsi, Budapest, Hungary
- 2011 *Vortex-radiation interaction: comparison of second and first order dynamics*, Strong Interactions in Quantum Field Theory, Austria-Croatia-Hungary Triangle Workshop, Fürstenfeld, 4 May, Austria
- 2011 *Vortex–radiation interaction in  $\phi^4$  and GP theories*, International School of Subnuclear Physics, Erice, Sicily
- 2010 *Twisted vortices without  $SU(2)$* , International School of Subnuclear Physics, Erice, Sicily
- 2010 *Vortex–radiation interaction in  $\phi^4$  theory*, Seminar talk at the Roland Eötvös University, Budapest, Hungary
- 2009 *Twisted vortices without  $SU(2)$* , Quantum Fields and Quark Matter, 4<sup>th</sup> Austrian–Croatian–Hungarian Meeting, Rab, Croatia
- 2009 *Vortex–radiation interaction in the  $\phi^4$  theory*, Strong interactions in QFT, Austria–Croatia–Hungary Triangle Workshop, Fürstenfeld, Austria
- 2008 *Examination of the stability of twisted vortices’ at Eötvös Loránd University*, Seminar talk at the Roland Eötvös University, Budapest, Hungary (Particle Physics seminar)
- 2007 *Can the radiation pressure exerted on a kink be negative?*, Seminar talk at the Roland Eötvös University, Budapest, Hungary (Particle Physics seminar)
- 2007 *Negative radiation pressure in nonlinear field theories*, Seminar talk at the RMKI Research Institute for Particle and Nuclear Physics, Budapest, Hungary
- 2006 *Quasinormal modes*, Presentation at the Summer school ‘Measurements and Einstein’s Gravitation Theory’, Gyöngyöstarján, Hungary

#### Conference posters

- 2018 *Weyl discs*, Physics Veldhoven, Veldhoven, The Netherlands
- 2016 *Some properties of BPS Skyrmions*, International School of Subnuclear Physics, Erice, Sicily
- 2015 *Non-Abelian vortices with a twist*, International School of Subnuclear Physics, Erice, Sicily
- 2013 *Tractor beams, cosmic strings, and related phenomena*, Wigner 111, Budapest, Hungary
- 2013 *Tractor beams, cosmic strings, and related phenomena*, International School of Subnuclear Physics, Erice, Sicily
- 2013 *Motion of vortices in first and second order  $\phi^4$  theory*, Equations of Motion 2013, Bad Honnef, Germany
- 2010 *String solutions in two component Abelian Higgs models*, Geometry and Physics, Cracow, Poland

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#### Popular science articles

- 2019 Á. Lukács, *Symmetries in physics and their mathematics*, De Physicus **30**/4, p.22
- 2006 Á. Lukács, *Evaporating black holes in the laboratory*, Tétékás Nyúz XXXIII./9-10., p.17 (Weekly newspaper of the students of Eötvös Loránd University, in Hungarian)

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#### Edited volumes

- 2021 Yu.L. Dokshitzer, P. Lévai, Á. Lukács, and J. Nyiri, *Gribov-90 Memorial Volume: Field Theory, Symmetry, and Related Topics*, Proceedings of the Memorial Workshop Devoted to the 90th Birthday of V.N. Gribov, World Scientific, Singapore.