<u>Záznamy vložené do ASEP za UI (1. 4. - 31. 5. 2025)</u>

New ICS records in ASEP (1.4. - 31. 5. 2025)

0635648 - ÚI 2026 CH eng B - Monography <u>Sedlár, Igor (ed.)</u> - Standefer, S. (ed.) - Tedder, A. (ed.) *New Directions in Relevant Logic*. Cham: Springer, 2025. 468 s. Trends in Logic, 63. ISBN 978-3-031-69940-5. ISSN 1572-6126 **Institutional support**: RVO:67985807 **Keywords** : Relevant logic * Paraconsistent logic * Logical consequence * First Degree Entailment * Non-classical logic * Relevance in proof theory * Quantified modal relevant logics * Belnap-Dunn Logic * Relevance logic and the use criterion

Result website: <u>https://doi.org/10.1007/978-3-031-69940-5</u> **DOI**: <u>https://doi.org/10.1007/978-3-031-69940-5</u>

This book brings together contemporary work on relevant logics to showcase the recent progress of the field and set the stage for future research. The papers in the volume contribute to the formal and philosophical development of the field. They include contributions from different traditions and approaches ranging from philosophical discussions of the foundations of relevant, and related kinds of non-classical, logic to mathematical work concerning open technical problems in the field. This is the first edited collection on the topic in many years, and it includes contributions from established figures as well as younger generations of researchers. Relevant logics have recently seen a resurgence of interest and this volume will be an important resource for logicians working on substructural and relevant logics for years to come.

Permanent Link: https://hdl.handle.net/11104/0366682

0635653 - ÚI 2026 RIV CH eng M - Monography Chapter Sedlár, Igor - Vigiani, P. Explicit and Implicit Belief in First Degree Entailment with Strict Implication. New Directions in Relevant Logic. Cham: Springer, 2025 - (Sedlár, I.; Standefer, S.; Tedder, A.), s. 425-452. Trends in Logic, 63. ISBN 978-3-031-69940-5 R&D Projects: GA ČR(CZ) GA22-01137S Institutional support: RVO:67985807 DOI: https://doi.org/10.1007/978-3-031-69940-5 17

We introduce FDE -3c, an extension of FDE with strict implication and a classicality constant, and we show that it formalizes the distinction between explicit and implicit belief. In the style of Levesque's formalization of these two concepts, explicit beliefs are modelled as sets of formulas closed under our extension of FDE, while implicit beliefs form, in a sense, the classical closure of explicit beliefs. We establish an embedding of Levesque's logic of explicit and implicit belief into FDE -3c. This result shows that FDE -3c is a viable generalization of Levesque's logic lifting some of its limitations. Unlike a similar generalization introduced by Lakemeyer, FDE -3c comes with an Australian-plan semantics and so it is an alternative potentially attractive to those who prefer the Australian plan over the American one.

0635666 - ÚI 2026 RIV eng J - Journal Article

Böhm, A. - Lucka, J. - <u>Jajcay, Nikola</u> - Segev, A. - Janková, J. - Kollárová, M. - Hollý, O. -Šebenová Jerigová, V. - Števková, J. - Spilak, M. - Skorec, F. - Guzma, K. - Johanesová, L. -Hanesz, Z. - Karolčík, Š. - Remak, A. - Sobotka, P. A. - Bezák, B.

A Noninvasive System for Remote Monitoring of Left Ventricular Filling Pressures.

JACC-Basic to Translational Science. Roč. 10, č. 3 (2025), s. 256-258. ISSN 2452-302X

Institutional support: RVO:67985807

Impact factor: 8.4, year: 2023 ; AIS: 2.933, rok: 2023

Method of publishing: Open access

Result website:

https://www.jacc.org/doi/10.1016/j.jacbts.2025.01.008 **DOI**: https://doi.org/10.1016/j.jacbts.2025.01.008

Heart failure (HF) remains a leading cause of hospitalization and a major driver of health care costs, significantly affecting patient prognosis despite considerable advancements in treatment.1 Telemonitoring has been proposed as a promising strategy to address these challenges by facilitating remote management and enabling the early detection of decompensations. However, the results from clinical trials have been inconsistent. In particular, telemonitoring approaches focused on symptoms, body weight, blood pressure, or heart rate have not demonstrated a clear prognostic benefit.2 On the other hand, left ventricular filling pressure (LVFP) monitoring has shown positive outcomes in randomized trials and meta-analyses. Nevertheless, current LVFP monitoring methods are invasive, costly, and associated with procedure-related complications, and they require long-term antithrombotic therapy.3,4 These limitations, combined with reimbursement complexities and the need for specialized provider training, have limited their widespread implementation. **Permanent Link:** https://hdl.handle.net/11104/0366699

0635690 - ÚI 2026 RIV eng J - Journal Article Grygarová, D. - Havlík, P. - Adámek, P. - Horáček, J. - Juríčková, V. - <u>Hlinka, Jaroslav</u> -

Kesner, L.

Beliefs in Misinformation About COVID-19 and the Russian Invasion of Ukraine Are Linked: Evidence From a Nationally Representative Survey Study.

JMIR Infodemiology. Roč. 5, March (2025), č. článku e62913. ISSN 2564-1891

Institutional support: RVO:67985807

Keywords : misinformation * COVID-19 * war in Ukraine * political trust * digital media * belief rigidity * vaccine hesitancy * war * political * trust * belief * survey * questionnaire * national * false * association * correlation * correlation analysis * public opinion * media; news * health information * public health * COVID * misinformation * propaganda

Impact factor: 3.5, year: 2023

Method of publishing: Open access

Result website: https://doi.org/10.2196/62913

DOI: <u>https://doi.org/10.2196/62913</u>

BACKGROUND: Detrimental effects of misinformation were observed during the COVID-19 pandemic. Presently, amid Russia's military aggression in Ukraine, another wave of misinformation is spreading on the web and impacting our daily lives, with many citizens and politicians embracing Russian propaganda narratives. Despite the lack of an objective connection between these 2 societal issues, anecdotal observations suggest that supporters of misinformation regarding COVID-19 (BM-C) have also adopted misinformation about the war in Ukraine (BM-U) while sharing similar media use patterns and political attitudes. OBJECTIVE: The aim of this study was to determine whether there is a link between respondents' endorsement of the 2 sets of misinformation narratives, and whether some of the selected factors (media use, political trust, vaccine hesitancy, and belief rigidity) are associated with both BM-C and BM-U. METHODS: We conducted a survey on a nationally representative sample of 1623 individuals in the Czech Republic. Spearman correlation analysis was performed to identify the relationship between BM-C and BM-U. In addition, multiple linear regression was used to determine associations between the examined factors and both sets of misinformation. RESULTS::We discovered that BM-C and BM-U were moderately correlated (Spearman p=0.57; P<.001). Furthermore, increased trust in Russia and decreased trust in the local government, public media, and Western allies of the Czech Republic predicted both BM-C and BM-U. Media use indicating frustration with and avoidance of public or mainstream media, consumption of alternative information sources, and participation in webbased discussions indicative of epistemic bubbles predicted beliefs in misinformation narratives. COVID-19 vaccine refusal predicted only BM-C but not BM-U. However, vaccine refusers were overrepresented in the BM-U supporters (64/161, 39.8%) and undecided (128/505, 25.3%) individuals. Both beliefs were associated with belief rigidity. CONCLUSIONS: Our study provides empirical evidence that supporters of COVID-19 misinformation were susceptible to ideological misinformation aligning with Russian propaganda. Supporters of both sets of misinformation narratives were primarily linked by their shared trust or distrust in the same geopolitical actors and their distrust in the local government.

Permanent Link: <u>https://hdl.handle.net/11104/0366717</u> Research data: <u>OSF.io</u>

0618888 - ÚI 2026 RIV GB eng J - Journal Article

Ghosh, S. - Dallmer-Zerbe, Isa - Bučková, Barbora - Hlinka, Jaroslav

Amplitude entropy captures chimera resembling behavior in the altered brain dynamics during seizures.

Scientific Reports. Roč. 15 (2025), č. článku 14212. ISSN 2045-2322. E-ISSN 2045-2322

R&D Projects: GA MŠMT(CZ) EH22_008/0004643; GA ČR(CZ) GA21-32608S

Institutional support: RVO:67985807

Keywords : Neuroscience * Physics

Impact factor: 3.8, year: 2023 ; AIS: 1.061, rok: 2023

Method of publishing: Open access

Result website: https://doi.org/10.1038/s41598-025-97854-y

DOI: https://doi.org/10.1038/s41598-025-97854-y

Epilepsy is a neurological disease characterized by epileptic seizures, which commonly manifest with pronounced frequency and amplitude changes in the EEG signal. In the case of focal seizures, initially localized pathological activity spreads from a so-called "onset zone" to a wider network of brain areas. Chimeras, defined as states of simultaneously occurring coherent and incoherent dynamics in symmetrically coupled networks are increasingly invoked for characterization of seizures. In particular, chimera-like states have been observed during the transition from a normal (asynchronous) to a seizure (synchronous) network state. However, chimeras in epilepsy have only been investigated with respect to the varying phases of oscillators. We propose a novel method to capture the characteristic pronounced changes in the recorded EEG amplitude during seizures by estimating chimera-like states directly from the signals in a frequency- and time-resolved manner. We test the method on a publicly available intracranial EEG dataset of 16 patients with focal epilepsy. We show that the proposed measure, titled Amplitude Entropy, is sensitive to the altered brain dynamics during seizure, demonstrating its significant increases during seizure as compared to before and after seizure. This finding is robust across patients, their seizures, and different frequency bands. In the future, Amplitude Entropy could serve not only as a feature for seizure detection, but also help in characterizing amplitude chimeras in other networked systems with characteristic amplitude dynamics. Permanent Link: https://hdl.handle.net/11104/0365665

0635669 - ÚI 2026 GB eng J - Journal Article

Liczbińska, G. - <u>Brabec, Marek</u> - Rachwal, P.

Daughters over sons: could physical labor and social stress have shaped birth patterns of single mothers in 19th-century Poznań?

The History of the Family. Online 11 February 2025 (2025). ISSN 1081-602X. E-ISSN 1873-5398 **Institutional support**: RVO:67985807

Keywords : Sex ratio at birth * stress hormones * psychological stress * poverty * social and economic well-being * GAM

OECD category: Statistics and probability

Impact factor: 1, year: 2023 ; AIS: 0.7, rok: 2023

Method of publishing: Limited access

Result website: https://doi.org/10.1080/1081602X.2025.2461457

DOI: https://doi.org/10.1080/1081602X.2025.2461457

The study examines the proportion of males to females at birth among unmarried and married mothers in Poznań, Poland, during the nineteenth century. We used individual information on births collected from birth registers of seven Poznań parishes (n = 82,005). The data records contained the following information: child's sex, parental religion, father's occupation, and maternal marital status. GAM logistic models were used to analyse the data. The main results demonstrate that the impact of a mother's marital status on the probability of bearing a daughter was statistically significant (p = 0.004), i.e. there was a smaller probability of married mothers giving birth to daughters compared to unmarried mothers. The effects of other factors were not statistically significant. This result can be explained by single pregnant women being exposed to more stress resulting from poor living conditions, financial problems, loneliness, unemployment, violence, lack of psychosocial support, social instability, and uncertainty of the future than married women. They worked professionally, which involved physical effort and work stress. Psychological pressure related to women's exposure to social stressors and physical workload may have disturbed the course of pregnancy and resulted in the elimination of weaker male foetuses more often than female foetuses, resulting in a decline in the proportion of boys to girls at birth. It should be noted, however, that the ratio of males to females at birth could also have resulted from other factors – not identified in this study.

Permanent Link: https://hdl.handle.net/11104/0366703

0635684 - ÚI 2026 RIV DE eng J - Journal Article

Hartman, David - Hons, T. - Nešetřil, J.

Gadget Construction and Structural Convergence.

Combinatorica. Roč. 45, March (2025), č. článku 15. ISSN 0209-9683. E-ISSN 1439-6912 **Institutional support**: RVO:67985807

Keywords : Gadget construction * Structural convergence * Graph limits * Ehrenfeucht-Fraïssé games

OECD category: Pure mathematics

Impact factor: 1, year: 2023 ; AIS: 1.235, rok: 2023

Method of publishing: Open access

Result website: https://doi.org/10.1007/s00493-025-00140-8

DOI: https://doi.org/10.1007/s00493-025-00140-8

Nešetřil and Ossona de Mendez recently proposed a new definition of graph convergence called structural convergence. The structural convergence framework is based on the probability of satisfaction of logical formulas from a fixed fragment of first-order formulas. The flexibility of choosing the fragment allows to unify the classical notions of convergence for sparse and dense graphs. Since the field is relatively young, the range of examples of convergent sequences is limited and only a few methods of construction are known. Our aim is to extend the variety of constructions by considering the gadget construction. We show that, when restricting to the set of sentences, the application of gadget construction on elementarily convergent sequences yields an elementarily convergent

sequence. On the other hand, we show counterexamples witnessing that a generalization to the full first-order convergence is not possible without additional assumptions. We give several different sufficient conditions to ensure the full convergence. One of them states that the resulting sequence is first-order convergent if the replaced edges are dense in the original sequence of structures. **Permanent Link:** <u>https://hdl.handle.net/11104/0366711</u>

0635688 - ÚI 2026 RIV GB eng J - Journal Article **Kynčl, J. -** <u>Brabec, Marek</u> - <u>Malý, Marek</u> - Šimka, V. - <u>Urban, Aleš</u> Influenza-Related Deaths in the Czech Republic Over 21 Seasons. *Influenza and Other Respiratory Viruses.* Roč. 19, č. 3 (2025), č. článku e70072. ISSN 1750-2640 **R&D Projects**: GA ČR(CZ) GA22-24920S **Institutional support**: RVO:67985807 ; RVO:68378289 **Keywords** : excess mortality * influenza * morbidity * mortality **OECD category**: Statistics and probability **Impact factor**: 4.3, year: 2023 ; **AIS**: 1.3, rok: 2023 **Method of publishing**: Open access **Result website**:<u>https://doi.org/10.1111/irv.70072</u> **DOI**: <u>https://doi.org/10.1111/irv.70072</u> BACKGROUND: Influenza is a relatively serious infection that causes considerable morbidity and

mortality. Epidemics of influenza are reported almost every year. METHODS: Based on the Czech national all-cause mortality and acute respiratory infection/influenza-like illness surveillance data for the 1999/2000 to 2019/2020 influenza seasons, excess deaths attributable to influenza were estimated using the threshold derived as 90th percentile of death counts during nonepidemic periods. Daily death counts broken by the 5-year age intervals were modelled via Poisson generalised additive model. RESULTS: The estimated total number of excess deaths from influenza during study period was 22,306. Thus, the mean total of excess deaths related to influenza per season was 1062 for the age group 40–94 years. The total number of excess deaths increased steadily with age from the 40– 44 age group to the 85–89 age group, which accounted for the highest percentage of excess deaths (17%), followed closely by the 80–84 age group (16%). The age groups 40–44 years and 45–49 years contributed the least (3% each). More than three quarters of excess deaths occurred at age 65 and over (17,027 cases, 76%). Relative numbers of excess deaths per 100,000 population peaked in the oldest age groups of 85-89 and 90-94 years. CONCLUSIONS: We estimate that at least 0.98% of allcause mortality throughout the study period was attributable to influenza in the Czech Republic. This excess is not negligible, and public health actions in the field of influenza prevention are vitally needed.

Permanent Link: https://hdl.handle.net/11104/0366715

0619340 - ÚI 2026 RIV DE eng J - Journal Article

Bauerová, P. - Keder, J. - Šindelářová, A. - Vlček, O. - Patiño, W. - <u>Krč, Pavel</u> - <u>Geletič,</u> <u>Jan</u> - <u>Řezníček, Hynek</u> - <u>Bureš, Martin</u> - <u>Eben, Kryštof</u> - Belda, M. - Radović, J. - Fuka, V. -Jareš, R. - Esau, I. - <u>Resler, Jaroslav</u>

Measurement report: A complex street-level air quality observation campaign in a heavy-traffic area utilizing the multivariate adaptive regression splines method for field calibration of low-cost sensors. *Atmospheric Chemistry and Physics*. Roč. 25, č. 8 (2025), s. 4477-4504. ISSN 1680-7316. E-ISSN 1680-7324

R&D Projects: GA TA ČR(CZ) TO01000219; GA TA ČR(CZ) SS02030031

Institutional support: RVO:67985807

Keywords : air quality * observations * low-cost sensor * LCS * multivariate adaptive regression splines * MARS

OECD category: Meteorology and atmospheric sciences **Impact factor**: 5.2, year: 2023 ; **AIS**: 1.584, rok: 2023 **Method of publishing**: Open access

Result website:<u>https://doi.org/10.5194/acp-25-4477-2025</u> **DOI**: <u>https://doi.org/10.5194/acp-25-4477-2025</u>

As part of the TURBAN project, the "Legerova campaign" investigated air quality and meteorology in a traffic-dense area of Prague, Czech Republic, from 30 May 2022 to 28 March 2023. The study deployed a network of 20 low-cost sensor (LCS) stations to measure NO2, O3, PM10 and PM2.5 concentrations, complemented by advanced meteorological instruments such as a microwave radiometer and Doppler lidar. Ensuring data quality from LCS measurements presented significant challenges. Initial field tests at a reference monitoring station revealed strong correlations between raw LCS and reference data (r > 0.90 for NO2 and PM2.5, r > 0.80 for O3 and PM10). However, individual biases were observed. Applying the multivariate adaptive regression splines (MARS) method effectively reduced biases and enhanced alignment with reference measurements for all pollutants (R2 0.88–0.97). During the campaign, sensor ageing and technical issues were identified through double mass curve analysis and final field testing. The highest NO2 concentrations were recorded in streets with dense building blocks and traffic lights, corresponding to peak traffic patterns (with medians of concentrations 20-34 ppb). Aerosol concentrations were generally low (medians of $PM10 < 25 \ \mu g \ m-3$ at all sites), with less temporal and spatial variability than NO2. Elevated PM10 and PM2.5 levels occurred primarily during temperature inversions, often linked to local sources, and during a short, non-local episode. This study highlights the MARS method as a reliable tool for field calibration of LCS networks and provides valuable data on urban air quality and its dynamics with high spatiotemporal resolution.

Permanent Link: https://hdl.handle.net/11104/0366071

0635673 - ÚI 2026 RIV DE eng J - Journal Article

Brabec, Marek - Marmolejo-Ramos, F. - Loh, L. - Lee, I. O. - Kulyabin, M. - Zhdanov, A. -Posada-Quintero, H. - Thompson, D. A. - Constable, P. A.

Remodeling the light-adapted electroretinogram using a Bayesian statistical approach.

BMC Research Notes. Roč. 18, January (2025), č. článku 33. ISSN 1756-0500. E-ISSN 1756-0500 **Institutional support**: RVO:67985807

Keywords : Attention deficit hyperactivity disorder * Neurodevelopment * Retina * Time-domain * ERG trajectory

OECD category: Statistics and probability

Impact factor: 1.6, year: 2023

Method of publishing: Open access

Result website:

https://doi.org/10.1186/s13104-025-07115-4

DOI: <u>https://doi.org/10.1186/s13104-025-07115-4</u>

To present a remodeling of the electroretinogram waveform using a covariance matrix to identify regions of interest and distinction between a control and attention deficit/hyperactivity disorder (ADHD) group. Electroretinograms were recorded in n = 25 ADHD (16 male, age 11.9 ± 2.7 years) and n = 38 (8 male, age 10.4 ± 2.8 years neurotypical control participants as part of a broad study into the determining if the electroretinogram could be a biomarker for ADHD. Flash strengths of 0.6 and 1.2 log cd.s.m- 2 on a white 40 cd.m- 2 background were used. Averaged waveforms from each eye and flash strength were analyzed with Bayesian regularization of the covariance matrices using 100 equal length time intervals. The eigenvalues of the covariance matrices were ranked for each group to indicate the degree of complexity within the regularized waveforms.

0635636 - ÚI 2026 NL eng J - Journal Article

Dallmer-Zerbe, Isa - Kopal, Jakub - Pidnebesna, Anna - Curot, J. - Denuelle, M. - de Barros, A. - Sol, J.-Ch. - Valton, L. - Barbeau, E. J. - <u>Hlinka, Jaroslav</u>

Pro-ictal, rather than pre-ictal, brain state marked by global critical slowing and local gamma power increase.

Clinical Neurophysiology. Online 14 May 2025 (2025), č. článku 2110742. ISSN 1388-2457. E-ISSN 1872-8952

R&D Projects: GA ČR(CZ) GA21-32608S; GA MŠMT(CZ) EH22_008/0004643

Institutional support: RVO:67985807

Impact factor: 3.7, year: 2023 ; AIS: 1.198, rok: 2023

Method of publishing: Open access

Result website: https://doi.org/10.1016/j.clinph.2025.2110742

DOI: <u>https://doi.org/10.1016/j.clinph.2025.2110742</u>

OBJECTIVE: The pre-surgical evaluation of epilepsy relies on the electrophysiological recordings of spontaneous seizures. During this period drug dose decreases increase the likelihood of seizures transitioning the brain from a low to high seizure likelihood state, so-called pro-ictal state. This study aimed to identify the dynamic brain changes characteristic of this transition from 386 ten-minute segments of intracranial EEG recordings of 29 patients with drug-refractory temporal lobe epilepsy. METHODS: We studied brain dynamics through mean phase locking value and relative power in gamma band, and autocorrelation function width. We further explored interactions with pro-ictal factors, such as rate of interictal spikes and high frequency oscillations, circadian and multi-day cycles, and clinical outcomes. RESULTS: We observed significant increases in gamma power in the epileptogenic zone, and critical slowing in both the epileptogenic zone and presumably healthy cortex. These changes were linked with increases in spike and high frequency oscillations rate. CONCLUSIONS: Brain dynamics changed on the slow time scale – from the beginning to the end of the multi-day interval – but did not change in the short-term during the pre-ictal interval, thus could reflect pro-ictal changes. SIGNIFICANCE: We highlight gamma power and critical slowing indices as markers of pro-ictal brain states, as well as their potential to track the seizure-related brain mechanisms during the presurgical evaluation of epilepsy patients.

Permanent Link: https://hdl.handle.net/11104/0366666

0619743 - PSÚ 2026 RIV GB eng J - Journal Article

Klocek, Adam - Kollerová, Lenka - Netík, Jan - Havrdová, E. - D'Urso, G. - Pour, M.

Longitudinal network associations between risk and protective factors for bullying, victimization, and well-being: Effects of an antibullying intervention.

Personality and Individual Differences. Roč. 244, říjen (2025), č. článku 113257. ISSN 0191-8869. E-ISSN 1873-3549

R&D Projects: GA ČR(CZ) GA23-06289S

Institutional support: RVO:68081740 ; RVO:67985807

Keywords : antibullying program * bullying * KiVa * mechanisms of change * victimization * wellbeing

OECD category: Psychology (including human - machine relations); Education, general; including training, pedagogy, didactics [and education systems] (UIVT-O)

Impact factor: 3.5, year: 2023 ; AIS: 1.027, rok: 2023

Method of publishing: Limited access

Result website: https://www.sciencedirect.com/science/article/pii/S0191886925002193

DOI: <u>https://doi.org/10.1016/j.paid.2025.113257</u>

Objective: The present study explored the differences in networks of bullying, victimization, and wellbeing, along with related protective and risk factors. Network differences were investigated in adolescent samples following an antibullying intervention vs. regular school year. Methods: A sample of 671 students (52 % girls, Mage = 10.3 years) from 24 elementary schools participated across three time points. A multigroup lag-1 graphical vector autoregressive cross-lagged panel network model was employed and yielded an acceptable model fit. The final model was pruned and bootstrapped (N = 100 resamplings). Results: Several variables demonstrated stability across time points. Cross-lagged associations differed between intervention and control groups. In the absence of intervention, defending increased only when empathy for victims increased, while social self-efficacy reduced both bullying and moral disengagement. In the intervention group, defending became more interconnected with well-being, and an adverse feedback loop emerged between victimization and bullying. Contemporaneous effects were similar across intervention and control schools and showed expected associations, such as positive interrelatedness between moral disengagement and bullying perpetration. Conclusions: The antibullying intervention changed the dynamic interplay of factors related to bullying, victimization, and well-being in schools. While the outcomes were largely positive, some adverse effects emerged, which could guide future research.

Permanent Link: https://hdl.handle.net/11104/0366389

0619600 - FZÚ 2026 RIV US eng J - Journal Article

Acero, M. A. - Acharya, B. - Adamson, P. - <u>Filip, Peter</u> - <u>Hakl, František</u> - <u>Lokajíček, Miloš</u> - <u>Zálešák, Jaroslav</u> ... Total 208 authors

Dual-baseline search for active-to-sterile neutrino oscillations in NOvA.

Physical Review Letters. Roč. 134, Feb (2025), č. článku 081804. ISSN 0031-9007. E-ISSN 1079-7114 **R&D Projects**: GA MŠMT(CZ) EH22_008/0004632

Research Infrastructure: Fermilab-CZ III - 90261

Institutional support: RVO:68378271 ; RVO:67985807

Keywords : NOvA * NuMI beam * active-to-sterile neutrino oscillations

OECD category: Particles and field physics; Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8) (UIVT-O)

Impact factor: 8.1, year: 2023 ; AIS: 3.013, rok: 2023

Method of publishing: Open access

DOI: https://doi.org/10.1103/PhysRevLett.134.081804

We report a search for neutrino oscillations to sterile neutrinos under a model with three active and one sterile neutrinos (3+1 model). This analysis uses the NOvA detectors exposed to the NuMI beam, running in neutrino mode. The data exposure, 13.6×1020 protons on target, doubles that previously analyzed by NOvA, and the analysis is the first to use vµ charged-current interactions in conjunction with neutral-current interactions. Neutrino samples in the near and far detectors are fitted simultaneously, enabling the search to be carried out over a Δ m412 range extending 2 (3) orders of magnitude above (below) 1 eV2. NOvA finds no evidence for active-to-sterile neutrino oscillations under the 3+1 model at 90% confidence level. New limits are reported in multiple regions of parameter space, excluding some regions currently allowed by IceCube at 90% confidence level. We additionally set the most stringent limits for anomalous vT appearance for Δ m412<3 eV2. **Permanent Link:** https://hdl.handle.net/11104/0366286

0619514 - FZÚ 2026 RIV US eng J - Journal Article

Acero, M. A. - Acharya, B. - Adamson, P. - <u>Filip, Peter</u> - <u>Hakl, František</u> - <u>Lokajíček, Miloš</u> - <u>Zálešák, Jaroslav</u> ... Total 212 authors

Measurement of $d^{2}[\times]\sigma/d[\times]| \rightarrow q[\times]d[\times]E_{\text{avail}}$ in charged current ν_{μ} -nucleus interactions at $\langle E_{\nu} \rangle = 1.86$ GeV using the NOvA Near Detector.

Physical Review D. Roč. 111, č. 5 (2025), č. článku 052009. ISSN 2470-0010. E-ISSN 2470-0029 **R&D Projects**: GA MŠMT(CZ) EH22_008/0004632

Research Infrastructure: Fermilab-CZ III - 90261

Institutional support: RVO:68378271 ; RVO:67985807

Keywords : NOvA * SuSAv2 2p2h models * theory-based València

OECD category: Particles and field physics; Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8) (UIVT-O)

Impact factor: 4.6, year: 2023 ; AIS: 1.057, rok: 2023

Method of publishing: Open access

DOI: https://doi.org/10.1103/PhysRevD.111.052009

Double- and single-differential cross sections for inclusive charged-current vµ-nucleus scattering are reported for the kinematic domain 0 to 2 GeV/c in three-momentum transfer and 0 to 2 GeV in available energy, at a mean vµ energy of 1.86 GeV. The measurements are based on an estimated 995,760 vµ charged-current (CC) interactions in the scintillator medium of the NOvA Near Detector. The subdomain populated by 2-particle-2-hole (2p2h) reactions is identified by the cross section excess relative to predictions for vµ-nucleus scattering that are constrained by a data control sample. Models for 2-particle-2-hole processes are rated by χ 2 comparisons of the predicted-versus-measured vµ CC inclusive cross section over the full phase space and in the restricted subdomain. Shortfalls are observed in neutrino generator predictions obtained using the theory-based València and SuSAv2 2p2h models.

Permanent Link: https://hdl.handle.net/11104/0366178

0619656 - FZÚ 2026 RIV US eng J - Journal Article

Acero, M. A. - Acharya, B. - Adamson, P. - <u>Filip, Peter</u> - <u>Hakl, František</u> - <u>Lokajíček, Miloš</u> - <u>Zálešák, Jaroslav</u> ... Total 221 authors

Monte Carlo method for constructing confidence intervals with unconstrained and constrained nuisance parameters in the NOvA experiment.

Journal of Instrumentation. Roč. 20, č. 2 (2025), č. článku T02001. ISSN 1748-0221. E-ISSN 1748-0221

R&D Projects: GA MŠMT(CZ) EH22_008/0004632

Research Infrastructure: Fermilab-CZ III - 90261

Institutional support: RVO:68378271 ; RVO:67985807

Keywords : neutrino: oscillation * statistical analysis: frequentist * NOvA

OECD category: Particles and field physics; Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8) (UIVT-O)

Impact factor: 1.3, year: 2023 ; AIS: 0.425, rok: 2023

DOI: <u>https://doi.org/10.1088/1748-0221/20/02/T02001</u>

Measuring observables to constrain models using maximum-likelihood estimation is fundamental to many physics experiments. Wilks' theorem provides a simple way to construct confidence intervals on model parameters, but it only applies under certain conditions. These conditions, such as nested hypotheses and unbounded parameters, are often violated in neutrino oscillation measurements and other experimental scenarios. Monte Carlo methods can address these issues, albeit at increased computational cost. In the presence of nuisance parameters, however, the best way to implement a Monte Carlo method is ambiguous. This paper documents the method selected by the NOvA experiment, the profile construction. It presents the toy studies that informed the choice of method, details of its implementation, and tests performed to validate it. It also includes some practical considerations which may be of use to others choosing to use the profile construction. **Permanent Link:** https://hdl.handle.net/11104/0366285

0619167 - ÚVGZ 2026 RIV NL eng J - Journal Article

<u>Vaňo, Simeon</u> - <u>Duchková, Helena</u> - Bašta, P. - Jančovič, M. - <u>Geletič, Jan</u> - <u>Lorencová,</u> <u>Eliška</u> - <u>Suchá, Lenka</u>

From scenarios to strategies: Integrated methodology for addressing urban heat vulnerability in an uncertain future.

Sustainable Cities and Society. Roč. 121, č. článku 106202. ISSN 2210-6707. E-ISSN 2210-6715 **R&D Projects**: GA MŠMT(CZ) EH22_008/0004635; GA TA ČR(CZ) TL01000238

Institutional support: RVO:86652079 ; RVO:67985807

Keywords : climate change * future scenarios * heat vulnerability * population * sustainability * urban planning

OECD category: Environmental sciences (social aspects); Meteorology and atmospheric sciences (UIVT-O)

Method of publishing: Open access

Result website: <u>https://www.sciencedirect.com/science/article/pii/S2210670725000794</u> **DOI**: <u>https://doi.org/10.1016/j.scs.2025.106202</u>

Challenges posed by extreme heat threaten cities, human health and well-being. Consequently, climate adaptation has become crucial for sustainable urban development. Heat vulnerability assessment has been proposed to guide adaptation strategies by identifying areas and populations susceptible to climate impacts. This article presents an innovative methodological approach to heat vulnerability assessment, integrating climate models based on Representative Concentration Pathways, participatory co-production of future land use and land cover scenarios derived from Shared Socioeconomic Pathways, and demographic projections. Using Prague as a case study, this approach generates vulnerability scenarios that pinpoint specific patterns and vulnerable urban areas for both near (2030) and distant futures (2050). Results suggest that while climate change and socioeconomic development outlooks will negatively impact urban vulnerability, cities can mitigate climate effects through comprehensive adaptation measures and sustainably-oriented urban planning. The article highlights methodological contributions and explores how a nuanced understanding of future developments can empower planners and decision-makers to enhance urban climate resilience and sustainability.

Permanent Link: https://hdl.handle.net/11104/0365891

0635681 - ÚI 2026 RIV CZ eng C - Conference Paper (international conference) <u>Lukšan, Ladislav</u> - <u>Matonoha, Ctirad</u> - <u>Vlček, Jan</u>

Noonsmooth Equation Method for Nonlinear Nonconvex Optimization.

Programs and Algorithms of Numerical Mathematics 22. Prague: Matematický ústav AV ČR, v. v. i., 2025 - (Chleboun, J.; Papež, J.; Segeth, K.; Šístek, J.; Vejchodský, T.), s. 105-114. ISBN 978-80-85823-74-5.

[PANM 22: Programy a algoritmy numericke matematiky /22./. Hejnice (CZ), 23.06.2024-28.06.2024] **Institutional support**: RVO:67985807

Keywords : nonlinear programming * nonsmooth analysis * semismooth equations * KKT systems * algorithms

OECD category: Pure mathematics

Result website:<u>https://panm22.math.cas.cz/sbornik/PANM22_proceedings.pdf</u> **DOI**: <u>https://doi.org/10.21136/panm.2024.10</u>

The contribution deals with the description of two nonsmooth equation methods for inequality constrained mathematical programming problems. Three algorithms are presented and their efficiency is demonstrated by numerical experiments.

0635707 - ÚTIA 2026 RIV CZ eng C - Conference Paper (international conference) Papáček, Štěpán - Matonoha, Ctirad

A note on the OD-QSSA and Bohl-Marek methods applied to a class of mathematical models. *Programs and Algorithms of Numerical Mathematics 22 : Proceedings of Seminar.* Praha: Matematicky ustav AV CR, v. v. i., 2025 - (Chleboun, J.; Papež, J.; Segeth, K.; Šístek, J.; Vejchodský, T.), s. 127-136. ISBN 978-80-85823-74-5.

[Programs and Algorithms of Numerical Mathematics /22./. Hejnice (CZ), 23.06.2024-28.06.2024] **Institutional support**: RVO:67985556 ; RVO:67985807

Keywords : mathematical modelling * chemical kinetic systems * quasi-steady-state approximation * M-Matrix * quasi-linear formulation

OECD category: Automation and control systems; Pure mathematics (UIVT-O) **Result website:** <u>https://library.utia.cas.cz/separaty/2025/TR/papacek-0635707.pdf</u> **DOI:** <u>https://doi.org/10.21136/panm.2024.12</u>

The complex (bio)chemical reaction systems, frequently possess fast/slow phenomena, represent both diffculties and challenges for numerical simulation. We develop and test an enhancement of the classical QSSA (quasisteady-state approximation) model reduction method applied to a system of chemical reactions. The novel model reduction method, the so-called delayed quasi-steady-state approximation method, proposed by Vejchodsky (2014) and further developed by Papacek (2021) and Matonoha (2022), is extensively presented on a case study based on Michaelis-Menten enzymatic reaction completed with the substrate transport. Eventually, an innovative approach called the Bohl-Marek method is shown on the same numerical example.

Permanent Link: https://hdl.handle.net/11104/0366741

0627735 - ÚI 2026 US eng V - Research Report

Hladký, Jan - Hng, Eng Keat - Limbach, Anna Margarethe

Graphon branching processes and fractional isomorphism.

Cornell: Cornell University, 2024. 44 s. arXiv.org e-Print archive, arXiv:2408.02528.

Institutional support: RVO:67985807

Result website:

https://doi.org/10.48550/arXiv.2408.02528 **DOI**: https://doi.org/https://doi.org/10.48550/arXiv.2408.02528

In their study of the giant component in inhomogeneous random graphs, Bollobás, Janson, and Riordan introduced a class of branching processes parametrized by a possibly unbounded graphon. We prove that two such branching processes have the same distribution if and only if the corresponding graphons are fractionally isomorphic, a notion introduced by Grebík and Rocha. A different class of branching processes was introduced by Hladký, Nachmias, and Tran in relation to uniform spanning trees in finite graphs approximating a given connected graphon. We prove that two such branching processes have the same distribution if and only if the corresponding graphons are fractionally isomorphic up to scalar multiple. Combined with a recent result of Archer and Shalev, this implies that if uniform spanning trees of two dense graphs have a similar local structure, they have a similar scaling limit. As a side result we give a characterization of fractional isomorphism for graphs as well as graphons in terms of their connected components.

Permanent Link: <u>https://hdl.handle.net/11104/0366529</u> Research data: <u>ArXiv.org</u>

0627733 - ÚI 2026 US eng V - Research Report **Garbe, F. -** <u>Hladký, Jan</u> *A tower lower bound for the degree relaxation of the Regularity Lemma*. Cornell: Cornell University, 2024. 13 s. arXiv.org e-Print archive, arXiv:2410.05023.

Institutional support: RVO:67985807

Result website:<u>https://doi.org/10.48550/arXiv.2410.05023</u> **DOI**: <u>https://doi.org/10.48550/arXiv.2410.05023</u>

It is well-known that if is an -regular pair (in the sense of Szemerédi) then there exist sets and with and so that the degrees of all vertices in differ by at most and the degrees of all vertices in differ by at most . We call such a property "-degularity". This leads to the notion of an "-degular" partition of a graph in the same way as the definition of -regular pairs leads to the notion of -regular partitions. We show that there exist graphs in which any -degular partition requires the number of clusters to be . That is, even though degularity is a substantial relaxation of regularity, in general one cannot improve much on the bounds that come with Szemerédi's regularity lemma.

Permanent Link: <u>https://hdl.handle.net/11104/0366528</u> Research data: <u>ArXiv.org</u>

0627736 - ÚI 2026 US eng V - Research Report Hladký, Jan - Il'kovič, D. - León, J. - Shu, X. *On cospectral graphons*. Cornell: Cornell University, 2024. 7 s. arXiv.org e-Print archive, arXiv:2411.13229. Institutional support: RVO:67985807 Result website: https://doi.org/10.48550/arXiv.2411.13229 DOI: https://doi.org/https://doi.org/10.48550/arXiv.2411.13229 In this short note, we introduce cospectral graphons, paralleling the notion of cospectral graphs. As in the graph case, we give three equivalent definitions: by equality of spectra, by equality of cycle densities, and by a unitary transformation. We also give an example of two cospectral graphons that cannot be approximated by two sequences of cospectral graphs in the cut distance.

Permanent Link: <u>https://hdl.handle.net/11104/0366531</u> Research data: ArXiv.org

Research data: <u>ArXiv.org</u>

0619077 - ÚI 2026 US eng V - Research Report

<u>Girier, Guillaume</u> - <u>Dallmer-Zerbe, Isa</u> - Chvojka, J. - Kudláček, J. - Jiruška, P. - <u>Hlinka,</u> <u>Jaroslav</u> - <u>Schmidt, Helmut</u>

Ion Dynamics Underlying the Seizure Delay Effect of Low-Frequency Electrical Stimulation. Laurel Hollow: Cold Spring Harbor Laboratory, 2025. 22 s. Biorxiv Preprints, 10.1101/2025.04.01.646594.

R&D Projects: GA MŠMT(CZ) EH22 008/0004643

Institutional support: RVO:67985807

OECD category: Neurosciences (including psychophysiology

Result website: https://www.biorxiv.org/content/10.1101/2025.04.01.646594v1

DOI: https://doi.org/10.1101/2025.04.01.646594

The biological mechanisms underlying the spontaneous and recurrent transition to seizures in the epileptic brain are still poorly understood. As a result, seizures remain uncontrolled in a substantial proportion of patients. Brain stimulation is an emerging and promising method to treat various brain disorders, including drug-refractory epilepsy. Selected stimulation protocols previously demonstrated therapeutic efficacy in reducing the seizure rate. The stimulation efficacy critically depends on chosen stimulation parameters, such as the time point, amplitude, and frequency of stimulation. This study aims to explore the neurobiological impact of 1Hz stimulation and provide the mechanistic explanation behind its seizure-delaying and seizure-suppressing effects. We study this effect using a

computational model, a modified version of the Epileptor-2 model, in close comparison with such stimulation effects on spontaneous seizures recorded in vitro in a high-potassium model of ictogenesis in rat hippocampal slices. In particular, we investigate the mechanisms and dynamics of spontaneous seizure emergence, the seizure-delaying effect of the stimulation, and the optimal stimulation parameters to achieve the maximal anti-seizure effect. We show that the modified Epileptor-2 model replicates key experimental observations, and captures seizure dynamics and the anti-seizure effects of low-frequency electrical stimulation (LFES) observed in hippocampal slices. We identify the critical thresholds in the model for seizure onset and determine the optimal stimulation parameters – timing, amplitude, and duration – that exceed specific thresholds to delay seizures without triggering premature seizures. Our study highlights the central role of sodium-potassium pump dynamics in terminating seizures and mediating the LFES effect.

Permanent Link: https://hdl.handle.net/11104/0365840

0619884 - ÚI 2026 CZ eng E - Electronic Document

Římanová, R. - <u>Hlinka, Jaroslav</u>

An epileptic seizure doesn't always strike out of the blue, says Jaroslav Hlinka.

Prague: Czech Academy of Sciences, 2024

Institutional support: RVO:67985807

Keywords : popularisation of science * popularizace vědy

Result website:

https://www.avcr.cz/en/news-archive/An-epileptic-seizure-doesnt-always-strike-out-of-the-blue-says-Jaroslav-Hlinka/

A brief blank stare, a sense of déjà vu, loss of consciousness accompanied by convulsions, or even weeks-long confusion – epileptic seizures can manifest in many forms. Most of the time, they occur unexpectedly. But do they really? Computational neuroscientist Jaroslav Hlinka, from the Institute of Computer Science of the Czech Academy of Sciences (CAS), has been modeling the dynamics of epileptic seizures for years. His research was recently featured in the quarterly A / Magazine published by the CAS.

Permanent Link: https://hdl.handle.net/11104/0366477

0619885 - ÚI 2026 CZ cze E - Electronic Document

Paluš, Milan - Dejčmar, V. - Kyša, L.

JAK MATEMATICI PŘEDPOVÍDAJÍ BUDOUCNOST? Ptáme se na využití teorie informace v praxi.

Prague: Jadrná věda / Youtube.com, 2024

Institutional support: RVO:67985807

Keywords : popularisation of science * popularizace vědy

Result website:

https://www.youtube.com/watch?v=vhtAvf1dY_4&ab_channel=Jadrn%C3%A1v%C4%9Bda

Pokročilá teorie informace nám může přinést schopnost předpovědět extrémní jevy. Jak moc je spolehlivá a jak funguje? Složité otázky a ještě složitější odpovědi přináší Jadrná věda, do níž dorazil matematik a fyzik Milan Paluš z Ústavu informatiky Akademie věd ČR, a Václav Dejčmar, spoluzakladatel RSJ algorithmic trading a nadace na podporu vědy Neuron. Co všechno půjde díky systému českých vědců předpovědět? A lze pomocí matematické metody vydělat na finančních trzích? **Permanent Link:** https://hdl.handle.net/11104/0366479

0618568 - ÚI 2026 eng A - Abstract

<u>Pidnebesna, Anna</u> - <u>Hartman, David</u> - <u>Trlifaj, Daniel</u> - <u>Pokorná, Aneta</u> - <u>Hlinka, Jaroslav</u> Are the graphlets a good tool for network analysis? Human brain examples. [Seminář ISCB ČR. Institute of Computer Science of the Czech Academy Sciences, 18.02.2025] **URL events**: <u>https://sites.google.com/view/iscb-czechia/in-the-news/2025-anna-pidnebesna?authuser=0</u>

Institutional support: RVO:67985807

Keywords : anomaly detection * threshold selection * multivariate normal distribution **Permanent Link:** <u>https://hdl.handle.net/11104/0365450</u>

0635691 - ÚI 2026 NL A - Abstract

Kummer, I. - Brkić, J. - <u>Reissigová, Jindra</u> - Pokladníková, J. - Hoogendijk, E. O. - Joling, K. J. - van Hout, H. P. J. - Kooijmans, E. C. M. - Buric, B. - Lazarevic, V.

Underuse Of Pharmacological And Nonpharmacological Strategies Of The Treatment Of Depression In Older Home Care Clients In Several European Countries.

International Journal of Clinical Pharmacy. Roč. 46, č. 3 (2024), s. 766-767. ISSN 2210-7703. E-ISSN 2210-7711

Institutional support: RVO:67985807