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Leiden
The Netherlands

On cluster algebras and topological string theory

Semenyakin, M.

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Bibliography

- [1] P.C.Argyres, M.R.Douglas, *New Phenomena in SU(3) Supersymmetric Gauge Theory*; Nucl. Phys. **B448** (1995) 93-126 [[arXiv:9505062](#)].
- [2] H.Awata, B.Feigin, J.Shiraishi, *Quantum Algebraic Approach to Refined Topological Vertex*; J. High Energ. Phys. 2012, **41** (2012), [[arXiv:1112.6074](#)].
- [3] H. Awata, B. Feigin, J. Shiraishi, *Quantum Algebraic Approach to Refined Topological Vertex*, J. High Energ. Phys. **2012**, 41 (2012) [[arXiv:1112.6074](#)].
- [4] N. Affolter, M. Glick, P. Pylyavskyy, S. Ramassamy, *Vector-relation configurations and plabic graphs*, [[arXiv:1908.06959](#)].
- [5] L.F.Alday, D.Gaiotto, Y.Tachikawa, *Liouville Correlation Functions from Four-dimensional Gauge Theories*; Lett. Math. Phys. **91**: 167-197, 2010, [[arXiv:0906.3219](#)].
- [6] O. Aharony, A. Hanany, B. Kol, *Webs of (p,q) 5-branes, Five Dimensional Field Theories and Grid Diagrams*, J. High Energ. Phys. 01 (1998) [[arXiv:hep-th/9710116](#)].
- [7] M. Aganagic, A. Klemm, M. Marino, C. Vafa, *The Topological Vertex*, Commun. Math. Phys. **254**, 425–478 (2005) [[arXiv:hep-th/0305132](#)].
- [8] M. Aganagic, K. Schaeffer, *Wall Crossing, Quivers and Crystals*, J. High Energ. Phys. **2012**, 153 (2012) [[arXiv:1006.2113](#)].
- [9] D. A. Bandurin, *et al.*, *Negative local resistance caused by viscous electron backflow in graphene*, Science **351**, 1055-1058 (2016). [[arXiv:1509.04165](#)].

- [10] V. V. Bazhanov, R. J. Baxter, *New solvable lattice models in three dimensions*, J Stat Phys 69, 453–485 (1992);
- [11] V. V. Bazhanov, R. J. Baxter, *Star-triangle relation for a three-dimensional model*, J Stat Phys 71, 839–864 (1993), [arXiv:hep-th/9212050].
- [12] M. Bershtein, B. Feigin, G. Merzon, *Plane partitions with a "pit": generating functions and representation theory*, Sel. Math. New Ser. 24(1) (2018) 21–62, [arXiv:1512.08779].
- [13] A. Berenstein, S. Fomin, A. Zelevinsky, *Cluster algebras III: Upper bounds and double Bruhat cells*, Duke Math. J. (2005) **126** 1, 1–52, [arXiv:math/0305434].
- [14] M. Bershtein, P. Gavrylenko, A. Marshakov, *Cluster integrable systems, q -Painlevé equations and their quantization*, J. High Energ. Phys. **2018**, 77 (2018) [arXiv:1711.02063].
- [15] M. Bershtein, P. Gavrylenko, A. Marshakov, *Cluster Toda chains and Nekrasov functions*, Theor Math Phys **198**, 157–188 (2019) [arXiv:1804.10145].
- [16] G. Bonelli, A. Grassi, A. Tanzini, *Quantum curves and q -deformed Painlevé equations*, Lett. Math. Phys. **109**, 1961–2001 (2019), [arXiv:1710.11603].
- [17] G. Bosnjak, V. Mangazeev, *Construction of R -matrices for symmetric tensor representations related to $U_q(\widehat{\mathfrak{sl}}_n)$* , J. Phys. A: Math. Theor. 49 (2016) 495204, [arXiv:1607.07968].
- [18] G. Beaujard, J. Manschot, B. Pioline, *Vafa-Witten invariants from exceptional collections*, [arXiv:2004.14466].
- [19] V. V. Bazhanov, V. V. Mangazeev, S. M. Sergeev, *Quantum geometry of 3-dimensional lattices*, J. Stat. Mech. (2008), P07006, [arXiv:0801.0129].
- [20] V. V. Bazhanov, V. V. Mangazeev, S. M. Sergeev, *Quantum Geometry of 3-Dimensional Lattices and Tetrahedron Equation*, in Proc. XVIth International Congress on Mathematical Physics, pp. 23–44 (2010), Prague, Czech Republic, 3 - 8 August 2009, World Scientific:2010, [arXiv:0911.3693[math-ph]].

- [21] L.Bao, E.Pomoni, M.Taki, F.Yagi *M5-branes, toric diagrams and gauge theory duality*, JHEP, **105** (2012); [arXiv:1112.5228].
- [22] F. Benini, D. S. Park, P. Zhao, *Cluster algebras from dualities of 2d $\mathcal{N} = (2, 2)$ quiver gauge theories*, Commun. Math.Phys. 340 (2015) 1, 47-104, [arXiv:1406.2699].
- [23] V. V. Bazhanov, S. Sergeev, *Zamolodchikov's tetrahedron equation and hidden structure of quantum groups*, Journal of Physics A 39 (2006) 13, [arXiv:hep-th/0509181].
- [24] M. Bershtein, A. Shchepochkin, *q-deformed Painlevé τ -function and q-deformed conformal blocks*, J. Phys. A: Math. Theor. **50** 085202 [arXiv:1608.02566].
- [25] M. Bershtein and A. Shchepochkin, *Painlevé equations from Nakajima-Yoshioka blow-up relations* [arXiv:1811.04050].
- [26] M.Semenyakin, M.Bershtein, *To appear*
- [27] A. Berenstein, A. Zelevinsky, *Quantum cluster algebras*, Advances in Mathematics (2005) **195** 2, 405–455 [arXiv:math/0404446].
- [28] V. Chari, *Integrable representations of affine Lie-algebras*, Invent. math. 85 (1986), pp.317–335.
- [29] W. Chuang, D.L. Jafferis, *Wall Crossing of BPS States on the Conifold from Seiberg Duality and Pyramid Partitions*, Commun. Math. Phys. **292**, 285-301 (2009), [arXiv:0810.5072].
- [30] H. Cohn, R. Kenyon, J. Propp, *A variational principle for domino tilings*, J. Amer. Math. Soc. (2001), **14** 297-346, [arXiv:0008220].
- [31] V. Chari, A. Pressley, *A guide to quantum groups*, Cambridge University Press, 1994.
- [32] V. Chari, A. Pressley, *Quantum affine algebras*, Commun. Math. Phys. 142, 261—283 (1991).
- [33] J. Crossno, *et al.*, *Observation of the Dirac fluid and the breakdown of the Wiedemann-Franz law in graphene*, Science **351** (6277), 1058-1061(2016) [arXiv:1509.04713].

- [34] S. A. Cherkis, R. S. Ward, *Moduli of Monopole Walls and Amoebas*, J. High Energ. Phys. 2012, 90 (2012), [[arXiv:1202.1294](https://arxiv.org/abs/1202.1294)].
- [35] J.T. Ding, I.B. Frenkel, *Isomorphism of two realizations of quantum affine algebra $U_q(\mathfrak{gl}(n))$* ; Comm. Math. Phys. **156** 2 (1993), 277–300; [<https://projecteuclid.org/443/euclid.cmp/1104253628>].
- [36] R. Dijkgraaf, D. Orlando, S. Reffert, *Dimer Models, Free Fermions and Super Quantum Mechanics*, Adv. Theor. Math. Phys. **13** 05, (2009) [[arXiv:0705.1645](https://arxiv.org/abs/0705.1645)].
- [37] N. Do, B. Parker, *The topological vertex*, Adv. Theor. Math. Phys. **13** 05, (2009) [[arXiv:2205.02555](https://arxiv.org/abs/2205.02555)].
- [38] P. Etingof, I. Frenkel, A. Kirillov Jr., Lectures on representation theory and Knizhnik-Zamolodchikov equations, AMS, Providence, 1998.
- [39] R. Eager, S. Franco, K. Schaeffer, *Dimer Models and Integrable Systems*, J. High Energ. Phys. 2012, 106 (2012), [[arXiv:1107.1244](https://arxiv.org/abs/1107.1244)].
- [40] T. Eguchi, H. Kanno, *Topological Strings and Nekrasov's formulas*, J. High Energ. Phys. **2003**, 12 (2003) [[arXiv:0310235](https://arxiv.org/abs/0310235)].
- [41] D. Forcella, J. Zaanen, D. Valentini, D. van der Marel, *Electromagnetic properties of viscous charged fluids*, Phys. Rev. B **90**, 035143 (2014) [[arXiv:1406.1356](https://arxiv.org/abs/1406.1356)].
- [42] P. Etingof, O. Schiffmann, Lectures on quantum groups, Second edition, International Press, 2010.
- [43] G. Falkovich, *Fluid Mechanics, a short course for physicists*, Cambridge University Press 2011
- [44] V. V. Fock, *Inverse spectral problem for GK integrable system*, [[arXiv:1503.00289](https://arxiv.org/abs/1503.00289)].
- [45] A. Fayyazuddin, *Some comments on $N=2$ supersymmetric Yang-Mills*; Mod. Phys. Lett. A **10**: 2703-2708, 1995 [[arXiv:hep-th/9504120v1](https://arxiv.org/abs/hep-th/9504120v1)].
- [46] F. Ferrari, A. Bilal, *The Strong-Coupling Spectrum of the Seiberg-Witten Theory*; Nucl. Phys. **B469** (1996) 387-402 [[arXiv:hep-th/9602082v3](https://arxiv.org/abs/hep-th/9602082v3)].

- [47] V.V. Fock, A.B. Goncharov, *Moduli spaces of local systems and higher Teichmüller theory*, Publ. math. IHES **103**, 1–211 (2006) [arXiv:0311149].
- [48] V.V. Fock, A.B. Goncharov, *Cluster ensembles, quantization and the dilogarithm*, Annales scientifiques de l'École Normale Supérieure, 4, **42** (2009) 6, 865-930. [arXiv:0311245].
- [49] V.V. Fock, A. B. Goncharov, *Cluster X-varieties, amalgamation and Poisson-Lie groups*, In Algebraic Geometry Theory and Number Theory, pp. 27–68, Progr. Math., 253, Birkhäuser Boston, Boston, MA, 2006, [arXiv:math.RT/0508408].
- [50] B. Feng, Y.-H. He, K.D. Kennaway, C. Vafa, *Dimer Models from Mirror Symmetry and Quivering Amoebae*, Adv. Theor. Math. Phys. **12** 03, (2008) [arXiv:hep-th/0511287].
- [51] S. Franco, A. Hanany, K.D. Kennaway, D. Vegh, B. Wecht, *Brane Dimers and Quiver Gauge Theories*, J. High Energ. Phys. **2006** 01, (2006) [arXiv:hep-th/0504110].
- [52] S. Franco, Y. Hatsuda, M. Marino, *Exact quantization conditions for cluster integrable systems*; Journal of Statistical Mechanics: Theory and Experiment, **6** 6 (2016) [arXiv:1512.03061].
- [53] B. Feigin, M. Jimbo, T. Miwa, E. Mukhin, *Branching rules for quantum toroidal $\mathfrak{gl}(n)$* , [arXiv:1309.2147].
- [54] G. Falkovich, L. Levitov, *Linking spatial distributions of potential and current in viscous electronics*, Phys. Rev. Lett. **119** (6), (2017). [arXiv:1607.00986].
- [55] V.V. Fock, A. Marshakov, *Loop groups, Clusters, Dimers and Integrable systems*, [arXiv:1401.1606].
- [56] V. V. Fock and A. Marshakov, *A Note on Quantum Groups and Relativistic Toda Theory*, Nucl.Phys. **56B** (Proc. Suppl.) (1997) 208-214.
- [57] S. Fomin, A. Zelevinsky, *Total positivity: tests and parametrizations*, [arXiv:math/9912128].

- [58] S. Fomin, A. Zelevinsky, *Cluster algebras I: Foundations*, Journal of the American Mathematical Society, **15**(2), 497–529. [arXiv:math/0104151].
- [59] S.Fomin, A.Zelevinsky *Cluster algebras IV: Coefficients*, Compositio Mathematica, **143**(1) (2007), 112-164; [arXiv:0602259].
- [60] S. Fomin, A. Zelevinsky, *Double Bruhat cells and total positivity*, [arXiv:math/9802056].
- [61] P. Gavrylenko, *Isomonodromic τ -functions and W_N conformal blocks*, J. High Energ. Phys. **2015**, 167 (2015) [arXiv:1505.00259].
- [62] D. Gaiotto, G. Moore, A. Neitzke *Wall-crossing, Hitchin Systems, and the WKB Approximation*, Adv in Math **234**, (2013), 239–403 [arXiv:0907.3987].
- [63] I. Gelfand, S. Gelfand, V. Retakh, R. L. Wilson, Quasideterminants, Advances in Mathematics 193 (2005) 56–141.
- [64] A.Grassi, Y.Hatsuda, M.Marino, *Topological Strings from Quantum Mechanics*; [arXiv:1410.3382].
- [65] T. George, G. Inchiostro, *Cluster modular groups of dimer models and networks*, [arXiv:1909.12896].
- [66] H. Guo, E. Ilseven, G. Falkovich, L. Levitov, *Stokes paradox, back reflections and interaction-enhanced conduction*, [arXiv:1612.09239].
- [67] H. Guo, E. Ilseven, G. Falkovich, L. Levitov, *Higher-than-ballistic conduction of viscous electron flows*, PNAS **114** (12) 3068-3073 (2017) [arXiv:1607.07269].
- [68] O. Gamayun, N. Iorgov, O. Lisovyy, *Conformal field theory of Painlevé VI*, J. High Energ. Phys. **2012**, 38 (2012) [arXiv:1207.0787].
- [69] O. Gamayun, N. Iorgov, O. Lisovyy, *How instanton combinatorics solves Painlevé VI, V and III's*, J. Phys. A: Math. Theor. **46** (2013) 335203 [arXiv:1302.1832].
- [70] P. Gavrylenko, N. Iorgov, O. Lisovyy, *Higher rank isomonodromic deformations and W -algebras*, Lett Math Phys **110**, 327–364 (2020) [arXiv:1801.09608].

-
- [71] A. B. Goncharov, R. Kenyon, *Dimers and cluster integrable systems*, Ann. Sci. Ec. Norm. Sup **46** 5 (2013), 747–813, [arXiv:1107.5588].
- [72] A. Gorsky, I. Krichever, A. Marshakov, A. Mironov, A. Morozov, *Integrability and Seiberg-Witten Exact Solution*; Phys. Lett. **B355** (1995) 466–474 [arXiv:2010.15871].
- [73] I.M. Gelfand, M.M. Kapranov, A.V. Zelevinsky, *Generalized Euler integrals and A-hypergeometric functions*, Advances in Mathematics (1990) **64** 2, 255–271
- [74] P. Gavrylenko, O. Lisovyy, *Fredholm determinant and Nekrasov sum representations of isomonodromic tau functions*, Commun. Math. Phys. **363**, 1–58 (2018) [arXiv:1608.00958].
- [75] P. Gavrylenko, A. Lyashik, A. Marshakov, I. Motorin, M. Semenyakin, *To appear*
- [76] P. Gavrylenko, A. Marshakov, *Residue Formulas for Prepotentials, Instanton Expansions and Conformal Blocks*, J. High Energ. Phys. **2014**, 97 (2014) [arXiv:1312.6382].
- [77] P. Gavrylenko, A. Marshakov, *Free fermions, W-algebras and isomonodromic deformations*, Theor Math Phys **187**, 649–677 (2016) [arXiv:1605.04554].
- [78] D. Gaiotto, G.W. Moore, A. Neitzke, *Four-dimensional wall-crossing via three-dimensional field theory*; Commun. Math. Phys. **299**:163–224, 2010 [arXiv:0807.4723].
- [79] D. Gaiotto, G.W. Moore, A. Neitzke, *Wall-crossing, Hitchin Systems, and the WKB Approximation*; [arXiv:0907.3987].
- [80] M. Gekhtman, M. Shapiro, S. Tabachnikov, A. Vainshtein, *Integrable cluster dynamics of directed networks and pentagram maps*, Adv. Math. **300** (2016), 390–450, [arXiv:1406.1883].
- [81] M. Gekhtman, M. Shapiro, A. Vainshtein, *Cluster algebras and Poisson geometry*, Mosc. Math. J., **3**:3 (2003), 899–934 [arXiv:math/0208033].

- [82] M. Gekhtman, M. Shapiro, A. Vainshtein, *Generalized Bäcklund–Darboux transformations for Coxeter–Toda flows from a cluster algebra perspective*, Acta Math. **206**(2), (2011) 245–310 [arXiv:0906.1364].
- [83] M. Gekhtman, M. Shapiro, A. Vainshtein, *Poisson Geometry of Directed Networks in a Disk*, Selecta Math., (2009) 15, 61–103, [arXiv:0805.3541].
- [84] M. Gekhtman, M. Shapiro, A. Vainshtein, *Poisson Geometry of Directed Networks in an Annulus*, Journal of the European Mathematical Society, (2012) 541–570, [arXiv:0901.0020].
- [85] P.Gavrylenko, M.Semenyakin, Y.Zenkevich, *Solution of tetrahedron equation and cluster algebras*; J. High Energ. Phys. 2021, **103** (2021) [arXiv:2010.15871].
- [86] I. Gessel, G. Viennot, *Binomial Determinants, Paths, and Hook Length Formulae*, Advances in Mathematics 58, 300–321 (1985)
- [87] K. Hikami, R. Inoue, *Braids, Complex Volume, and Cluster Algebra*, Algebr. Geom. Topol. 15 (2015) 2175–2194, [arXiv:1304.4776].
- [88] A. Hanany, K. D. Kennaway, *Dimer models and toric diagrams*, Acta Math. **206**(2), (2011) 245–310 [arXiv:hep-th/0503149].
- [89] Y. Hatsuda, H. Katsura, Y. Tachikawa, *Hofstadter’s Butterfly in Quantum Geometry*, New J. Phys. **18** 103023 (2016) [arXiv:1606.01894].
- [90] A. Hone, R. Inoue *Discrete Painlevé equations from Y-systems*, J. Phys. A: Math. and Theor., **47** (47) 2014; [arXiv:1405.5379].
- [91] Y. Hatsuda, Y. Sugimoto, *Bloch electrons on honeycomb lattice and toric Calabi-Yau geometry*, J. High Energ. Phys. **2020**, 26 (2020) [arXiv:2003.05662].
- [92] Y. Hatsuda, Y. Sugimoto, Z. Xu, *Calabi-Yau geometry and electrons on 2d lattices*, Phys. Rev. D **95**, 086004 (2017) [arXiv:1701.01561].
- [93] A. Hanany, D. Vegh, *Quivers, Tilings, Branes and Rhombi*, J. High Energ. Phys. **2007** 10, (2007) [arXiv:hep-th/0511063].

- [94] J. J. Heckman, C. Vafa *Crystal Melting and Black Holes*, J. High Energ. Phys. **2007** 09, (2007) [[arXiv:hep-th/0610005](#)].
- [95] R. Inoue, T. Ishibashi, H. Oya *Cluster realizations of Weyl groups and higher Teichmüller theory*, [[arXiv:1902.02716](#)].
- [96] A. Iqbal, A.-K. Kashani-Poor, *Instanton Counting and Chern-Simons Theory*, Adv.Theor.Math.Phys. **7** (2004) 457-497 [[arXiv:hep-th/0212279](#)].
- [97] A. Iqbal, A.-K. Kashani-Poor, *SU(N) Geometries and Topological String Amplitudes*, Adv.Theor.Math.Phys. **10** (2006) 1-32 [[arXiv:hep-th/0306032](#)].
- [98] A. Iqbal, C. Kozcaz, C. Vafa, *The Refined Topological Vertex*, J. High Energ. Phys. **2009**, 10 (2009) [[arXiv:hep-th/0701156](#)].
- [99] R. Inoue, T. Lam, P. Pylyavskyy, *On the cluster nature and quantization of geometric R-matrices*, [[arXiv:1607.00722](#)].
- [100] N. Iorgov, O. Lisovyy, J. Teschner, *Isomonodromic tau-functions from Liouville conformal blocks*, Commun. Math. Phys. **336**, 671–694 (2015) [[arXiv:1401.6104](#)].
- [101] A. Iqbal, N. Nekrasov, A. Okounkov, C. Vafa, *Quantum Foam and Topological Strings*, J. High Energ. Phys. **2008** 04, (2008) [[arXiv:hep-th/0312022](#)].
- [102] M. Jimbo, H. Nagoya, H. Sakai, *CFT approach to the q-Painlevé VI equation*, Journal of Integrable Systems **2**, 1 (2017) [[arXiv:1706.01940](#)].
- [103] H. Jenne, G. Webb, B. Young, *The combinatorial PT-DT correspondence*, [[arXiv:2012.08484](#)].
- [104] R. Kenyon, *Height fluctuations in the honeycomb dimer model*, Commun. Math. Phys. **281**, 675 (2008), [[arXiv:math-ph/0405052](#)].
- [105] P. Kasteleyn, *Graph theory and crystal physics*, in Graph Theory and Theoretical Physics, 43–110, Academic Press, London (1967)
- [106] I.M. Krichever, *Two-dimensional periodic difference operators and algebraic geometry*, Sov. Math., Dokl. **32**, 623-627 (1985)

- [107] I. G. Korepanov, *Tetrahedral Zamolodchikov Algebras Corresponding to Baxter's L-Operators*, Commun. Math. Phys. 154, 85–97 (1993).
- [108] I. G. Korepanov, *A Dynamical System Connected with inhomogeneous 6-Vertex Model*, Zapiski Nauchn. Semin. POMI (S-Petersburg) 215 (1994) 178-196, [arXiv:hep-th/9402043].
- [109] I. G. Korepanov, *Algebraic integrable dynamical systems, 2+1-dimensional models in wholly discrete space-time, and inhomogeneous models in 2-dimensional statistical physics*, [solv-int/9506003].
- [110] V. Kac, *Infinite dimensional Lie algebras*, Cambridge University Press, 1990.
- [111] S. Kharchev, *Unpublished*.
- [112] R. M. Kashaev, I. G. Korepanov, S. M. Sergeev, *Functional tetrahedron equation*, Theor. Math. Phys. 117:3 (1998) 1402 - 1413, [arXiv:solv-int/9801015].
- [113] R. M. Kashaev, V. V. Mangazeev, Yu. G. Stroganov, *Spatial symmetry, local integrability and tetrahedron equations in the Baxter-Bazhanov model*, International Journal of Modern Physics A, 8 (3) (1993) 587-601.
- [114] R. Kenyon, A. Okounkov, *Low temperature limits of dimer models*, unpublished
- [115] R. Kenyon, A. Okounkov, *Planar dimers and Harnack curves*, Duke Mathematical Journal **131** 3 (2006), [arXiv:math-ph/0311062].
- [116] R. Kenyon, A. Okounkov, *Limit shapes and the complex burgers equation*, [arXiv:math-ph/0507007].
- [117] A. Kuniba, M. Okado, S. Sergeev, *Tetrahedron equation and generalized quantum groups*, J. Phys. A: Math. Theor. 48 (2015) 304001 (38pp), [arXiv:1503.08536].
- [118] R. Kenyon, A. Okounkov, S. Sheffield, *Dimers and Amoebae*, [arXiv:math-ph/0311005].

- [119] R. Kenyon, R. Pemantle, *Double-dimers, the Ising model and the hexahedron recurrence*, [arXiv:1308.2998].
- [120] A. Kuniba, S. Sergeev, *Tetrahedron Equation and Quantum R Matrices for Spin Representations of $B_n^{(1)}$, $D_n^{(1)}$ and $D_{n+1}^{(2)}$* , Commun. Math. Phys. 324, 695–713 (2013), [arXiv:1203.6436].
- [121] M.Kontsevich, Y.Soiselman, *Stability structures, motivic Donaldson-Thomas invariants and cluster transformations*; [arXiv:0811.2435].
- [122] M. Kapranov, V. Voevodsky, *2-categories and Zamolodchikov tetrahedra equations*, Proc. Sympos. Pure Math., 56 (2) 1994.
- [123] B. Lindström, *On the Vector Representations of Induced Matroids*, Bulletin of the London Mathematical Society, 5: 85-90 (1973).
- [124] L. Levitov, G. Falkovich, *Electron viscosity, current vortices and negative nonlocal resistance in graphene*, Nature Phys. **12**, 672-676 (2016). [arXiv:1508.00836].
- [125] T. Lam, P. Pylyavskyy, *Total positivity in loop groups, I: Whirls and curls*, Advances in Mathematics, 230 (2012) 3: 1222 - 1271, [arXiv:0812.0840].
- [126] A. Litvinov, L. Spodyneiko, *On W algebras commuting with a set of screenings*, J. High Energ. Phys. 2016, 138 (2016), [arXiv:1609.06271].
- [127] A. Litvinov, L. Spodyneiko, *On dual description of the deformed $O(N)$ sigma model*, J. High Energ. Phys. 2018, 139 (2018), [arXiv:1804.07084].
- [128] A. Marshakov, *Lie groups, cluster variables and integrable systems*, Journal of Geometry and Physics (2013) 67: 16-36, [arXiv:1207.1869].
- [129] M. Marino, *Spectral Theory and Mirror Symmetry*, Proc. Symp. Pure Math. **98** (2018) 259 [arXiv:1506.07757].
- [130] M. Matone, *Instantons and recursion relations in $\mathcal{N} = 2$ SUSY gauge theory*, J Phys.Lett. **B357** (1995) 342-348 [arXiv:hep-th/9506102].

- [131] V. Mangazeev, V. Bazhanov, S. Sergeev, *An integrable 3D lattice model with positive Boltzmann weights*, J. Phys. A: Math. Theor., v. 46, 465206 (2013), [arXiv:1308.4773].
- [132] A. Mironov, A. Morozov, *Superintegrability summary*, [arXiv:2201.12917].
- [133] A.Marshakov, A.Mironov, *5d and 6d Supersymmetric Gauge Theories: Prepotentials from Integrable Systems*; Nucl.Phys. **B518** (1998) 59-91 [arXiv:hep-th/9711156v1].
- [134] A. Mironov, A. Morozov, B. Runov, Y. Zenkevich, A. Zotov, *Spectral dualities in XXZ spin chains and five dimensional gauge theories*; JHEP **1312** (2013) 034 [arXiv:hep-th/1307.1502].
- [135] T. Maeda, T. Nakatsu, *Amoebas and Instantons*, Int. J. Mod. Phys. **A22**: 937-984 (2007) [arXiv:hep-th/0601233].
- [136] Y. Matsuhira, H. Nagoya, *Combinatorial expressions for the tau functions of q-Painlevé V and III equations*; [arXiv:1811.03285].
- [137] P. J. W. Moll, P. Kushwaha, N. Nandi, B. Schmidt, A. P. Mackenzie, *Evidence for hydrodynamic electron flow in PdCoO₂*, Science **351** (6277) 1061-1064 (2016) [arXiv:1509.05691].
- [138] A. Morozov, A. Popolitov, S. Shakirov, *Quantization of Harer-Zagier formulas*, [arXiv:2008.09577].
- [139] S. Mozgovoy, M. Reineke, *On the noncommutative Donaldson-Thomas invariants arising from brane tilings*, Advances in Mathematics **223**(5) [arXiv:0809.0117].
- [140] A.Marshakov, M.Semenyakin, *Cluster integrable systems and spin chains*; J. High Energ. Phys. 2019, **100** (2019) [arXiv:1905.09921].
- [141] N.Nekrasov, *Seiberg-Witten Prepotential From Instanton Counting*; Adv. Theor. Math. Phys. **7**:831-864, 2004 [arXiv:hep-th/0206161].
- [142] N. Nekrasov, *Mathematical structures: On string theory applications in condensed matter physics. Topological string and two dimensional electron*, XXIII Solvay Conference, [PDF].

- [143] N. Nekrasov, *Five Dimensional Gauge Theories and Relativistic Integrable Systems*, Nucl. Phys. B 531 **1-3** (1998) [[arXiv:hep-th/9609219](#)].
- [144] N. Nekrasov, A. Okounkov, *Seiberg-Witten Theory and Random Partitions*, The Unity of Mathematics. Progress in Mathematics, **244**. Birkhäuser Boston [[arXiv:hep-th/0306238](#)].
- [145] N.Nekrasov, S.L.Shatashvili *Quantization of Integrable Systems and Four Dimensional Gauge Theories*; [[arXiv:0908.4052](#)].
- [146] N. Okubo, *Bilinear equations and q -discrete Painlevé equations satisfied by variables and coefficients in cluster algebras*, J. Phys. A: Math. Theor. **48** 355201; [[arXiv:1505.03067](#)].
- [147] N. Okubo, *Co-primeness preserving higher dimensional extension of q -discrete Painlevé I, II equations*; [[arXiv:1704.05403](#)].
- [148] A. Oskin, S. Pakuliak, A. Silantyev, *On the universal weight function for the quantum affine algebra $U_q(\hat{\mathfrak{gl}}_N)$* ; Lett. Math. Phys. **91** (2010) 167; [[arXiv:0711.2821](#)].
- [149] A. Okounkov, N. Reshetikhin, *Correlation function of Schur process with application to local geometry of a random 3-dimensional Young diagram*, [[arXiv:math/0107056](#)].
- [150] A. Okounkov, N. Reshetikhin, *Random skew plane partitions and the Pearcey process*, [[arXiv:math/0503508](#)].
- [151] A. Okounkov, N. Reshetikhin, C. Vafa, *Quantum Calabi-Yau and Classical Crystals*, In: Etingof, P., Retakh, V., Singer, I.M. (eds) The Unity of Mathematics. Progress in Mathematics, vol 244 [[arXiv:hep-th/0309208](#)].
- [152] V. Ovsienko, M. Shapiro, *Cluster algebras with Grassmann variables*, to appear in Electron. Res. Announc. Math. Sci., [[arXiv:1809.01860](#)].
- [153] N.Okubo, T.Suzuki *Generalized q -Painlevé VI systems of type $(A_{2n+1}+A_1+A_1)^{(1)}$ arising from cluster algebra* [[arXiv:1810.03252](#)].

- [154] H. Ooguri, M. Yamazaki, *Crystal Melting and Toric Calabi-Yau Manifolds*, Commun. Math. Phys. **292**, 179-199 (2009) [arXiv:0811.2801].
- [155] H. Ooguri, M. Yamazaki, *Emergent Calabi-Yau Geometry*, Phys. Rev. Lett. **102**: 161601 (2009) [arXiv:0902.3996].
- [156] C. M. Ormerod, Y. Yamada, *From Polygons to Ultradiscrete Painlevé Equations*, SIGMA **11** (2015), 056, [arXiv:1408.5643].
- [157] A. Postnikov, *Total positivity, Grassmannians, and networks*, [arXiv:math/0609764].
- [158] L.D. Faddeev, N.Yu.Reshetikhin, L.A.Takhtajan, *Quantization of Lie groups and Lie algebras*; Algebra and Analysis (Russian) 1.1 (1989), 118-206
- [159] S.N.M. Ruijsenaars, *"Relativistic Toda systems"*, Commun.Math. Phys., **133**:217 (1990), 753-760. [euclid.cmp/1104201396].
- [160] S. M. Sergeev, *Quantum 2 + 1 evolution model*, Journal of Physics A: Mathematical and General, 32 (30), [arXiv:solv-int/9811003].
- [161] J. Stienstra, *Hypergeometric Systems in two Variables, Quivers, Dimers and Dessins d'Enfants*, in "Modular Forms and String Duality", AMS, 2008, 125–161, [arXiv:0711.0464].
- [162] S. M. Sergeev, *Supertetrahedra and superalgebras*, J. Math. Phys. 50, 083519 (2009), [arXiv:0805.4653].
- [163] M. Semenyakin, *Comment on 'Linking Spatial Distributions of Potential and Current in Viscous Electronics'* [arXiv:1609.05316].
- [164] N.Seiberg, *Five Dimensional SUSY Field Theories, Non-trivial Fixed Points and String Dynamics*; [arXiv:hep-th/9608111].
- [165] N.Seiberg, *Non-trivial Fixed Points of The Renormalization Group in Six Dimensions*; [arXiv:hep-th/9609161].
- [166] S. M. Sergeev, *Solutions of the functional tetrahedron equation connected with the local Yang – Baxter equation for the ferro-electric*, [arXiv:solv-int/9709006].

- [167] S.Katz, A.Klemm, C.Vafa, *Geometric Engineering of Quantum Field Theories*; Nucl. Phys. **B497**: 173-195, 1997 [arXiv:hep-th/9609239].
- [168] R. K. Kumar *et al.*, *Superballistic flow of viscous electron fluid through graphene constrictions*, Nature Phys **13**, 1182–1185 (2017). [arXiv:1703.06672].
- [169] M. Sato, T. Miwa, M. Jimbo, *Holonomic quantum fields I–V*, Publ. RIMS Kyoto Univ. **14**, (1978), 223–267; **15**, (1979), 201–278; **15**, (1979), 577–629; **15**, (1979), 871–972; **16**, (1980), 531–584.
- [170] S. Sergeev, V. V. Mangazeev, Yu. G. Stroganov, *The vertex formulation of the Bazhanov-Baxter Model*, J. Stat Phys **82**, 31–49 (1996), [arXiv:hep-th/9504035].
- [171] G. Schrader, A. Shapiro, *A cluster realization of $U_q(\mathfrak{sl}_n)$ from quantum character varieties*, [arXiv:1607.00271].
- [172] N.Seiberg, E.Witten, *Monopole Condensation, And Confinement In $N=2$ Supersymmetric Yang-Mills Theory*; Nucl. Phys. **B426**: 19-52, 1994 [arXiv:hep-th/9407087].
- [173] N.Seiberg, E.Witten, *Gauge Dynamics And Compactification To Three Dimensions*; [arXiv:hep-th/9607163].
- [174] D. Thurston, *From Dominoes to Hexagons*, [arXiv:math/0405482].
- [175] K. Talaska, *A formula for Plucker coordinates associated with a planar network*, Int Math Res Notices (2008), ID: rnn081, [arXiv:0801.4822].
- [176] I. Torre, A. Tomadin, A. K. Geim, M. Polini, *Nonlocal transport and the hydrodynamic shear viscosity in graphene*, Phys. Rev. B **92**, 165433 (2015). [arXiv:1508.00363].
- [177] A.P. Veselov, I.M. Krichever, S.P. Novikov, *Two-dimensional periodic Schrödinger operator and Prym's θ -functions*, [PDF].
- [178] E.Witten, *Solutions Of Four-Dimensional Field Theories Via M Theory*; Nucl. Phys. **B500**: 3-42, 1997 [arXiv:hep-th/9703166].

-
- [179] B. Young, *Computing a pyramid partition generating function with dimer shuffling*, Journal of Combinatorial Theory Series A **116**(2), 334-350 [[arXiv:0709.3079](#)].
- [180] M. Yamazaki, *Crystal Melting and Wall Crossing Phenomena*, Int. J. Mod. Phys. A26 (2011) 1097-1228, [[arXiv:1002.1709v3](#)].
- [181] M. Yamazaki, *Cluster-Enriched Yang-Baxter Equation from SUSY Gauge Theories*, Lett Math Phys 108, 1137–1146 (2018), [[arXiv:1611.07522](#)].
- [182] A. B. Zamolodchikov, *Tetrahedra equations and integrable systems in three-dimensional space*, JETP, Vol. 52, No 2, p. 325.
- [183] Y. Zenkevich, *Higgsed network calculus*, [[arXiv:1812.11961](#)].
- [184] A. B. Zamolodchikov, *Tetrahedron equations and the relativistic S-matrix of straight-strings in 2+1-Dimensions*, Commun. Math. Phys. 79, 489–505 (1981).