Mark Edelman's Curriculum Vitae

PERSONAL

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EDUCATION

1991 Ph.D. in Astrophysics
Title of thesis: Accretion shock waves in AM Her objects and cloud-cloud collisions,
Odessa University, Odessa, USSR
1975 M.S. Degree in Physics and Computer Science, Rostov State University

EXPERIENCE AND ACHIEVEMENTS

September 2014-present Clinical Associate Professor of Physics, Stern College for Women, Yeshiva University;

September 2009-August 2014 Assistant Professor of Physics, Stern College for Women, Yeshiva University;

January 2015-present Adjunct, Department of Mathematics and Comp. Science, BCC, CUNY.

1995-2010 Research Scientist, Courant Institute of Mathematical Sciences, New York University. Research in nonlinear dynamics that includes:

1. Fractional dynamical systems: fractional maps with memory; fractal media; systems of long range interacting oscillators; fractional differential equations and numerical solution of such equations;

2. Numerical experiments in chaos. Topology of the phase space of dynamical systems and its effect on transport and equilibrium properties. Anomalous diffusion in mathematical billiards and plasmas. Numerical solution of fractional differential equations, data analysis, underwater acoustics, and pseudochaotic transport in tokamak plasma.

3. Computer work includes: a). Use of parallel systems for performing massive computation. Codes are written in C and C++ and MPI is employed for parallelization; b). Software design includes codes written in Visual C++ for the analysis of the dynamical system; c).   Design of the interactive educational on-line programs.

4. Courses taught at NYU: on-line summer course "Quantitative graduate preparation" (2007-2010), lecture course "Elementary Statistics" (spring 2006), and recitation on "Quantum Mechanics" (fall 2006).

2002-present   Adjunct professor, Yeshiva College, Yeshiva University. Courses taught: "Mathematical Physics", "Thermodynamics and Statistical Physics", "Quantum Mechanics", "Physics I", "Physics II", an introductory course "Physical Universe" (each semester from 2002 to 2011).

2004   Adjunct professor, Cooper Union. Teaching advanced course "Statistical Physics".

1993-1995   Visiting Scientist, Courant Institute of Mathematical Sciences, New York University. Linear and nonlinear stability of MHD shock waves and its effect on the variability of radiation from binary stars.

1994-1995   Instructor, Bramson Ort Technical Institute. Courses taught: "Business Statistics". "Quantitative analysis", "Business Mathematics"

1994   Adjunct professor, Polytechnic University. Course "Astronomy and astrophysics".

1989-92   Lecturer at the Rostov Planetarium, Rostov, Russia. Responsibilities included lecturing and managing the planetarium's 20 cm telescope.

1980-90   Senior Research Scientist and Adjunct professor, Rostov Pedagogical Institute.
1. As a leader of a small group of researchers took part in the creation of a catalogue of 400,000 stars in cooperation with Pulkovo Observatory;
2. Teaching "Astronomy" for undergraduate students.
3. Corrugation instability of radiative shocks and its role in AM Her objects and supernova remnants.
4. Radio-wave diffraction on a conductor with a multilayer dielectric cover.

1976-80 Research Scientist, Rostov State University, Russia.
1. Thermal evolution of gas with primeval chemical composition (the contraction of protogalaxies, cloud-cloud collisions and star formation in early galaxies).
2. Anomalous resistance in the Earth's ionosphere.

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AWARDS

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2016   Zaslavsky Prize for achievements in nonlinear science and complexity.
1992   The American Astronomical Society Grant awarded for the investigation of the stability of oblique MHD shock waves.

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SYNERGISTIC ACTIVITIES

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• **Member** of the APS.
• **Referee** of the APS journals, Nonlinear Dynamics, The European Physical Journal, ESAIM: Mathematical Modelling and Numerical Analysis, Discontinuity, Nonlinearity, and Complexity.
• **Editorial Boards**: 1. Fractional Calculus and Applied Analysis;
                              2. Journal of Applied Nonlinear Dynamics.
• **Co-Organizer and Co-chair of 6th International Conference on Nonlinear Science and Complexity** in Sao Jose dos Campos, Brazil http://www.inpe.br/nsc2016/en/index.php. (NSC-16). **Member of the organizing committee** of the NSC-18 in San Luis Potosi, Mexico.
• **Invited Co-Editor** of the Special Issue of the journal Discontinuity, Nonlinearity, and Complexity "Fractional Dynamics and Systems with Power-Law Memory", December, 2015
• **Organizer of a mini-symposium** "Nonlinear Fractional Dynamics and Systems with Memory" http://nsc2014.xjtu.edu.cn/file/NSC2014EdelmanN.pdf.

Recent conference talks:

1. Aug. 14-17, **7th International Conference on Nonlinear Science and Complexity, (NSC-2018), member of the organizing committee**, **Invited talk** "Regular and chaotic fractional (with power-law memory) dynamics".

2. July 22-27, 2018; **The 9th International Conference on Complex Systems,** Cambridge, MA, USA (http://www.necsi.edu/events/iccs2018/index.html), talk "Regular and chaotic fractional (with power-law memory) dynamics".

3. July 3-6, 2018; **European Conference on Iteration Theory, (ECIT 2018),** Murcia, Spain (http://www.ecit2018.org/home.html), 30 min talk "Iterations with power-law memory: fractional maps".

4. July 3-5, 2017; **International Conference on Nonlinear Dynamics and Complexity; (NDC 2017),** ŁÓDŹ, POLAND (http://www.ndc17.p.lodz.pl/), **Invited talk** "New face of universality in nonlinear fractional dynamics".

5. May 2017, **Invited lecture** "Nonlinear Fractional dynamics" at School of Control Science and Engineering and Power Electronic Energy-saving Technology & Equipment Engineering Research Center of Education Ministry, Shandong University, Jinan, China.

6. May 16-20, 2016; **6th International Conference on Nonlinear Science and Complexity**; Sao Jose dos Campos, Brazil (http://www.inpe.br/nsc2016/en/index.php). **Plenary talk** (**Zaslavsky Award Speech**): "Systems with power-law memory and fractional dynamics".

7. Dec. 26 - Dec. 30. 2015; **International Workshop on Nonlinear Dynamical Systems**; cycle of lectures "Systems with power-law memory and nonlinear fractional dynamics"; Dec. 28, five hours at the Sichuan University of Science and Engineering, Zigong; Dec. 30, two hours at the Southwestern Jiaotong University, Chendu; Jan. 1 – Jan 11, 2016, **Cycle of lectures** (12 hours) on fractional dynamics for graduate students, Xi'an Jiaotong University, Xi'an, China.

8. June 1-5, 2015; **International Conference CCT15 - Chaos, complexity and transport 2015**, Marseilles, France (http://cct15.cpt.univ-mrs.fr). Member of the **scientific committee.** Contributed talk: "Chaos in discrete and continuous systems with power-law memory".

9. August 4-9, 2014; **5th International Conference on Nonlinear Science and Complexity**; Xi'an, China (http://nsc2014.xjtu.edu.cn). **Invited talk:** "Systems with Power-Law Memory"; **Invited talk:** "Fractional Maps and Fractional Attractors: Non-Linear Fractional Difference Equations". **Session Chair**: Complex Flows and Dynamics; **Session Chair**: Fractional Dynamics-III.

10. June 23-25, 2014; **International Conference on Fractional Differentiation and its Applications**; Catania, Italy (http://www.icfda14.dieei.unict.it/index.html). **Contributed talk**: "Universality in Fractional Dynamics". **Session Chair**: Theory.

11. March 18-22, 2013; **APS March Meeting;** Baltimore, Maryland (http://meetings.aps.org/Meeting/MAR13). Contributed talk: "The universal α-family of maps".

12. July 33-29, 2012**; International Conference on Nonlinear Dynamics and Complexity;** Shandong Normal University, Jinan, China (https://www.lhscientificpublishing.com/Conference/NSC.aspx). **Keynote talk**: "α-families of maps and fractional attractors"

13. February 27 - March 2, 2012; **APS March Meeting;** Boston, Massachusetts (http://meetings.aps.org/Meeting/MAR12). Contributed talk (with Stern student Laura Taieb): "Cascade of bifurcations type attractors as a general type of attractors in fractional dynamical systems".

14. June 30– July 2; 2011; **IDOTA2011: Integral and Differential Operators and Their Applications**. **An International Conference in Honor of Professor Stefan Samko,** Aveiro, Portugal. (http://c2.glocos.org/index.php/idota/2011). Contributed Talk (with Stern student Laura Taieb): "New types of solutions of non-linear fractional differential equations".

15. July 25 – Aug 8, 2011; **WCHAOS11: International Seminar and Workshop on Weak Chaos, Infinite Ergodic Theory, and Anomalous Dynamics;** Max Planck Institute for the Physics of Complex Systems, Dresden, Germany (http://www.pks.mpg.de/~wchaos11/). Contributed Talk: "Chaos and fractional dynamical systems".

16. July 13-20, 2010: **IV International Conference "Frontiers of Nonlinear Physics",** organized by the Institute of Applied Physics, Russian Academy of Sciences, Nizhny Novgorod, Russia. (http://www.fnp.sci-nnov.ru/venue.html). **Invited Talk**: "Fractional Maps as Models of Fractional Dynamical Systems and Fractional Attractors".

17. 28 - 31 July, 2010; **3rd Conference on Nonlinear Science and Complexity**, Ankara, Turkey (http://nsc10.cankaya.edu.tr/). **Invited Talk**: "Fractional Standard Map: Riemann-Liouville vs. Caputo". **Session Chair**: Fractional Calculus Applications.

Apr. 2010; YU **colloquium talk**: "Fractional Standard Map".
Apr. 2013; Courant Institute at NYU **Seminar Talk**: "α-Families of Maps and General Properties of Fractional Dynamical Systems".
Mar. 2015; YU **Colloquium Talk** "Systems with power-law memory and fractional attractors".
Apr. 2015; UC Merced, ME graduate **Seminar Talk** "Systems with power-law memory".
Apr. 2015; Courant Institute, **cSplash talk** "Systems with power-law memory".
Feb. 2016: BCC CUNY, **Math department colloquium talk** "Systems with power-law memory and nonlinear fractional dynamics**".**

PUBLICATIONS

Books edited:

M. Edelman, E. Macau, and M. A. F. Sanjuan (eds.), Chaotic, Fractional, and Complex Dynamics: New Insights and Perspectives; Series: Understanding Complex Systems,   Springer, eBook, 2018, http://www.springer.com/us/book/9783319681085

Book Chapters:

1. M. Edelman, "Maps with power-law memory: direct introduction and Eulerian numbers, fractional maps, and fractional difference maps, in: A. Kochubei and Y. Luchko (eds.), *Handbook of Fractional Calculus with Applications, Volume 2, Theory,* De Gruyter, Berlin, 2018 (accepted).

2. M. Edelman, "Dynamics of nonlinear systems with power-law memory" in V.E. Tarasov (ed.), *Handbook of Fractional Calculus with Applications, Volume 2, Applications in Physics,* De Gruyter, Berlin, 2018 (accepted).

3. M. Edelman, E. Macau, and M. A. F. Sanjuan, "New Insights and Perspectives in Chaotic,Fractional, and Complex Dynamics", in: M. Edelman, E. Macau, and M. A. F. Sanjuan (eds.):Chaotic, Fractional, and Complex Dynamics: New Insights and Perspectives; Series: Understanding Complex Systems, 1–7, Springer, eBook, 2018.

4. M. Edelman, "Universality in Systems with Power-Law Memory and Fractional Dynamics", in: M. Edelman, E. Macau, and M. A. F. Sanjuan (eds.): Chaotic, Fractional, and Complex Dynamics: New Insights and Perspectives; Series: Understanding Complex Systems, 147–171, Springer, eBook, 2018.

5. M. Edelman, "On nonlinear fractional maps: Nonlinear maps with power-law memory", in "Chaos, Complexity and Transport", Proceedings of the CCT '15**,** Conference on Chaos, Complexity and Transport 2015, Marseilles, France, 1 – 5 June 2015; X. Leoncini, C. Eloy, and G. Boedec (Editors), pp. 119-130 (World Scientific, Singapore, 2017). On-line http://www.worldscientific.com/doi/abs/10.1142/9789813202740_fmatter

6. M. Edelman, "Fractional Maps as Maps with Power-Law Memory" in: "Nonlinear Dynamics and Complexity", Nonlinear Systems and Complexity, 8, V. Afraimovich et al. (Eds.), pp. 79-120 (Springer, New York, 2014); arXiv:1306.6361.

7. M. Edelman and L.A. Taieb, "New types of solutions of non-linear fractional differential equations", in: Advances in Harmonic Analysis and Operator Theory; Series: Operator Theory: Advances and Applications, A. Almeida, L. Castro, F.-O. Speck (Eds.) pp. 139-155 (Springer, Basel, 2013); arXiv:1211.4012.

8. G.M. Zaslavsky and M. Edelman, "Pseudochaos", in Perspectives and Problems in Nonlinear Science, Eds: E. Kaplan, J.E. Marsden, R.S. Katepalli, 421-443, (Springer, New York, 2003); arXiv:nlin/0112033.

Refereed Journals:

1. M. Edelman, "On Stability of Fixed Points and Chaos in Fractional Systems", Chaos, 28, 023112 (2018); arXiv:1711.06777.

2. M. Edelman, "On Fractional Eulerian Numbers and Equivalence of Maps with Long-Range Power-Law Memory (Integral Volterra Equations of the Second Kind) to Grünwald-Letnikov Fractional Difference (Differential) Equations", Chaos, 25, 073103 (2015); arXiv:1410.6864.

3. M. Edelman and J.A. Tenreiro Machado, "Fractional Dynamics and Systems with Power-Law Memory", Discontinuity, Nonlinearity, and Complexity 4, 381-382, (2015);

4. M. Edelman, "Fractional Maps and Fractional Attractors. Part II: Fractional Difference α-Families of Maps", Discontinuity, Nonlinearity, and Complexity, 4, 391-402, (2015); arXiv:1404.4906.

5. M. Edelman, "Universality in fractional dynamics", International Conference on Fractional Differentiation and Its Applications (ICFDA), 2014 DOI: 10.1109/ICFDA.2014.6967376, (2014), Page(s): 1-6; arXiv:1401.0048.

6. M. Edelman, "Caputo standard α-family of maps: Fractional difference vs. fractional", Chaos, 24, 023137 (2014); arXiv:1406.4059.

7. M. Edelman, "Universal Fractional Maps and Cascade of Bifurcations Type Attractors", Chaos 23, 033127 (2013); arXiv:1209.5713.

8. M. Edelman, "Fractional Maps and Fractional Attractors. Part I: α-Families of Maps", Discontinuity, Nonlinearity, and Complexity 1, 305-324, (2013); arXiv:1209.5681.

9. M. Edelman, "Fractional Standard Map: Riemann-Liouville vs. Caputo", Commun. Nonlin. Sci. Numer. Simul. 16, 4573-4580 (2011); arXiv:1305.1249.

10. V.E. Tarasov and M. Edelman, "Fractional dissipative standard map", Chaos 20, 023127 (2010); arXiv:1107.5464.

11 M. Edelman and V.E. Tarasov, "Fractional standard map", Phys. Let. A 374, 279, (2009); arXiv:0909.5412.

12. G.M. Zaslavsky, M. Edelman, "Superdiffusion in the Dissipative Standard Map", Chaos, 18, 033116 (2008); arXiv:0805.1952.

13. G.M. Zaslavsky, P.N. Guzdar, M. Edelnman, M.I. Sitnov, A.S. Sharma, "Multiscale behavior and fractional kinetics from the dataof solar wind– magnetosphere coupling", Com. in Nonlin. Sci. and Num. Sim., 13, p. 314 (2008); arXiv:physics/0511096.

14. M. Courbage, M. Edelman, S.M. Saberi Fathi, G.M. Zaslavsky, "Problem of transport in billiards with infinite horizon", Phys. Rev. E 77, Art. No. 036203 (2008).

15. G.M. Zaslavsky, M. Edelman, "Stochastic Web as a Generator of Three-Dimensional Quasicrystal Symmetry", Chaos, 17, 023127 (2007).

16. G.M. Zaslavsky , P.N. Guzdar, M. Edelman, et al. "Selfsimilarity and fractional kinetics of solar wind-magnetosphere coupling", Physica A, 373, p. 11 (2007).

17. G.M. Zaslavsky, M. Edelman, and V.E.Tarasov, "Dynamics of the chain of forced oscillators with long-range interaction: From synchronization to chaos", Chaos, 17, 043124 (2007); arXiv:0707.3941.

18. G.M. Zaslavsky, M. Edelman, "Stochastic Web in Multidimensions", in Chaos, Complexity and Trasport, Proceedings of the CCT'07, Eds. C. Chandre, X. Leoncini, and G. Zaslavsky, 27-39, Marseille, France, 4-8 June 2007.

19. G.M. Zaslavsky, A.A. Stanislavsky, and M. Edelman, "Chaotic and pseudochaotic attractors of perturbed fractional oscillator", Chaos, 16, 013102 (2006); arXiv:nlin/0508018.

20. G.M. Zaslavsky, M. Edelman, "Stickiness of trajectories in a perturbed Anosov system", Regular & Chaotic Dynamics 11, 329-336 (2006); arXiv:nlin/0511027.

21. A.S. Landsnman, S.A. Cohen, M. Edelman, G.M. Zaslavsky, "Resonance and chaotic trajectories in magnetic field reversed configuration", Commun. in Nonlin. Sci and Num. Sim. 10, 617, (2005).

22. G.M. Zaslavsky, B.A. Carreras, V.E. Lynch, L. Garcia, M. Edelman, "Topological Instability Along Invariant Surfaces and Pseudochaotic Transport", Phys. Rev. E 72, Art. No. 026227 (2005).

23. I.P. Smirnov, A.L. Virovlyansky, M. Edelman, and G.M. Zaslavsky, "Chaos-induced intensification of wave scattering", Phys. Rev. E 72, 026206 (2005).

24. G.M. Zaslavsky and M. Edelman, "Polynomial Dispersion of Trajectories in Sticky Dynamics", Phys. Rev. E 72, Art. No. 036204 (2005).

25. G.M. Zaslavsky and M. Edelman, "Fractional Kinetics of Pseudochaotic Dynamics", in Fractional differentiation and its applications, Eds: A. Le Mechaute, J.A. Tenreiro Machado, J.C. Trigeassou, J. Sabatier, 183-193, Books on demand, Germany (2005).

26. G.M. Zaslavsky and M. Edelman, "Fractional dynamics of pseudochaotic Systems" First Workshop on Fractional Differentiation and its Applications of the International Federation of Automatic Control, July 19-21, 2004, Bordeaux, France (2004).

27. G.M. Zaslavsky and M. Edelman, "Fractional kinetics: From pseudochaotic dynamics to Maxwell's Demon", Physica D 193, Iss.1-4, p. 128 (2004).

28. B. A. Carreras, V. E. Lynch, L. Garcia, M. Edelman, and G. M. Zaslavsky, "Topological instability along filamented invariant surfaces" Chaos 13, Iss.4, p. 1175 (2003).

29. O. Lyubomudrov, M. Edelman, and G.M. Zaslavsky, "Pseudochaotic Systems and Their Fractional Kinetics", Int. J. Mod. Phys.17, p. 4149 (2003).

30. S.V. Prants, M. Edelman, and G.M. Zaslavsky, "Chaos and flights in the atom -photon interaction in cavity QED", Phys. Rev. E 66, 046222 (2002); arXiv:nlin/0210036.

31. G.M. Zaslavsky and M. Edelman, "Weak mixing and anomalous kinetics along filamented surfaces", Chaos, 11, 295 (2001).

32. G.M. Zaslavsky, M. Edelman, M., H. Weitzner, B. Carreras, G. McKee, R. Bravenec, and R. Fonk, "Large-scale behavior of tokamak density Fluctuations", Phys. Plasmas, 7, 3691 (2000).

33. G.M. Zaslavsky and M.Edelman, "Hierarchical structures in the phase space and fractional kinetics: I. Classical systems", Chaos v.10, No.1, p. 135 (2000).

34. G.M. Zaslavsky, M. Edelman, and B.A. Niyazov, "Self-Similarity, Renormalization, and Phase Space Nonuniformity of Hamiltonian Chaotic Dynamics", Chaos 7, 159-181 (1997).

35. G.M. Zaslavsky and M. Edelman, "Maxwell's Demon as a dynamical model", Phys. Rev. E 56, 5310-5320 (1997).

36. J.M. Stone and M.A. Edelman, "The Corrugation Instability in Slow Magneto-Sonic Shock Waves", The Astrophysical Journal 454, 182-193 (1995).

37. M.A. Edelman, "Corrugation Instability of a Slow Shock Wave and Variability of Low-Mass X-Ray Binaries", Bulletin AAS v.25, No.4, p.1372 (1993).

38. M.A. Edelman, "Corrugation Instability of a Strong Slow Parallel Shock Wave: 2. Approximate Analytic Investigation", Astrophysics 31, 758-764 (1990).

39. M.A. Edelman, "Corrugation Instability of a Strong Slow Parallel Shock Wave: 1. Numerical Calculations for the Case of a Radiative Shock", Astrophysics 31, 656-663 (1990).

40. M.A. Edelman, "Corrugation Instability of Radiative Shock Waves", Rostov-on-Don, 27pp. - (manuscript dep. in VINITI; No. 7882 - B85 Dept.) (in Russian) (1985).

41. A.A. Suchkov, Yu. Shchekinov, and M.A. Edelman, "Collision of Massive Gas Clouds with Primeval Chemical Composition: Dynamics and Star Formation", Astrofizika 18, 629 - 640 (in Russian). English translation in Astrophysics (1982).

42. Yu. Shchekinov and M.A. Edelman, "The thermal Evolution of Gas with Primeval Chemical Composition, Contracting Under the Influence of Gravitation", Astron. Zh. 57, 1287 - 1294 (1980) (in Russian); English translation in Soviet. Astron., v.24, No.6 (1980).

43. Yu. Shchekinov and M.A. Edelman, "On the Cooling Mechanisms of Primeval Metter", Pis'ma Astron. Zh. 4, 435-440 (in Russian). English translation in Sov. Astron. Lett (1978).