

RESUMÉ

Abraham Berman

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Born: February 8, 1943, Haifa, Israel. I.D: 006103113

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Academic Degrees

1970: Ph.D. Applied Mathematics. Northwestern University Evanston IL, USA.

1968: M.Sc. Mathematics. Technion - Israel Institute of Technology, Haifa, Israel.

1966: B.Sc. Mathematics. Technion - Israel Institute of Technology, Haifa, Israel.

Academic Appointments

2011 - Professor Emeritus, Technion - Israel Institute of Technology, Haifa, Israel.

2017- Senior Researcher, The Samuel Neaman Institute.

2007-2011 The Israel Pollak Academic Chair, Technion

1989 – 2011 Professor, Department of Mathematics, Technion

1981-89 Associate Professor, Department of Mathematics, Technion

1972-81 Senior Lecturer, Department of Mathematics, Technion

1995-2010 Professor, Department of Education in Sciences and Technology, Technion

2007 - 2010 Head, Department of Education in Technology & Science, Technion -

1990-1997 Head, The Center for Pre-Academic Education, Technion.

Visiting Professorships

Department of Mathematics, McGill University, Departments of Mathematics and Computer Sciences, The University of Tennessee, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Departments of Mathematics, University of California, San Diego and Santa Barbara, Department of Mathematics, University of New South Wales

Visiting Research Positions

Centre de Recherches Mathematiques, Universite de Montreal, Department of Mathematics and Statistics Research, Nuclear Division, Oak Ridge, National Research Institute for Mathematical Sciences, Council for Scientific and Industrial Research, Pretoria, Department of Mathematics, Bielefeld University, Department of Mathematics, University of Victoria, Department of Mathematics, University of Lisbon, Department of Mathematics, Wake Forest University, Department of Mathematics, University of Science and Technology of China, Department of Mathematics, Brigham Young University, Department of Combinatorics and Optimization, University of Waterloo, Department of Mathematics, Princeton University, Institute for Advanced Study, Princeton, Department of Mathematics, Technical University, Berlin. Department of Mathematical Sciences, University College, Dublin, Laboratory for Population Dynamics, Rockefeller University, The Hamilton Institute, Maynooth, University of Auckland, Monash University

Research Fields

Matrix Theory, Spectral Graph Theory, Mathematics Education, Creativity and Giftedness

Awards

The Henry Guthwirth Research Fund Award, 1991

The Muriel and David Jacknow Award for Excellence in Teaching, 2002.

Invited Lectures (since 2011)

May 2011 Linear Algebra Workshop, Slovenia.

October 2011, Workshop on Linear Algebra and Applications. The Hamilton Institute, Maynooth, Ireland.

2012 The 10th International Conference on Matrix Theory and its Applications , Guiyang, Guizhou, China.

2013 International Workshop on Numerical Linear Algebra with Applications, Hong Kong.

December 2014, International Conference on Linear Algebra and its Applications, Manipal, India.

May 2016, IWTMA, Shanghai University, Shanghai, China.

May 2016, TMA 2016, The Chern Research Institute, Tianjin, China.

June 2017, ICMAA 2017, Da Nang, Vietnam.

29 October – 2.11. 2017, Oberwolfach workshop on Copositivity and Complete Positivity.

Research Grants

1974 Israel Ministry of Education

1982 Israel Ministry of Defense-Military Industries

1983 Elbit

1984, 1989, 2000-01, 2004 The Sam Neeman Foundation

2004-5 Science Foundation Ireland, International Collaborator

2007-2009 ISF (CI; B. Koichu and R. Leikin - PI's)

2011-2014 ISF (PI with N. Movshovitz-Hadar)

2013-2015 GIF (PI with M. Duer and N.Shaked-Monderer)

2015-2019 ISF NSFC (PI with XiaoDong Zhang)

2016-2019 Ministry of Science (PI with N. Movshovitz-Hadar)

Public Service (since 2011)

-2012 Advisory committee, The Hamilton Institute, Ireland

Scientific committee, Tensor and Matrix Theory research Center, University of Shanghai, China

Committees of the Council for Higher Education of Israel

The Advisory Committee on Mathematics, Ministry of Education

The Academic Committee, The National Science Museum

2012-2015 Board of Directors, The International Linear Algebra Society

Board of Trustees, The Reali School

- 2021 Board of Directors, The Reali School.

2017- 2021 Chair, the Pedagogical Committee, The Reali School.

2017-2021 BOB Technion

Editorial Posts

1984-97 Editor, Etgar-Gilionot Matematica (in Hebrew)

1988-90, 2004-06 Special Editor, Linear Algebra and its Applications

1989-95 Editorial Board, SIAM Journal on Matrix Analysis and Applications

2004 Special Editor, Electronic Journal of Linear Algebra

2010- 2011 Editorial Board, Dor LeDor, Studies in the history of education in Israel (in Hebrew)

2014- IJRUME – International Journal on Research in Undergraduate Mathematics Education

Graduate Students

Ron Aharoni 1979, Ph.D., "Combinatorial Problems in Matrix Theory".

Ron Adin 1981, M.Sc., "Extreme Positive Operators on Minimal and Almost-Minimal Cones".

Daniel Hershkowitz 1982, Ph.D., "Stable Matrices and Matrices with Nonnegative Principal Minors".

Avital Livne 1983, M.Sc., "Copositive Matrices".

Ofra Kessler 1984, M.Sc., "Inverse M-matrices".

Dan Shemesh 1984, Ph.D., "Commutativity Subspaces".

Ron Iрмаi 1985, M.Sc., "Multicriteria Decision Problems by Dynamic Programming".

Dafna Shasha 1987, Ph.D. (Co-Supervisor D. Hershkowitz), "Diagonal Semistability of Matrices".

Natali Kogan 1989, M.Sc., "Completely Positive Matrices and Completely Positive Graphs".

Sarel Kagan 1991, M.Sc., "Constrained Matrix Scaling".

Naomi Shaked Monderer 1992, Ph.D., "Convex Sets of Positive Semidefinite Matrices".

Natali Kogan 1993, Ph.D. (Co-Supervisor D. Hershkowitz), "Combinatorial Spectral Theory".

Avi B. Sigler 1994, Ph.D., "Geometric Investigations of High School Students and Pre Service Teachers".

Mark Krupnik 1994, Ph.D., "Completion Problems in Matrix Theory".

Marina Arab 1995, M.Sc., "The Extended Linear Complementarity Problem".

Alex Kuperman 1996, Ph.D. (Co-Supervisor N. Movshovitz-Hadar), "Misconceptions in Linear Algebra".

Galit Dremer 1996, M.Sc., "Seeing Mathematics".

Roza Leikin 1997, Ph.D. (Co-Supervisor O. Zaslavsky), "Symmetry as a Way of Thought".

Amal Sherif Rasslan 2000, Ph.D., "University Professor as a High School Teacher a Case Study".

Shmuel Aruchas 2000, M.Sc., "Mathematical Problems that Can Be Used to Identify Gifted Students".

Nurit Katchalsky 2002, M.Sc., "The Majority Rule in Graphs".

Boris Koichu 2003, Ph.D. (Co-Supervisor M. Moore), "Senior High School Student's Heuristic Behaviors in Mathematical Problem Solving".

Sagit Ophrain 2003, M.Sc., "Final Paper on Teaching Analytic Geometry".

Yulia Bulgaev 2004, M.Sc., "The Wiener Index of a Graph".

Felix Goldberg 2004, M.Sc., "Laplacian at Graphs, Quasi-Strongly Regular Graphs and Completely Positive Graphs".

Olga Bortnik 2004, M.Sc., "Words in Positive Definite Matrices".

Shmuel Aruchas 2005, Ph.D. (Co-Supervisor I. Verner), "Applications Motivated Calculus Course".

Alon Hadad 2008, M.Sc., "Nonnegative Matrix Factorizations".

Shirley Medjinsky 2008, Ph.D. (Co-Supervisor R. Tal), "Embedded Assessment in Pull-Out Programs for the Gifted".

Felix Goldberg 2010, Ph.D., "The Colin De Verdiere number of a Graph".

Yefim Katz 2010, Ph.D., "Aesthetics of Problem Solving" (Co-Supervisor B. Koichu)

Michal Dina 2010, M.Sc., "Spectrally Arbitrary Patterns and Tree Sign Patterns" (Co-Supervisor D. Hershkowitz)

Oleg Kostenko 2010, M.Sc., "Self Adjusted Zero Trees" (Co-Supervisor I. Baron)

Batia Amit 2011, Ph.D. "Interweaving Mathematical Snapshots in High-School Teaching" (Co-Supervisor N. Movshovitz-Hadar)

Galit Hagi 2012, Ph.D. "Listening to the Students Voice – Incorporating Students Interests into the Formal Biology Curriculum" (Co-Supervisor A. Baram-Tsabari)

Miriam Farber 2013, M.Sc. "Bounds for the Eigenvalues of Symmetric Matrices"

Ran Peleg 2013, Ph.D. "Science Plays in Elementary Science Education" (Co-Supervisor A. Baram-Tsabari)

Sallwa Mabariki, 2014, M.Sc. "Integrating Beautiful Mathematical Problems in Teaching Mathematics"

Or Raz, 2015, M.Sc. "Learning Workshop for Calculus Students"

Eli Levi, M. Sc. 2015 "Ways, Using Teaching Mathematics, to the Heart of Youth at Risk"

Mirela Wider, Ph.D 2016 "Hiding in Plane View: Visual Perception of Two-Dimensional Representations in Teaching Spatial Geometry" (Co-Supervisor B. Koichu)

Michal Klinstern, Ph.D. 2016 "Problem Posing or Choosing by High School and University Mathematics Teachers" (Co-Supervisor B. Koichu)

Dudi Medjinsky, Ph.D. 2019 "An Integrated Mathematics and Physics Learning in High School: Problems Solving and Attitudes" (Co-Supervisor R. Truper, University of Haifa)

Ahlan Mahagna, Ph.D. 2021 "The Impact of an Enrichment Course in Mathematics" (Co-Supervisor R. Leikin, University of Haifa)

Eli Levi, Ph.D. (In Progress)

Suleiman Hamud, Ph.D.(In Progress)

Postdoctoral Students

Xiao-Dong Zhang, 1998-2000

Changqing Xu, 2002-2003

Shirley Medjinsky, 2008-2010

Felix Goldberg, 2013

Tiruwork Mulat, 2013-2015

Rajesh Kannan 2014-2015

Roberto Diaz Martinez, 2015-2016

Ana Julio Torres, 2015-2016

Swarup K. Panda, 2017-2018

Ranveer Singh, 2018-2019

Nader Hilf, 2018-2019

Mirit Rahamim, 2018-2019

Visiting Ph.D. Students

Francesco Barioli, University of Padova 2000

Rade Stansojevic, The National University of Ireland 2004

LIST OF PUBLICATIONS

Books

1. A. Berman, Cones, Matrices and Mathematical Programming, Lecture Notes in Economic

- and Mathematical Systems 79, Springer Verlag, Berlin- Heidelberg-New York, 1973.
2. A. Berman and R.J. Plemmons, Nonnegative Matrices in the Mathematical Sciences, Computer Science and Applied Mathematics, Academic Press, 1979.
 3. A. Berman, M. Neumann and R.J. Stern, Nonnegative Matrices in Dynamic Systems, Pure and Applied Mathematics, Wiley, 1989.
 4. A. Berman and R.J. Plemmons, Nonnegative Matrices in the Mathematical Sciences, (Revision of [2]), Classics in Applied Mathematics, SIAM, Philadelphia, 1994.
 5. A. Berman and B. Z. Kon, Linear Algebra (in Hebrew), BAK, Haifa, 1999.
 6. A. Berman and N. Shaked-Monderer, Completely Positive Matrices, World Scientific, 2003.
 7. B. Abramovitz, M. Berezina, A. Berman and L. Shvartsman, Educating Undergraduate Students to Understand Mathematics, Lambert, 2017.
 8. N. Shaked-Monderer and A. Berman, Copositive and Completely Positive Matrices, World Scientific, 2021.
 9. A. Berman, The president problems. World Scientific, 2021.

Books (editor)

1. A. Berman, School Mathematics 2000 (in Hebrew), The S. Neeman Foundation, Haifa, 1989.
2. A. Berman, Promoting Excellence in Science and Technology Education (in Hebrew), The S. Neeman Foundation, Haifa, 1990.
3. A. Berman and S. Gueron, Promoting Mathematical Talent (in Hebrew), The S. Neeman Foundation, Haifa, 2002.
4. R. Leikin, A. Berman and B. Koichu, Creativity in Mathematics and the Education of Gifted Students, Sense Publishers, 2009.
5. S. Stewart, C. Andrews-Larson. A. Berman and M. Zandieh, Challenges and Strategies in Teaching Linear Algebra, Springer, 2018.

Papers

In Print (since 2011)

95. F. Goldberg and A. Berman, On the Colin de Verdiere number of Graphs, *Linear Algebra and its Appl.* 434 (2011), 1656-1662.
96. M. Farber and A. Berman, A lower bound for the second largest Laplacian eigenvalue of a weighted graph, *Electronic Journal of Linear Algebra* 22 (2011), 1179-1184.
97. A. Berman and D. Shasha, Completely Positive House Matrices, *Linear Algebra and its Appl.* 436 (2012), 12-26.
98. I. Kontorovich B. Koichu, R. Leikin and A. Berman, A framework for handling the complexity of students mathematics problem posing in small groups. *Journal of Mathematical Behavior* 31 (2012), 149-161.
99. A. Berman, C. King and R. Shorten, Common diagonal stability and co-stability, *Linear and Multilinear Algebra* 60 (2012), 1117-1123.
100. A. Shlote, F. Wirth, A. Berman and R. Shorten, On the higher moments of TCP. *Linear Algebra and its Appl.* 439 (2013), 899-913.
101. F. Goldberg and A. Berman, Zero Forcing for Sign Patterns. *Linear Algebra and its Appl.* 447 (2014), 56-67.
102. B. Abramovitz, M. Berezina and A. Berman, Learning to prove: From examples to general statements, *International Journal of Mathematical Education in Science and Technology.* 45/8 (2014), 1233-1248.
103. N. Shaked-Monderer, A. Berman, I. Bomze, F. Jarre and W. Schachinger, New results on the cp rank and related properties of co(mpletely) positive matrices, *Linear and Multilinear Algebra* 63 (2) (2015), 384-396.
104. M. Farber and A. Berman, A contribution to the connections between Fibonacci numbers and matrix theory, *Involve.* Vol. 8 (2015), No. 3. 491-501.
105. R. Kannan, N. Shaked-Monderer and A. Berman, Some properties of strong H-tensors and general H-tensors, *Linear Algebra and its Applications*, 476 (2015) , 42-55.
106. A. Berman, M. Dur, N. Shaked-Monderer and J. Witzel, Cutting planes for semidefinite relaxations based on triangle-free subgraphs, *Optimization Letters* 10(3) (2015).
107. A. Berman, M. Dur and N. Shaked-Monderer, Open problems in the theory of completely positive and copositive matrices, *Electronic Journal of Linear Algebra.* 29 (2015) 46–58.
108. R. Kannan, A. Berman and N. Shaked-Monderer, On weakly irreducible nonnegative tensors and interval hull of some classes of tensors, *Linear and Multilinear Algebra* (2015).
109. N. Shaked-Monderer, M. Duer and R. Kannan, SPN completable graphs, *Linear Algebra and its Applications*, 498 (2016), 58-73.

110. A. Berman, L. Shvartsman, Definitions are important : the case of linear algebra ", European Journal of Science and Mathematics Education, 4 (2016), 26-32.-
111. B. Koichu, E. Katz and A. Berman, Stimulating aesthetic response to mathematical problems by means of manipulating the extent of surprise, The Journal of Mathematical Behavior, 46 (2017),42-57.
112. R. Leikin, B. Koichu, A. Berman and S. Dinur, How are questions that students ask in high level mathematics classes related to general giftedness? ZDM, 49 (2017), 65-80.
113. M. Widder, A. Berman and B. Koichu, Dismantling visual obstacles to comprehension of 2-D sketches depicting 3-D objects, JRME, 2019
114. A. Berman, D.M. Chen, Z. B. Chen, W.Z. Liang and XiaoDong Zhang, A family of graphs that are determined by their normalized Laplacian spectra, LAA 548 (2018) 66-76.
115. A. Berman and N. Shaked-Monderer, Completely positive matrices, real, rational and integral, Acta Mathematica Vietnamica, 43 (2018), pp. 623-639.
116. N. Shaked- Monderer, M. Duer and A. Berman, Complete positivity over the rationals, Pure and Applied Functional Analysis 3(4) (2018), pp. 681-691.
117. A. Berman, N. Shaked-Monderer, R.Singh, X.-D. Zhang, Complete multipartite graphs that are determined, up to switching, by their Seidel spectrum, Linear Algebra and its Applications,564 (2019), 58-71.
118. A. Berman, N. Shaked-Monderer and S.K. Panda, Strongly self-inverse weighted graphs, ELA 36:80-89, 2020.
119. A. Ostrov , D. Neftin, A. Berman and R. Abed Elrazik, Polynomial values in Fibonacci sequences. Involve 13-4:597-605, 2020.
120. R. Singh, C. Zheng, N. Shaked-Monderer, A. Berman, Nonsingular (vertex-weighted) block graphs. Discrete Applied Mathematics, 2021.
121. R. Singh, N. Shaked-Monderer, A. Berman, Linear time algorithm to check the nullity of block **graphs**.
122. A. Berman and N. Shaked-Monderer, Triangle-free graphs and completely positive matrices, Central European Journal of Operations Research, 2021.

Submitted

1. M. Rahamim, A. Berman and B. Koichu, Scaffolding
Conference Proceedings (since 2011)

22 I. Kontorovich, B. Koichu, R. Leikin, and A. Berman, (2011). Indicators of creativity in mathematical problem posing: How indicative are they? pp. 120-125 in Proceedings of the 6th International Conference on Creativity in Mathematics Education and the Education of Gifted Students edited by M. Avotina, D. Bonka, H. Meissner, L. Ramana, L. Sheffield, & E. Velikova, University of Latvia, Riga, Latvia.

23. A. Berman and K. Okubo, Teaching Linear Algebra, DG3, ICME 2012.

24. A. Berman, B. Koichu, B and L. Shvartsman, Understanding understanding equivalence of matrices. Presented at the 8th Conference of the European Society for Research in Mathematics Education, Antalya, Turkey 2013.

25. M. Klinstern, B. Koichu and A. Berman, (2013). What do high school teachers mean by saying “I pose my own problems”?, pp. 185-192 In Proceedings of the 37th Conference of the International Group for the Psychology of Mathematics Education, Vol. 3, edited by A. M. Lindmeier and A. Heinze, Kiel, Germany, 2013.

26. M. Widder, A. Berman and B. Koichu, COMPREHENSION OF 2-D SKETCHES DEPICTING 3-D OBJECTS: DISMANTLING VISUAL OBSTACLES. PME 2014.

27. R. Singh, N. Shaked-Mondere and A. Berman, Linear time algorithm to check the singularity of block graphs, CALDAM 2019.

Chapters in Books (since 2011)

6. B. Abramovitz, M. Berezina, A. Berman and L. Shvartsman, A blended learning approach in mathematics, pp. 22-42 in Teaching Mathematics Online: Emergent Technologies and Methodologies, edited by A. A. Juan, M. A. Huertas, S. Trenholm and C. Steegman, IGI Global, 2012,.

7. A. Berman, F. Goldberg and R. Shorten, Comments on alpha stability with some extensions, pp. 19-30 in Variational and Optimal Control Problems on Unbounded Domains, edited by G. Wolansky and S. Zaslavsky, Contemporary Mathematics 69, AMS 2014.

8. R. Leikin and A. Berman, Nurturing Students with High Mathematical Potential in Israel: Some examples of special classes, programs and schools, in International Panorama of special secondary schools for the mathematically talented, edited by B. Vogeli and A. Karp, World Scientific.

9. A. Berman, Using Challenging Problems in Teaching Linear Algebra, pp. 369-378 in Challenges and Strategies in Teaching Linear Algebra, edited by S. Stewart, C. Andrews-Larson. A. Berman and M. Zandieh, Springer, 2018.

10. A. Berman and R. Leikin, Nurturing Students with High Mathematical Potential, pp. 155-163 in K-12 Mathematics Education in Israel, edited by N. Movshovitz-Hadar, 2018.

11. R. Singh, N. Shaked-Monderer, and A. Berman (2019), Linear time algorithm to check the singularity of block graphs, in S. P. Pal and A. Vijayakumar (eds.), Algorithms and Discrete Applied Mathematics (Springer International Publishing, Cham, pp. 77–90.

Research Report (2010)

Berman, A., Dana-Pickard, N., Koichu, B., Medzinsky, S., Nachlieli, T., & Svarkman, A. (2009). Exploration of the literature on secondary school mathematics programs in five countries (in Hebrew). Ministry of Education, 2010. http://meyda.education.gov.il/files/tochnioyt_Limudim/Portal/Skirot/MathSkira.pdf.

Papers in Hebrew (since 2011)

4. M. Widder, A. Berman and B. Koichu, ALEH 52 (2015).