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Phone: 054-2639173, 08-9352206

## EDUCATION

- 2002 - 2004** *Post Doctorate Studies, University of Toronto, Toronto, Canada.*  
Calculations of Quantum Mechanical Decoherence effects in Chemistry
- 2001 - 2002** *Post Doctorate Studies, Weizmann Institute of Science, Rehovot, Israel.*  
Multidimensional Fourier Grid Mapping methods
- 1997 - 2001** *Ph. D. (Honors) in Theoretical Chemical Physics, Bar Ilan University, Ramat Gan*  
Thesis: Semiclassical Treatment of Chemical Reaction Dynamics  
Advisor: Professor K. G. Kay
- 1992 - 1994** *B.Sc. (Summa Cum Laude) in Chemistry, Bar Ilan University, Ramat Gan.*
- 2010** *Teachers Certificate in Mathematics, Weizmann Institute of Science, Rehovot.*  
**2020** *Organizational Innovation Management Course, Israel Innovation Institute.*

## PROFESSIONAL EXPERIENCE

**April 2017 - present** *Davidson Institute of Science Education, Weizmann Institute of Science, Rehovot, Israel*

- **Founder and Director, Center for Innovation in Science Education**

I head the innovation center - a strategic tool for the management of the Institute to design, create and implement an innovative roadmap for science education. We achieve this by spawning unique Institute-wide projects, facilitating meetings, conferences and workshops for educators and scientists from the Weizmann Institute and similar organizations around the world and integrating state-of-the-art knowledge, pedagogies, and technologies throughout the programs of the Davidson Institute of Science Education. Current projects: the new, Clore 2.0 science museum on campus, the educational program for Ultrasat – the Weizmann Institute's space telescope initiative and Davidson's Digital Campus.

**2020 - present** *Gamification and Innovation in Education Cluster, Department of Education Western Galilee College, Akko, Israel*

- **Adjunct lecturer**

Courses:

- Introduction to innovation and creative thinking for undergraduate students, (2020-present)
- Creativity in math instruction - seminar for graduate students (M.A. in innovation in education) (2021-present)

- Dynamic applications for development of mathematical thinking for undergraduate students (2022-present)

**Jan-Mar 2017** *Davidson Institute of Science Education, Weizmann Institute of Science, Rehovot, Israel*

- Acting director of the Davidson Institute of Science Education, between terms of outgoing and incoming C.E.O's.

**2009 - 2016** *Davidson Institute of Science Education, Weizmann Institute of Science, Rehovot, Israel*

- **Director, Technology in Education Unit**

I founded and was the first director of the unit of technology in education. The unit was formed to enhance the use of innovative technology and techno-pedagogy throughout the Davidson Institute and to create and run innovative web-based science education and science communication initiatives. It is comprised of three groups: Online courses, technological and techno-pedagogical services, and science communication.

- **Recreational mathematician and popular scientist**

Lecturer / program designer / developer in the following programs:

- National recreational math, games, and puzzles conference (Chairman).
- Math and Science-by-Mail (Management, lecturer, developer)
- Astronomy Programs and Observations (Lecturer)
- Clore Garden of Science (Math exhibit consultation and design)
- Additional recreational math and popular science programs (Lecturer, scientific advisor)
- Massive Online Open Course designer and developer: Math Puzzles: cryptarithms, symbologies and secret codes, Flexagons, Introduction to recreational math, Flexagons Galore – an advanced flexagon course, Future Learn, 2016-present

**2004 - 2009** *Davidson Institute of Science Education, Weizmann Institute of Science, Rehovot, Israel*

- **Recreational mathematician and science educator, Online and Distant Learning Activities, General Public Unit** (formerly: Young at Science)

I served as an entrepreneur and manager of online and distant learning activities in Math and Science Education. In particular, I initiated the growth and digital transformation of the Math and Science-by-Mail programs and designed and managed the Institute's Science Communication website, Davidson Online. I also served as lecturer and consultant for many different programs within the Institute.

*Galileo Popular Science magazine (additional job for years 2007 - 2009)*

- **Monthly Columnist in "Galileo"**

*Bloomfield Science Museum, Jerusalem (additional job for years 2005 - 2006)*

- **Scientific Consultant, Tri-country mathematics exhibition**

*Tachkemoni Elementary School, Rehovot (additional job for years 2004 - 2005)*

- **Teacher, Math for excellent students (6'th grade)**

**2002 - 2005**    *Work (in addition to post-doctoral research position, Toronto, Canada)*

*University of Toronto, Toronto, Canada*

- **Instructor, Theoretical Chemistry Course for Ph.D. Students**

*Jewish Board of Education, Toronto, Canada*

- **Guest Lecturer, Professional Development Day for Math teachers in the Jewish Day School System in Toronto**

*Weizmann Canada, Toronto, Canada*

- **Initiated the translation of the Math-by-Mail program and began running the program in the Jewish day schools in Toronto**

**1997 - 2002**    *Work (in addition to a doctoral research position, Ramat-Gan, Israel)*

*Bar Ilan University, Ramat Gan, Israel*

- **Teaching assistant:**

Introduction to Quantum Chemistry course for third year undergraduate students.  
Quantum Chemistry and Spectroscopy course for third year undergraduate students.  
Introduction to Computers in Chemistry course for first year undergraduate students

*Young at Science, Weizmann Institute of Science, Rehovot, Israel*

- **Instructor and Developer:**

Math-by-Mail  
Math and Science Clubs for kids grades 5-7  
Chetz program for excellent high school students  
Math, Music and Art Summer Camp

*ORT Ebin Engineering College, Ramat Gan, Israel*

- **Lecturer, Electrochemistry for chemical engineers**

**1985 - 1997**    *Officer (Major), Branch head, Intelligence Corps, IDF (8200)*

## **GRANTS & AWARDS**

- 2002-2004 Henry Croft Post-Doctoral Fellowship (University of Toronto)
- 2002 Member of the Israeli Student Delegation to the 52<sup>nd</sup> Meeting of the Nobel Laureates, Lindau, Germany
- 2002 Feinberg School Post Doctoral Fellowship, Weizmann Institute of Science
- 2001 Friedmann Award in Chemical Physics
- 1999 Faculty of Exact Sciences Excellency Award
- 1998 Rector's Award for Outstanding Graduate Students
- 1997 Wolf Foundation Grant for Excellent Graduate Students
- 1992 IDF Chief of Staff Prize for Excellent Officers

## **TECHNOLOGY SKILLS**

- Programming Languages: C, C++, Python, MATLAB, Mathematica (Wolfram Programming Language), FORTRAN, JAVA
- Operating Systems: Windows, IOS, UNIX (Sun, Solaris), IBM Mainframe.
- Other: Parallel computing, HTML, PHP, MYSQL, Javascript, web technologies, Mobile programming.
- MOOC developer

## MEDIA

- Guest appearances on various TV and radio shows including: CTV Morning show (Toronto)
- Monthly guest interviewer on Israel TV (channel 11) and Radio
- Articles written in national news sites including: Ynet etc...
- [The Prisoner Boxes Riddle](#), TedEd
- [The Egg Drop Riddle](#), TedEd

## HOBBIES

Astronomy, Skiing, Violin.

## VOLUNTARY ACTIVITIES

2019-present	Hod Israel, distributing food for the needy in Rehovot
2019	Math activities for children with mental health disabilities, Geha hospital
2007-2015	Founder, Chairman, Tzori Organization for Children with Special Needs
2000-2001, 2005-2006	President, "Ohel Yitzchak Synagogue"

## SELECTED PUBLICATIONS

### **Education, Technology in Education, Innovation and Recreational Math**

1. Y. Elran, "A Generalization of Retrolife", chapter in: eds. T. Plambeck, and T. Rokiccki, Barrycades and Septoku: Papers in Honor of Martin Gardner and Tom Rodgers, Spectrum Vol. 100, AMS/MAA Press, Providence, Rhode Island, 2020
2. Y. Elran, "Twists, Tilings, and Tessellations A Review by Yossi Elran", Notices of the American Mathematical Society, 66 (pp 1326-1329), 2019
3. Y. Elran and A. Schwartz, "Should we call them flexa-bands?", chapter in: J. Beineke and J. Rosenhouse, "The Mathematics of Various Entertaining Subjects Volume 3", Princeton University Press, New Jersey, 2019
4. A. Lachish-Zalait, Y. Ben-Horin, O. Eckstein, Z. Elgali, Y. Elran, N. Bar-On and L. Ben-David, "The Davidson Institute of Science Education: Building bridges between science and people", New Perspectives in Science Education, Conference Proceedings, 2018
5. מיכל אלרון, כרמל בר, יוסי אלרון, "ביצועי הבנה - מתמטיקה בהתכתבות" כמקרה בוחן לכלי הערכה חדשני", JCRM5 Conference Proceedings, Jerusalem, Israel 2017
6. M. Elran, C. Bar, N. Bar-On and Y. Elran, "Do our MOOCs work? Creative Ways to Assess Innovative E-learning Programs", EDEN Conference proceedings, Budapest, Hungary, 2016
7. Y. Elran, "The Generalised Apex Magic Trick", Recreational Mathematics Magazine, 2, 53-58, 2014
8. C. Bar, M. Elran and Y. Elran, "Mind the Gap: Bridging the Gap between Scientists, Mathematicians and Elementary School Students", New Perspectives in Science Education, 2, 2013

9. Y. Elran, C. Bar, N. Bar-On and M. Elran, "The EDEN Online Nobel Prize Competition", EDEN Conference proceedings, Oslo, Norway, 2013
10. A. Weizmann, S. Kotzer, I. Schanin, Y. Elran and M. Kesner, "From E-learning to practice: the influence of online professional development of science teachers' practice", Science Education Research For Evidence-based Teaching and Coherence in Learning, Nicosia, Cyprus: European Science Education Research Association (2013)
11. Sabine Stöcker-Segre and Yossi Elran, "Interactive e-learning as a tool to overcome socio-economic and age-related disadvantages", EDEN Conference proceedings, Porto, Portugal, 2012
12. R. Lachmy, Y. Amir, S. Azmon, Y. Elran and M. Kesner, "Pythagoras' School Revived: Collaborative Learning of Mathematics Supported by Learning Management Systems in Secondary School, EduLearn 12 Proceedings, IATED, Barcelona, Spain, 2013
13. M. Elran, N. Bar-On and Y. Elran, "What can an e-learning recreational math program contribute to gifted children? "Math-by-Mail" as a case study", Proceedings, ICME 12, Seoul, Korea, 2012.
14. Yossi Elran, "Retrolife and The Pawns Neighbors", The College Mathematics Journal, 43, 147 (2012 ), reproduced as a chapter in M. Henley (ed.) and B. Hopkins (ed.), "Martin Gardner in the 21st Century", MAA (2012)
15. S. Kotzer and Y. Elran, "Learning and Teaching with Moodle-based E-learning Environments Combining Learning Skills and Content in the Field of Math, Science and Technology", Proceeding of 1st Moodle Research Conference, Crete, Greece, 2012
16. בר כרמל, אלרן יוסי ואלרן מיכל, ממגדל השן לכל המתעניין: תכניות למידה מרחוק למצטיינים במדע ובמתמטיקה, קריאת ביניים, 2011
17. Elran Michal, Bar Carmel and Elran Yossi, "From the university to the village: a sustainable math and science e-learning initiative for gifted students", EDEN Conference proceedings, Dublin, Ireland, 2011
18. Zahava Scherz, Marcel Frailich, Shulamit Kotzer, and Yossi Elran, "A Mediated Visual-based Computerized Environment for Investigation-based Learning about Solubility ", Proceedings of the 4<sup>th</sup> Knowledge Cities World Summit 2011,
19. Shulamit Kotzer ,Yossi Elran. "Development of E-Learning environments combining learning skills and science and technology content for junior high school ", Procedia - Social and Behavioral Sciences 00 (2010)
20. Shulamit Kotzer ,Yossi Elran. Online Informal Science Education – from "Math by Mail" to "Ask the Expert", EDEN Conference proceedings :Media Inspirations for Learning - *What makes the impact ?* Valencia, Italy, 2010)
21. "Retrolife", chapter contributed to "Homage to a Pied Puzzler", (editors: Erik Demaine, Martin Demaine and Tom Rodgers, A. K. Peters Ltd., Wellesley, MA)
22. Math by Mail, Y. Elran and M. Elran, Proceedings of the 5<sup>th</sup> International Conference on Creativity in Mathematics and the Education of Gifted Students, Haifa, Israel, Editor: R. Leikin.
23. Galileo Popular Science Magazine, recreational math column, vols. 106-133, Y. Elran and M. Elran, S. B. C. Publishers (in Hebrew), 2007-2009
24. "על מספרים מעניינים", יוסי אלרן ומיכל אלרן, מספר חזק, מאי 2006
25. "חשבון שעון ולוח שנה", יוסי אלרן ומיכל אלרן, מספר חזק, נובמבר 2006
26. Math-by-Mail, 2000-2016, Y. Elran and M. Elran, Weizmann Institute of Science (in Hebrew, recent volumes translated into English, Arabic and Spanish).

### **Theoretical Chemistry**

27. Quantum decoherence of I<sub>2</sub> in liquid Xenon: a classical Wigner approach, Y. Elran and P. Brumer, J. Chem. Phys. 138, 234308 (2013)

28. Temperature crossover of decoherence rates in chaotic and regular dynamics, A. S. Sanz, Y. Elran and P. Brumer, Phys. Rev. E, 85, 036218 (2012).
29. Scattering from an Eckart Barrier, Computer programs contributed to: D. Tannor, Introduction to Quantum Mechanics – A Time-Dependent Perspective, (University Science Books, Herndon, 2006).
30. Decoherence in an anharmonic oscillator coupled to a thermal environment: A semiclassical forward-backward approach, Yossi Elran and Paul Brumer, J. Chem. Phys. 121 2673 (2004)
31. Semiclassical Study of Decoherence of an Anharmonic Oscillator in a thermal bath, Y. Elran and P. Brumer, Abstracts of papers of the American Chemical Society, 121 2673 (2004)
32. Semiclassical IVR calculations of reactive collisions, Y. Elran and K.G. Kay, J. Chem. Phys. 116 10577 (2002)
33. Uniform Semiclassical IVR Treatment of the S-Matrix, Y. Elran and K.G. Kay, J. Chem. Phys. 114 4362 (2001)
34. Improving the Efficiency of the Herman-Kluk Propagator by Time Integration, Y. Elran and K.G. Kay, J. Chem. Phys. 110 3653 (1999)
35. Time-Integrated Form of the Semiclassical Initial Value Method, Y. Elran and K.G. Kay, J. Chem. Phys. 110 8192 (1999)

## PRESENTATIONS IN SCIENTIFIC MEETINGS

1. The Hebrew Calendar Doomsday, Gathering for Gardner 13, Atlanta, GA, USA, April 2018
2. "המה, האיך והלמה של החינוך המדעי העתידי", כנס עתידנות בחינוך, מכללת הגליל המערבי, עכו, ישראל, אפריל, 2022
3. "חדשנות וקסם בלמידת מתמטיקה – על טבעות מוביוס, פלקסגונים ועוד קיפולי נייר מתמטיים", כנס עתידנות בחינוך, מכללת הגליל המערבי, עכו, ישראל, מרץ, 2022
4. "חדשנות – לא מה שחשבתם", כנס יום המדע, מכון ויצמן למדע, רחובות, ישראל, מרץ, 2022
5. "יצירתיות במתמטיקה", השתלמות עירונית במתמטיקה, מעלות תרשיחא, ינואר 2022
6. Innovation in Science Education, Science, Education, Art conference, Haifa, Israel, July 2021
7. "על יצירתיות במתמטיקה", כנס מתמטיקה כיצירה, מכללת הגליל המערבי, עכו, ישראל, מאי, 2021
8. Flexagons Galore, West Chester University, Spring 2021 Mathematics Colloquium, Zoom, March 2021
9. Creative thinking and innovation in the classroom, Israel ambassadors course, Zoom, February 2021
10. All you need is paper, Celebration of Mind, Zoom, October, 2020
11. "חדשנות בחינוך מדעי", שומעים שש-שש, כנס חדשנות רחובות, ישראל, אוקטובר, 2020
12. "איקס עיגול - לא מה שחשבתם, ליל המדענים, רחובות, ישראל, ספטמבר, 2019"
13. Paper puzzles, MOVES conference, New York, USA, August 2019
14. Panel participant: STEM education, Israel Ed-tech Summit, Tel-Aviv. Israel, July 2019
15. How to "cut" a knot, demonstration, Science Centers Global Network Workshop, November, 2018
16. Innovation in Science Education, Science Centers Global Network Workshop, Israel, November, 2018
17. How we engage thousands of people learning math together all at once, really!, Israel Ed-tech Summit, Tel-Aviv. Israel, July 2018
18. "13 Ways to tie a knot in a paper band", Gathering for Gardner 13, Atlanta, GA, USA, April 2018
19. Invited speaker, "All you need is Paper", Museum of Mathematics, Manhattan, New York, USA, April 2018
20. "Should we call them Flexabands?", MOVES, New York, USA, August 2017

21. "The 100 Prisoners Puzzle Revisited", Gathering for Gardner, 12, GA, USA, March 2016
22. "Unusual problems that can be solved using chess pieces and a chessboard", Recreational Mathematics Colloquium, Lisbon, Portugal, 2015
23. כנס לינקס, אוניברסיטת חיפה, 2014, "יומנו של יוצר דיגיטאלי"
24. "The School of the Future", Next Future Science Festival, Invited Speaker, Genoa, Italy, 2014
25. "Can John Conway, Retrolife, the number 11 and a mathematical magic trick be coherently addressed in 5 minutes", Gathering for Gardner 11, Atlanta, GA, USA, March 2014
26. "Digital creative writing for math and science education", Creative writing in Mathematics workshop, Banff, 2013
27. "Have a GO at LIFE", Gathering for Gardner 10, Atlanta, GA, USA, March 2012
28. "From the university to the village: a sustainable math and science e-learning initiative for gifted students", EDEN Conference, Dublin, Ireland, 2011
29. "תפוס את ההייל – בחיים" והידות מעניינות נוספות, הכנס השביעי למשחקי חשיבה, מכון ויצמן למדע, רחובות, מאי 2011
30. מפגשים עם מצטיינים במרחב הדיגיטאלי, מיכל אלרן, כרמל בר ויוסי אלרן, הכנס הארצי הרביעי למצוינות בישראל, חיפה 2011
31. Variations on Tic-Tac-Toe and other pencil and paper games, Conference for Math Education in the elementary school, Carmiel, Israel, January 2010
32. Math and Word Games, National Conference for Math Education in the elementary school, Jerusalem, Israel, July 2009
33. Which online science activities engage the public the most? ECSITE, Milan, Italy, June 2009
34. Retrolife, The 4<sup>th</sup> Recreational math, puzzles and games conference, Rishon LeZion, Israel, March 2008
35. A Graeco-Latin Search Game, Gathering for Gardner 8, Atlanta, GA, U.S.A., March 2008
36. Math by Mail, The 5<sup>th</sup> International Conference on Creativity in Mathematics and the Education of Gifted Students, Haifa, Israel, February 2008
37. ליאונרד אוילר – משתתף קבוע בפעילות מתמטיקה לנוער במכון ויצמן למדע, הכנס השנתי של ההינוך המתמטי העל-יסודי, כפר המכביה, מרץ 2006
38. חוג למתמטיקה בהתכתבות: אתגר לתלמיד ברוך הכשרונות, כנס "מקצה אל קצה", ירושלים, פברואר 2006
39. Retrolife, Gathering for Gardner 7, Atlanta, GA, U.S.A., March 2006
40. Decoherence in an Anharmonic Oscillator Coupled to a Thermal Bath, Quantum Information and Quantum Control Conference, Toronto, Canada July 2004.
41. Semiclassical treatment of the S-Matrix, 5<sup>th</sup> Canadian Conference of Computational Chemistry, Toronto, Canada July 2003.
42. Semiclassical IVR calculations of reactive collisions, Symposium on Semiclassical Mechanics, Weizmann Institute, Israel May 2002.
43. Semiclassical Calculations of Molecular Dynamics, Colloquium, Hebrew University, Jerusalem, Israel, January 2002.
44. Uniform Semiclassical IVR Treatment of the S-Matrix, Charles Coulson Summer School, Oxford University, Oxford, UK. August 2001.
45. Between Quantum and Classical Mechanics: Semiclassical Calculations of Molecular Dynamics, Colloquium, Bar Ilan University, Ramat Gan, Israel May 2001.
46. Uniform Semiclassical IVR Treatment of the S-Matrix, MOLEC 2000 European Conference on Molecular Dynamics, Jerusalem, September 2000.
47. Improving the Efficiency of the Herman-Kluk Propagator by Time Integration. Symposium on Semiclassical Mechanics, Weizmann Institute, Rehovot, Israel November 1998.

## CONFERENCE CHAIRS AND COMMITTEES

1. M.A. Teaching committee, literacy and innovation in education
2. Advisory board, MathsWorld UK, 2015-present

3. Board member, Israeli Math Museum Initiative 2016-present
4. Chairman, International "Celebration of Mind" Committee, Gathering 4 Gardner Organization, 2014-2017
5. Board member, MEITAL - Inter University Center for E-Learning, 2009-2013
6. Conference committee member, Chais Conference on the Study of Innovation and Learning Technologies, Chais Research Center for the integration of technology in education, 2009-2018, 2022
7. Conference Chairman, "כנס מיט"ל", MEITAL - Inter University Center for E-Learning, March, 2012
8. Conference Chairman, "כנס משחקי השיבה", The National Recreational Math, Puzzles and Games Conference, Davidson Institute of Science Education, Weizmann Institute of Science, 2009-present
9. Advisory Board, Google Teachers Academy, Google Israel 2011-2012

## BOOKS

1. I. Garibi, D. Goodman and Y. Elran, "The Paper Puzzle Book", World Scientific Press, Singapore, 2017
2. Y. Elran, "Lewis Carroll's cats and rats and other puzzles with long tales", World Scientific Press, Singapore, 2021

## MOOC's (developed and run)

1. Flexagons galore, Future Learn, length: 6 weeks, 2 hours/week, 432 active learners (714 enrolments), 2021-present, <https://www.futurelearn.com/courses/further-explorations-of-flexagons>
2. Flexagons and the math behind twisted paper, Future Learn, length: 5 runs, 3 weeks/run, 4 hours/week, 3262 active learners (5560 enrolments), 2018-present, <https://www.futurelearn.com/courses/flexagons>
3. Introduction to recreational math, Future Learn, length: 5 runs, 3 weeks/run, 4 hours/week, 11,717 active learners (17,254 enrolments), 2018-present, <https://www.futurelearn.com/courses/recreational-math>
4. Math Puzzles: cryptarithms, symbologies and secret codes, Future Learn, length: 14 runs, 3 weeks/run, 4 hours/week, 25,081 active learners (50,334 enrolments), 2016-present, <https://www.futurelearn.com/admin/courses/maths-puzzles>