CURRICULUM VITAE

Professor Boris Tsukerblat

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1. Education:

- M. Sc. in Physics, physical faculty, State University of Kishinev, Moldova, 1961.
- Postgraduate (1961-1964). Thesis advisor: Professor Yury E. Perlin.
- Candidate of Sciences-PhD (Phys. & Math.) Kazan State University (1967)
  Thesis: "Multiphonon processes in the impurity centers of crystals"
- Doctor of Sciences (Phys. & Math.) State University of Tartu, Estonia (1975),
  Thesis: "Vibronic and exchange interactions in doped crystals".

2. Professional experience:

Titles:

- Full Professor of Theoretical and Mathematical Physics, Moscow (1986).
- Corressponding Member of the Academy of Sciences of Moldova (1995).

Employment details

- Institute of Chemistry, Academy of Sciences of Moldova, Kishinev (1965-1998)
  Junior Researcher, Leading Researcher, Chief Researcher.
- Institute of Applied Physics,Academy of Sciences of Moldova, Kishinev (1996-2002)
  Chief Researcher.
- Full Professor of the Theoretical Physics Department, Moldavian State University (1975-1995)
- From May,1, 2002 - Department of Chemistry, Ben-Gurion University of the Negev, Beer-Sheva, Israel, Full Professor.

Visiting and Invited Professor

- **Poland:** Wroclaw, October 1989 (Institute of Low Temperature and Structural Research, Polish Academy of Sciences, Wroclaw);
- **Bulgaria:** Sofia, April 1990 (Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, Sofia);
- **Italy**: Florence, April 1990; October-December 1991; December-February 1993; September - October 1994 (University of Florence);
- **USA:** January - February 1991 (Univ. of Virginia, Institute of Technology, Georgia, Carnegie-Mellon University, Pittsburgh, University of North Carolina, Chapel-Hill); Texas A&M University, January, 2002; Texas A&M University, April, 2004.
- **France :** Bordeaux, December 1992 (University of Bordeaux); March 1994, (Universite de Paris Sud, Universite Pierre et Marie Curie); February-May 1996 ; February -May 1997 (Universite Pierre et Marie Curie).
- **Spain:** Valencia, September-December 1992; November 1993-February 1994; November 1995 - February 1996; May-June 1996; October-December 1996; October 1998-December 1999; February-May 2000; December 2000; August-September 2001,August-October 2002; April-June, 2003; October-December, 2004 (University of Valencia); October, 2005 (University of Valencia). November, 2017-Feb.2018 (Institut for Molecular Sciences, University of Valencia).

3. Main areas of research:

- Molecular magnetism and molecule-based magnetic materials: exchange interactions, double exchange and mixed valence in metal clusters. Physics of nanoscopic objects, nanotechnological applications: single-molecule magnets as storage units, quantum bits (qubits), quantum computing. Molecular quantum cellular automata.
- Cooperative phenomena in molecule based magnets: charge and structural ordering in mixed valence systems, spin-crossover.
- Vibronic interactions and Jahn-Teller effect in molecules and crystals. Spectroscopy of transition metal complexes and impurity centers in doped crystals. Vibronic problem of mixed valence systems. Optical materials: laser and luminescent crystals, light emitting diods-LEDs, phosphors.
- Computational approaches in theoretical chemistry: group theory and theory of irreducible tensor operators as applied to molecular magnetism and Jahn-Teller effect.

- **4. Memberships, awards**

• COST (European Cooperation in Science and Technology) Management Committee (MC) member (from Israel**),** COST Action CA15128, COST Association Molecular Spintronics (MOLSPIN), 11April 2016- 10 April 2020.

• COST (European Cooperation in Science and Technology) Management Committee (MC) member (from Israel), COST Action 1203: COST Association Polyoxometalate Chemistry for Molecular Nanoscience (PoCheMoN). 26 July 2012- November 8, 2016

• Member of the Committee for the International Oliver Kahn Award in framework of the European Community MAGMANET Network of Excellence (2008)

• State Prize Laureate- Science and Techniques, Republic of Moldova, 1987.

• Member of the Editorial Board of the "Journal of Chemistry of Moldova".

• Member of the Editorial Board of the "Physical Journal of Moldova".

• Member of the Editorial Board of the journal "Scientific Research and Essays"

• Member of the Editorial Board of the journal "Magnetochemistry"

• Member of Scientific Councils of the Academy of Sciences of the former USSR: Chemical Kinetics and Structure (Quantum Chemistry Division); Inorganic Chemistry (Solid State Chemistry Division), Moscow.

• Member of Scientific Councils of the Moldavian Academy of Sciences: Coordination Chemistry, Theoretical Physics, Biophysics.

• Member of the Israel Chemical Society.

5. Research grants (since 2002):

2003- 2006 -Optimization of infra-red radiative characteristics in chromium doped CdSe crystals. *USA-Israel Binational Science Foundation* (*BSF*), PI

2004- 2008- Study of the magnetic exchange and electron delocalization in nano-size molecule based materials: from synthesis of giant metal clusters to single molecule magnets. *German- Israeli Foundation for Scientific Research and Development* (*GIF*), PI

2007- 2011- Study of cyanide-based clusters containing orbitally degenerate metal ions: from synthesis to new multifunctional optical and magnetic materials, *USA-Israel Binational Science Foundation* (*BSF*), PI

2009- 2013- Molecular magnets for quantum computing: problem of spin relaxation and coherence, *Israel Science Foundation* (*ISF*), PI

2013-2016- *European COST: European Cooperation in Science and Technolo*gy, Cost Action CM1203 "Polyoxometalate Chemistry for Molecular Nanoscience (PoCheMon)", Molecular nanomagnetism and POM-based molecular spintronics.

2015-2017- *Moléculas Magnéticas de Interés en Computación y Espintrónica Cuánticas*, CTQ2014-52758-P (Grupo de trabajo).

2017-2020- Design and study of new single molecule/ion magnets and molecular magnetic switching units with potential applications as robust qubits, single-molecule multiferroics, molecular quantum cellular automata, and nano-elements for spintronics, *Project from Ministery of Education and Science of Russian Federation* (Agreement No. 14.W03.31.0001).

6. Teaching courses (BGU, Chemistry Department**):**

- Electron-vibrational spectroscopy of molecular systems and laser crystals
- Molecular magnetism and nano-magnetic materials- theory and applications

7. Dissertations directed

21 dissertations of "Candidate of Sciences" (equivalent to Ph.D.) and Ph.D. and 5 dissertations of "Doctor of Sciences".

8. Seminars and Invited lectures at the Universities (since 2002):

1. Mixed valency: a short overview of the field (Chemical Department, Ben-Gurion University of the Negev, June, 11, 2002).
2. Problem of magnetic anisotropy in orbitally degenerate exchange and mixed-valence clusters (Department of Chemistry and Biochemistry University of Bern, Switzerland, January, 9, 2003).
3. A Pseudo Jahn-Teller model of sulphide spinels doped with Cr^{3+} ions-radiative properties (Department of Chemistry and Biochemistry University of Bern, Switzerland, January, 11, 2003)
4. Problem of magnetic anisotropy in orbitally degenerate exchange and mixed-valence clusters (University of Fribourg , Switzerland , January, 8 , 2003)
5. Exchange interaction between orbitally degenerate ions: magnetic anisotropy in metal clusters (Weizmann Institute of Science, Rehovot, Israel, March 19, 2003).
6. Why is the magnetic exchange in $Cs_3Yb_2Cl_9$ and $Cs_3Yb_2Br_9$ crystals isotropic? (Institute for Molecular Sciences, University of Valencia, Spain, May, 20, 2003)
7. Role of the orbitally degenerate Mn(III) ions in the single molecule magnet behavior of a trigonal bipyramidal cyanide cluster $\{[Mn^{II}(tmphen)_2]_3[Mn^{III}(CN)_6]_2\}$ (tmphen = 4,5,7,8-tetramethyl-1,10-phenantroline (Texas A&M University, USA, April, 28, 2004)
8. Electron –vibrational spectroscopy of the doped crystals- semiclassical theory (Materials Science Department, Ben-Gurion University of the Negev, April, 2, 2004).
9. Single molecular magnet Mn_5-cyanide - origin of the magnetic anisotropy (Department of Chemistry, Ben-Gurion University of the Negev, June,14,2004).
10. Single molecular magnets- magnetic anisotropy in Mn_5-cyanide cluster (University of Barcelona, Spain, 12 December, 2004).
11. Magnetic anisotropy in nano-clusters of transition metal ions-rational approach to the design of new single molecule magnets (University of Stuttgart, Germany, 27 January, 2005).
12. Single-molecule magnet Mn5-cyanide, magnetic anisotropy (Carnegue-Mellon University, Pittsburgh, USA, 8 February, 2006).
13. Antisymmetric exchange in V_{15} molecule (University of Florence, Italy, 4 September, 2006).
14. Spin frustration in nanoscopic cluster V15: antisymmetric exchange and magnetization, (Fakultät für Chemie der Universität Bielefeld, Bielefeld, Germany. November, 10, 2006).
15. Nanoscopic spin frustrated cluster V15: antisymmetric exchange and magnetization (Anorganisch Chemisches Institut, University of Heidelberg, Germany (November, 2, 2006).
16. Spin frustration in nanoscopic cluster V15: antisymmetric exchange and magnetization (School of Engineering and Science, Bremen, Germany, November, 7, 2006).
17. Spin frustration in nanoscopic cluster V15: antisymmetric exchange and magnetization (Forschungszentrum Jülich, Institut für Festkörperforschung, Jülich, Germany, November, 8, 2006).
18. Spin frustration in the nanoscopic molecule V_{15}: magnetic manifestations (Institut für Physik der (Kondensierten Materie, Technische Universität Braunschweig, Germany, Nov.,13, 2006).

19. Nanoscopic spin-frustrated cluster V15: antisymmetric exchange and instability (Universität Osnabrück, Fachbereich Physik, Osnabrück, Germany, 14, November, 2006).
20. Nanoscopic spin-frustrated cluster V_{15}: antisymmetric exchange and instability (Chemical Department, Ben-Gurion University of the Negev, June, 6, 2007).
21. Exchange interactions in metal clusters with unquenched orbital angular momenta Max Plank Institute für Bioanorganische Chemie, Mülheim an der Ruhr, Germany. September, 5, 2007
22. Exchange interactions in metal clusters with unquenched orbital angular momenta Fakultät für Chemie der Universität Bielefeld, Bielefeld, Germany. October, 4, 2007.
23. Spin frustration in the nanoscopic molecule V15: magnetic manifestations Hahn-Meitner-Institut, Berlin, Germany. September, 24, 2007.
24. Molecular magnetism and magnetic materials - some basic issues. Institut für Physik der Kondensierten Materie, Technische Universität Braunschweig, Germany. September, 29, 2007.
25. Spin frustration and antisymmetric exchange in the nanoscopic cluster V15 University of Barcelona, Department of Chemistry, 5 October, 2007
26. Spin frustration and antisymmetric exchange in the nanoscopic cluster V15 University of Zaragoza, 3, October, 2007
27. Nanoscopic cluster V15: spin frustration and antisymmetric exchange, Jerusalem, The Hebrew University, Fritz Haber Research Center,31, July, 2008
28. Spin frustration and antisymmetric exchange in the nanoscopic cluster V15 University of Tartu, Estonia, 25 June, 2008
29. Exchange coupling of metal ions with the unquenched orbital angular momenta, Department of Chemistry, Ben-Gurion University of the Negev, November, 17, 2008.
30. Symmetry in molecular magnetism: how to understand more and to calculate faster, University of Osnabruek, Germany, 22 June, 2009.
31. Jahn-Teller effect in molecular magnets: localized and delocalized Systems, University of Bielefeld, Germany, 25 June, 2009.
32. Beyond spin model: exchange coupling in metal clusters with unquenched orbital angular momenta, University of Karlsruhe, Germany, 1 July, 2009.
33. Jahn-Teller effect in molecular magnets: an overview, University of Frieburg, 2 July, 2009.
34. The nanoscopic cluster V_{15}: a unique magnetic polyoxometalate (Department of Chemistry, Texas A&M University) 10 June, 2010.
35. Beyond spin model: exchange coupling in metal clusters with unquenched orbital angular momenta (Department of Chemistry, Texas A&M University) 11 June, 2010.
36. Exchange coupling in metal clusters with degenerate ions (National High Field Magnetic Laboratory, Talahassee, USA) 18 June, 2010.
37. Jahn-Teller effect in molecular magnets: an overview (Florida State University, Talahassee) 11 June, 2010.
38. Molecular magnetism: a new faschinating field at the border line of physics, chemistry and materials science (University of the Academy of Sciences of Moldova, Kishinev, Moldova) Sept. 20, 2010.
39. Molecular magnetism: from scientific concepts to nanotechnological applications (University of the Academy of Sciences of Moldova, Kishinev, Moldova) Oct. 10, 2012.
40. Mixed valency and double exchange: a symmetry adapted approach to the non-adiabatic electron-vibrational problem (Ben-Gurion University of the Negev, Dept. of Chemistry) March, 2012
41. Towards quantum computing with molecular magnets (University of Granada, Spain) 23 Nov., 2012.
42. Towards quantum computing with molecular magnets: the nanoscopic spin frustrated vanadium cluster V_{15} (University of Nicosia, Cyprus) 22 January, 2013.

43. The nanoscopic spin frustrated vanadium cluster V_{15}: magnetisn, EPR and prospects for quantum computing, Slovak University of technology, Bratislava, 4 july, 2014
44. Science and life: a personal view, Colegio Major, Valencia, Spain, 18 nov. 2015.
45. A paradigm of quantum-dot cellular automata: molecular implementation, University of Taragonna, Spain, 6 Nov., 2014.
46. A paradigm of quantum-dot cellular automata**:** molecular implementation, Institute of Applied physics, Academy of Sciences of Moldova, 18 march, 2015
47. Basic science paves new routes in nanotechnologies: molecular magnets and quantum computing, Academy of Sciences of Moldova, 24 March, 2015.
48. Molecular magnetism and applications in quantum computing, Weizmann Institute, Rehovot, 20 May, 2015.
49. Molecular magnets: from basic science to new nanotechnologies, Ariel University, Ariel, Israel, 3 Jan., 2016
50. Electric field tunable mixed valence magnetic molecules, Institute of Problems of Chemical Physics, Russian Academy of Sciences, Chernogolovka, Russia, 20 Sept. 2017.
51. Electron delocalization and double exchange in mixed-valence magnetic clusters, Institute of Problems of Chemical Physics, Russian Academy of Sciences, Chernogolovka, Russia, 17 June, 2017
52. Quantum cellular automata based on mixed-valence molecular systems, Institute of Problems of Chemical Physics, Russian Academy of Sciences, Chernogolovka, Russia, 19 June, 2017.

9. Organization of the International Conferences (since 2002)

1. Member of the International Organizing Committee of the *XVI Jahn-Teller Symposium*, Belgium, Leuven, Aug.26-Sept. 1, 2002.
2. Member of the International Organizing Committee of the *XVII Jahn-Teller Symposium*, China, Beijing, August, 2004.
3. Member of the International Organizing Committee of the *XVIII Jahn-Teller Symposium*, Italy, Trieste August, 2006.
4. Member of the International Organizing Committee of the *Third International Conference on Mathematical Modeling and Computer Simulation of Materials Technologies* (MMT- 2004) Ariel, Israel, September 6 -10, 2004.
5. Member of the International Organizing Committee of the *2nd International Conference on Material Science and Condensed Matter Physics,* Kishinev, Moldova, September, 21- 26, 2004.
6. Member of International Organizing Committee of the *Forth International Conference on Mathematical Modeling and Computer Simulation of Materials Technologies* (MMT- 2006 Ariel, Israel , September 6 -10, 2006.
7. Member of the International Advisory Board of the XV-th International Conference "*Physical Methods in Coordination and Supramolecular Chemistry*", Chisinau, Moldova, Sept., 27 - Oct., 1, 2006.
8. Member International Organizing Committee of the *Symposium Magnetic Resonance in Condensed Matter* (MRCM - 2007) Chisinau, Moldova, 11-13 October 2007.
9. Member of the International Organizing Committee of the *XIX Jahn-Teller Symposium*, Germany, Heidelberg, 25-29 July, 2008.
10. Member of International Organizing Committee of the Fifth International Conference on *Mathematical Modeling and Computer Simulation of Materials Technologies* (MMT- 2008) Ariel, Israel , September 8 -12, 2008.
11. Member of International Organizing Committee of the *4th International Conference on Materials Science and Condensed Matter Physics*, Chisinau, Moldova, Sept. 24-26, 2008.
12. Member of International Organizing Committee of the the *International Conference dedicated to the 50th anniversary from the foundation of the Institute of Chemistry* of the Moldavian Academy of Sciences, Chisinau, Moldova, May 25-29 , 2009.
13. Member of the International Organizing Committee of the *XX Jahn-Teller Symposium*, Switzerland, Freiburg, 23-26 August, 2010.

14. Member of International Organizing Committee of the *Sixth International Conference on Mathematical Modeling and Computer Simulation of Materials Technologies* (MMT- 2010) Ariel, Israel , August, 23-27, 2010.
15. Member of International Organizing Committee of the *5th Conference on Materials Science and Condensed Matter Physics*-MSCMP, Kishinev, September 13 - 17, 2010 Moldova
16. Member of International Organizing Committee of the *5th Conference on Materials Science and Condensed Matter Physics*-MSCMP, Kishinev, September 11 - 14, 2012 Moldova
17. Member of the International Advisory Board of the XVII-th International Conference "*Physical Methods in Coordination and Supramolecular Chemistry*", Chisinau, Moldova, October 24-26, 2012, 2012.
18. Member of the International Organizing Committee of the *XXI Jahn-Teller Symposium*, Japan, Tsukuba, 27-31 August, 2012.
19. The International Conference dedicated to the 55th anniversary from the foundation of the Institute of Chemistry of the Academy of Sciences of Moldova.May 28 - May 30, 2014, Chisinau, Moldova.
20. Member of the International Organizing Committee of the *XXII Jahn-Teller Symposium*, Graz, Austria, 18-22 August, 2014.
21. Member of the International Organizing Committee of the *International Conference on material science and condensed matter physics*, Kishinev, Moldova, 16-19 Sept. 2014.
22. Member of the International Organizing Committee of the *XXIII Jahn-Teller Symposium*, Tartu, Estonia, 27-31 August, 2016.
23. Member of the International Organizing Committee of the *XXIV Jahn-Teller Symposium*, Santander, Spain, 24-29 June, 2018.
24. Member of the International Advisory Committee of the XVII International Feofilov Symposium on Spectroscopy of Crystals Doped with Rare Earth and Transition Metal Ions , September 23–28, 2018, Ekaterinburg, Russia
25. Member of the Scientific Committee of the Global Chemistry and Engeneering Conference, Valencia, March, 35-27, 2019, Spain
26. Member of the Steering Commettee of the *16th European Conference Physics of Magnetism,* 2020 (PM'20), Poznań, Poland, June 22 - 26, 2020.
27. Member of the International Organizing Committee of the *XXV Jahn-Teller Symposium*, USA ,Telluride (Colorado), June 14-17, 2020.

10. Research publications , highlights

(380- books, review articles, invited chapters in the books, papers)

h-index-32.

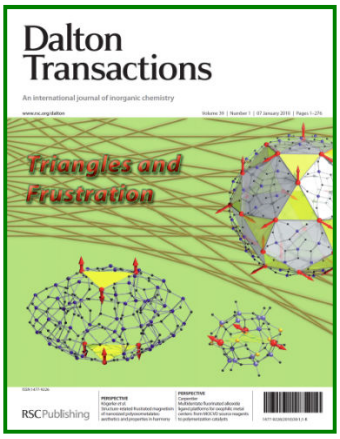
Sum of times cited - **5,021** (from Web of Science, 09 July, 2019)

Highlights:

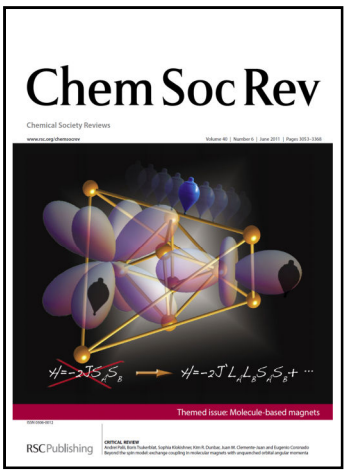
The article "High-Nuclearity Magnetic Clusters: Generalized Spin Hamiltonian and Its Use for the Calculation of the Energy Levels, Bulk Magnetic Properties, and Inelastic Neutron Scattering Spectra"(J.J.Borrás-Almenar, J.M.Clemente-Juan, E.Coronado, **B.S.Tsukerblat**), published in ***Inorganic Chemistry*** is being featured on the ACS Publications website [http://pubs.acs.org/journals/promo/most/highly_cited/index.html] as a "*Highly Cited Paper*" as defined by Thomson Scientific (ISI) Essential Science Indicators (top 1% of the most-cited papers during the last **10** years). Cited 720 times, 09 July, 2019

The article: "Quantum oscillations in a molecular magnet" (S. Bertaina, S. Gambarelli, T.Mitra, **B. Tsukerblat**, A. Müller, B. Barbara), ***Nature***, 453 (2008) 203 was **highlighted in**:
P.C.E. Stamp, Stopping the rot, *Nature*, 453 (2008) 167.
R. E. P. Winpenny, Quantum Information Processing Using Molecular Nanomagnets As

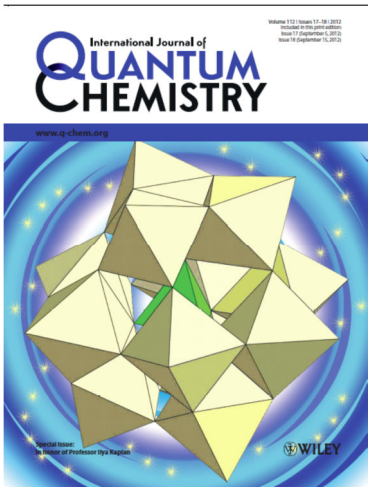
Qubits, *Angew. Chem. Int. Ed.* 2008, 47, 2–5.
http://arstechnica.com/news.ars/post/20080527-molecular-magnets-in-soap-bubbles-could-lead-to-quantum-ram.html
http://web.bgu.ac.il/Eng/home/News/Boris+Tsukerblat.htm
http://www.chemie.de/news/d/82028/
http://www.bulletins-electroniques.com/actualites/54634.htm
http://www.scinexx.de/wissen-aktuell-8220-2008-05-14.html
http://idw-online.de/pages/de/news259540
http://www.spectroscopynow.com/coi/cda/detail.cda?id=18633&type=Feature&chId=5&page=1



Cover image:
P. Kögerler, B. Tsukerblat, A. Müller, Structure-Related Frustrated Magnetism of Nanosized Polyoxometalates: Aesthetic Beauty and Properties in Harmony,
***Dalton Transactions, 39* (2010) 21–36.**



Cover image:
A. Palii, B. Tsukerblat, S. Klokishner, K. Dunbar, J. M. Clemente-Juan, E. Coronado, Beyond the spin model: Exchange coupling in molecular magnets with unquenched orbital angular momenta,
***Chemical Society Reviews*, 40 (2011) 3130–3156.**



Cover image:

B. Tsukerblat, A. Palii, J.M. Clemente-Juan, A. Gaita-Ariño, E. Coronado,
A Symmetry Adapted Approach to the Dynamic Jahn-Teller Problem: Application to Mixed-Valence Polyoxometalate Clusters with Keggin Structure ,
Int. J. Quantum Chemistry*, *112
(2012) 2849–2980.