

Shlomo Gelaki - CV

Professor, Department of Mathematics
Technion - Israel Institute of Technology

Email: gelaki@math.technion.ac.il

Personal webpage: <http://www2.math.technion.ac.il/~gelaki/>

Education:

Ph.D. (Summa Cum Laude)	1997, Mathematics, Ben - Gurion University, Israel.
M.Sc. (Summa Cum Laude)	1992, Mathematics and Computer Science, Ben - Gurion University, Israel.
B.Sc. (Summa Cum Laude)	1989, Mathematics and Computer Science, Ben - Gurion University, Israel.

Appointments:

2015 -	Professor, Technion.
2006 - 2015	Associate professor (tenure), Technion.
2000 - 2006	Senior lecturer (tenure track), Technion.
1999 - 2000	Post-doctoral fellow, MSRI, Berkeley.
1998 - 1999	Assistant professor, University of Southern California.
1997 - 1998	Post-doctoral fellow, Harvard University.
1993 - 1997	Teaching assistant, Ben - Gurion University.
1992 - 1993	Teaching assistant, University of Illinois at Chicago.
1990 - 1992	Teaching assistant, Ben - Gurion University.
1988 - 1990	Teaching assistant, Tel Aviv University.

Term Positions:

- *Visiting Professor, University of Michigan:* January 2018 - December 2018.
- *Research Member, MSRI:* August 2017 - December 2017.
- *Research Scholar, University of Michigan:* May 2017 - August 2017.
- *Visiting Associate Professor, University of Michigan:* September 2015 - December 2015.
- *Visiting Associate Professor, University of Oregon:* September 2013 - September 2014.
- *Research Scholar, MIT:* August 2006 - August 2007.
- *Visiting Professor, University of New Hampshire:* September 2006 - May 2007.
- *Research Scholar, MIT:* July 2017, August - September 2012, January 2012, September 2010, August - September 2008, August - October 2005, August - October 2004, February - March 2004, September 2003, September - October 2002, September 2001, October 2000.
- *Visiting Professor, Universidad Nacional De Cordoba:* August 2001, September 2000.

Research Interests:

Algebra. In particular, Hopf algebras, quantum groups, representation theory and tensor categories.

Honors:

- 2000 - 2002, Academic lectureship, David Posnack Memorial Lectureship Fund - USA, Technion.
- 2000, Levitzki prize. A national prize awarded every two years to an excellent Israeli mathematician for research in Algebra or related areas.
- 1999, A full year post-doctoral fellowship at MSRI, Berkeley.
- 1997, Rothschild Fellowship.
- Various university fellowships given for academic achievement: Ben Gurion University (1987 - 1990, 1992, 1995, 1996), The University of Illinois at Chicago (1991).

Research Grants:

- *Israel Science Foundation*. Tensor categories and quantum groups. 2012 - 2016. 180,000 NIS per year.
- *United States-Israel Binational Science Foundation*. Tensor categories with applications to Hopf algebras. 2009 - 2013. \$19000 per year. (Joint with P. Etingof and D. Nikshych.)
- *Israel Science Foundation*. Fusion categories and Hopf algebras. 2009 - 2012. 152,000 NIS per year.
- *Israel Science Foundation*. Hopf algebras, quasi-Hopf algebras and finite tensor categories. 2005 - 2009. 176,000 NIS per year.
- *United States-Israel Binational Science Foundation*. Hopf algebras and tensor categories. 2003 - 2007. \$22000 per year. (Joint with P. Etingof and V. Ostrik.)
- *Israel Science Foundation*. Hopf Algebras: classification, structure theory, twisting and relationships with tensor categories. 2002 - 2005. \$35,000 per year.

Membership In Professional Societies

- Israel Mathematical Union (IMU).
- European Mathematical Society (EMS).
- American Mathematical Society (AMS).

Graduate Students and Postdoctoral Fellows:

Ph.D Students

- Ehud Ben-Meir (Summa Cum Laude), *On certain cohomological properties of a group and their reflection in a finite index subgroup*, 2005 - 2010. (Joint with Prof. Eli Aljadeff.)
- Daniel Sebbag, *On the structure and properties of supergroup-theoretical categories*, 2010 - 2017.

Master Students

- Nir Ben David, *On groups of central type*, 2001 - 2005. (Joint with Prof. Eli Aljadeff.)
- Muhammad Abu-Hamed, *Frobenius-Schur indicators for the representation categories of semisimple Lie algebras*, 2003 - 2006.
- Joseph Shtok, *On group-theoretical categories*, 2004 - 2007.
- Evgeny Musicantov (Summa Cum Laude), *Extensions and equivariantizations of fusion categories*, 2007 - 2011.

Postdoctoral Fellows

- Carlo Rossi, 2003 - 2005 (Ph.D from ETH with Giovanni Felder).
- Crystal Hoyt, 2011 - 2013 (Ph.D from Berkeley with Vera Serganova).
- Tanmay Deshpande, 2011 - 2012 (Ph.D from U. Chicago with Vladimir Drinfeld).

Teaching Experience:

Undergraduate Courses

- Differential equations (Math 216), University of Michigan, Winter 2018.
- Advanced calculus I (Math 451), University of Michigan, Spring 2017.
- Introduction to probability (Math 425), University of Michigan, Fall 2015.
- ODE, Calculus I, Calculus II, Introduction to metric and topological spaces, Linear algebra b, Modern algebra, Field theory, Introduction to modules, rings and groups, Algebra 1, Introduction to rings and fields, Algebra 1/Extended, Technion.
- Calculus I, II (Math 251 - 252), University of Oregon, Fall, Winter, Spring 2013 - 2014.
- Calculus I, II (Math 125 - 126), University of Southern California, Fall, Spring 1998 - 1999.
- Linear algebra and differential equations (Math 225), University of Southern California, Fall, Spring 1998 - 1999.

- Calculus II (Math 1b), Harvard University, Spring 1998.

Graduate Courses

- Tensor categories, Quantum groups, Representation theory, Modern algebra 1 & 2 (commutative and noncommutative ring theory), Linear algebraic groups, Algebraic geometry, Lie algebras, Technion.

Service:

Technion Activities

- 2009 - 2013 Senate member
- 2002 - 2013 Admission committee of the Technion Excellence Program

Departmental Activities

- 2014 - 2015 Undergraduate studies - service courses teaching committee
- 2014 - 2015 Visitors & postdoc committee
- 2014 - 2015 Algebra seminar chairman
- 2011 - 2013 Board member of the Center for Mathematical Sciences
- 2008 - 2009 Colloquium chairman (with Dr. Uri Bader)
- 2007 - 2013 Visitors & postdoc committee
- 2007 - 2008 Colloquium chairman (with Prof. Michael Entov)
- 2005 - 2007 Institute for advanced mathematics committee
- 2003 - 2006 Library committee
- 2002 - 2006 Algebra seminar chairman
- 2001 - 2006 Secretary of the faculty council
- 2000 - 2002 Colloquium chairman (with Prof. Michael Cwikel)

Public Activities

- *Referee* for: Annals of Mathematics, Mathematical Research Letters, International Mathematics Research Notices, Journal of Algebra, Communications in Algebra, Transactions of the AMS, Proceedings of the AMS, Journal of Pure and Applied Algebra, London Mathematical Society, Journal of Algebra and Representation Theory, Crelle's Journal, Israel Journal of Mathematics, Communications in Mathematical Physics, Moscow Mathematical Journal, Glasgow Journal of Mathematics, Quantum Topology, Transformation Groups, Archiv der Mathematik, BSF, ISF, NSF, NSA, NSERC.
- *Reviewer* for Mathematical Reviews.

Publications

Theses

1. M.Sc., *Topics on quasitriangular Hopf algebras*, Ben - Gurion University of the Negev, 1992.
2. Ph.D., *Hopf algebras, quantum groups and invariants of knots and 3-manifolds*, Ben - Gurion University of the Negev, 1997.

Published papers

1. S. Gelaki. On pointed ribbon Hopf algebras, *Journal of Algebra* **181** (1996), 760–786.
2. S. Gelaki. Quantum groups of dimension pq^2 , *Israel Journal of Mathematics* **102** (1997), 227–267.
3. S. Gelaki and S. Westreich. On the quasitriangularity of $U_q(sl_n)'$, *Journal of the London Mathematical Society* **(2) (57)** (1998), 105–125.
4. P. Etingof and S. Gelaki. Some properties of finite-dimensional semisimple Hopf algebras, *Mathematical Research Letters* **5** (1998), 191–197.
5. P. Etingof and S. Gelaki. Semisimple Hopf algebras of dimension pq are trivial, *Journal of Algebra* **210** (1998), 664–669.
6. S. Gelaki. Pointed Hopf algebras and Kaplansky's 10th conjecture, *Journal of Algebra* **209** (1998), 635–657.
7. S. Gelaki. Addendum, *Journal of Algebra* **204** (1998), 347–352.
8. P. Etingof and S. Gelaki. On finite-dimensional semisimple and cosemisimple Hopf algebras in positive characteristic, *International Mathematics Research Notices* **16** (1998), 851–864.
9. P. Etingof and S. Gelaki. A method of construction of finite-dimensional triangular semisimple Hopf algebras, *Mathematical Research Letters* **5** (1998), 551–561.
10. P. Etingof and S. Gelaki. The representation theory of cotriangular semisimple Hopf algebras, *International Mathematics Research Notices* **7** (1999), 387–394.
11. P. Etingof and S. Gelaki. On the exponent of finite-dimensional Hopf algebras, *Mathematical Research Letters* **6** (1999), 131–140.
12. S. Gelaki. Some properties and examples of triangular pointed Hopf algebras, *Mathematical Research Letters* **6** (1999), 563–572.
13. S. Gelaki and S. Westreich. Hopf algebras of types $U_q(sl_n)'$ and $O_q(SL_n)'$ which give rise to certain invariants of knots, links and 3-manifolds, *Transactions of the AMS* **352** No.8 (2000), 3821–3836.

14. P. Etingof and S. Gelaki. The classification of triangular semisimple and cosemisimple Hopf algebras over an algebraically closed field, *International Mathematics Research Notices* **5** (2000), 223–234.
15. P. Etingof, S. Gelaki, R. Guralnick and J. Saxl. Biperfect Hopf algebras, *Journal of Algebra* **232 no.1** (2000), 331–335.
16. S. Gelaki and S. Westreich. On semisimple Hopf algebras of dimension pq , *Proceedings of the AMS*, **128** (2000), no.1, 39–47.
17. P. Etingof and S. Gelaki. Isocategorical groups, *International Mathematics Research Notices* **2** (2001), 59–76.
18. P. Etingof and S. Gelaki. On cotriangular Hopf algebras, *American Journal of Mathematics* **123** (2001), 699–713.
19. N. Andruskiewitsch, P. Etingof and S. Gelaki. Triangular Hopf algebras with the Chevalley property, *Michigan Journal of Mathematics* **49** (2001), 277–298.
20. P. Etingof and S. Gelaki. Classification of finite-dimensional triangular Hopf algebras with the Chevalley property, *Mathematical Research Letters* **8** (2001), 249–255.
21. P. Etingof and S. Gelaki. On families of triangular Hopf algebras, *International Mathematics Research Notices* **14** (2002), 757–768.
22. P. Etingof and S. Gelaki. On the quasi-exponent of finite-dimensional Hopf algebras, *Mathematical Research Letters* **9** (2002), 277–287.
23. E. Aljadeff, P. Etingof, S. Gelaki and D. Nikshych. On twisting of finite-dimensional Hopf algebras, *Journal of Algebra* **256** (2002), 484–501.
24. S. Gelaki and E. Letzter. An affine PI Hopf algebra not finite over a normal commutative Hopf subalgebra, *Proceedings of the AMS* **131** (2003), no. 9, 2673–2679.
25. P. Etingof and S. Gelaki. The classification of finite-dimensional triangular Hopf algebras over an algebraically closed field of characteristic 0, *Moscow Mathematical Journal* **3** (2003), no.1, 37–43.
26. P. Etingof and S. Gelaki. On Hopf algebras of dimension pq , *Journal of Algebra* **277** (2004), no.2, 668–674.
27. P. Etingof and S. Gelaki. Finite-dimensional quasi-Hopf algebras with radical of codimension 2, *Mathematical Research Letters* **11** (2004), 685–696.
28. P. Etingof, S. Gelaki and V. Ostrik. Classification of fusion categories of dimension pq , *International Mathematics Research Notices* **57** (2004), 3041–3056.
29. S. Gelaki. Basic quasi-Hopf algebras of dimension n^3 , *Journal of Pure and Applied Algebra* **198** (2005), 165–174.

30. P. Etingof and S. Gelaki. On radically graded finite dimensional quasi-Hopf algebras, *Moscow Mathematical Journal* **5** (2005), 371–378.
31. P. Etingof and S. Gelaki. Liftings of graded quasi-Hopf algebras with radical of prime codimension, *Journal of Pure and Applied Algebra* **205** (2006), 310–322.
32. M. Abu-Hamed and S. Gelaki. Frobenius-Schur indicators for semisimple Lie algebras, *Journal of Algebra* **315** (2007), 178–191.
33. S. Gelaki and D. Nikshych. Nilpotent fusion categories, *Advances in Mathematics*, **217** (2008), 1053–1071.
34. E. Aljadeff, J. Cuadra, S. Gelaki and E. Meir. On the Hopf-Schur group of a field, *Journal of Algebra*, **319** (2008), no. 12, 5165–5177.
35. P. Etingof and S. Gelaki. Quasisymmetric and unipotent tensor categories, *Mathematical Research Letters*, **15** (2008), no. 5, 857–866.
36. P. Etingof and S. Gelaki. The small quantum group as a quantum double, *Journal of Algebra*, **322** (2009), 2580–2585.
37. S. Gelaki and D. Naidu. Some properties of group-theoretical categories, *Journal of Algebra*, **322** (2009), 2631–2641.
38. S. Gelaki, D. Naidu and D. Nikshych. Centers of graded fusion categories, *Algebra & Number Theory*, **3** (2009), 959–990.
39. V. Drinfeld, S. Gelaki, D. Nikshych and V. Ostrik. On braided fusion categories I, *Selecta Mathematica New Series*, **16** (2010), 1–119.
40. S. Gelaki. Semisimplicity in symmetric rigid tensor categories, *Journal of Algebra*, **324** (2010), 3183–3198.
41. P. Etingof and S. Gelaki. Reductions of tensor categories modulo primes, *Communications in Algebra* **39** (2011), no. 12, 4634–4643.
42. S. Gelaki. Virtually indecomposable tensor categories, *Mathematical Research Letters* **18** (2011), no. 05, 957–967.
43. P. Etingof and S. Gelaki. Descent and forms of tensor categories, *International Mathematics Research Notices* **13** (2012), 3040–3063.
44. S. Gelaki. Module categories over affine group schemes, *Quantum Topology* **6** (2015), no. 1, 1–37.
45. S. Gelaki. Twisting of affine algebraic groups, I, *International Mathematics Research Notices* **16** (2015), 7552–7574.
46. P. Etingof and S. Gelaki. Exact sequences of tensor categories with respect to a module category, *Advances in Mathematics* **308** (2017), 1187–1208.

47. S. Gelaki. Exact factorizations and extensions of fusion categories, *Journal of Algebra* **480** (2017), 505–518.

Accepted Papers

48. P. Etingof and S. Gelaki. Invariant Hopf 2-cocycles for affine algebraic groups. *International Mathematics Research Notices*. *arXiv:1707.08672*.

Submitted Papers

49. S. Gelaki and D. Sebbag. On finite non-degenerate braided tensor categories with a Lagrangian subcategory. *Transactions of the AMS*. *arXiv:1835.01568*.
50. P. Etingof and S. Gelaki. Finite symmetric integral tensor categories with the Chevalley property. *International Mathematics Research Notices*. *arXiv:1901.00528*.

In preparation

51. V. Drinfeld, S. Gelaki, D. Nikshych and V. Ostrik. Group-theoretical properties of nilpotent modular categories, *arXiv:0704.0195*.

Review papers

52. M. Cohen, S. Gelaki and S. Westreich. Hopf algebras, *Handbook of Algebra* **4** (2006), Elsevier B.V, 173–239.

Books

53. P. Etingof, S. Gelaki and S. Shnider (Editors). Quantum Groups, *Contemporary Mathematics* **433** (2007), AMS.
54. P. Etingof, S. Gelaki, D. Nikshych and V. Ostrik. Tensor Categories, *AMS Mathematical Surveys and Monographs book series* **205** (2015), 362 pp.

Refereed papers in conference proceedings

55. S. Gelaki. On the classification of finite-dimensional triangular Hopf algebras, *New directions in Hopf algebras*, 69–116, Math. Sci. Res. Inst. Publ., **43** (2002), Cambridge Univ. Press, Cambridge.
56. S. Gelaki. Semisimple triangular Hopf algebras and Tannakian categories, *Proceedings of Symposia in Pure Mathematics* **70** (2002), 497–516 (editors M. Fried and Y. Ihara, 1999 Von Neumann Conference on Arithmetic Fundamental Groups and Noncommutative Algebra, August 16–27, 1999 MSRI).

Conferences

Selected Invited Talks

- “*Ribbon pointed Hopf algebras*”, Chicago, March 1995. AMS special session on Hopf algebras.
- “*The quasitriangularity of $U_q(\mathfrak{sl}_n)$* ”, Ben - Gurion University, May 1995. International workshop on Hopf algebras.
- “*Quantum groups of dimension pq^2* ”, Orlando, January 1996. AMS special session on algebra, cohomology algebra and polynomials identities.
- “ *$U_q(\mathfrak{sl}_n)$ and invariants of knots and 3-manifolds*”, Caltech, November 1996. AMS special session on Hopf algebras and their representations.
- “*Semisimple quasitriangular Hopf algebras*”, Temple University, April 1998. AMS special session on rings and representations.
- “*Semisimple Hopf algebras*”, San Bernardino, October 1998. 7th west coast operator algebra seminar.
- “*Methods of construction of semisimple triangular Hopf algebras*”, UCLA, November 1998. Southern California Algebra Conference.
- “*Groups with bijective 1-cocycle and triangular Hopf algebras*”, UCLA, December 1998. Workshop in Lie groups, Lie algebras and their representations.
- “*The classification of semisimple and cosemisimple triangular Hopf algebras*”, Berkeley, October 1999. Workshop in Hopf algebras.
- “*Infinite dimensional cotriangular Hopf algebras*”, Mexico, March 2000. Workshop on quantum groups.
- “*Cotriangular Hopf algebras*”, University of Haifa, May 2000. Annual meeting of the Israel Mathematical Union.
- “*The exponent of Hopf algebras*”, Technion, June 2000. Amitsur Memorial Symposium.
- “*Isocategorical groups*”, La Falda, Argentina, August 2001. Algebra Colloquium.
- “*The classification of finite dimensional triangular Hopf algebras*”, Oberwolfach, Germany, April 2002. Interactions Between Algebraic Geometry and Noncommutative Algebra.
- “*Classification of fusion categories of dimension pq* ”, Zichron Ya’akov, May 2003. Annual meeting of the Israel Mathematical Union.
- “*The classification of finite dimensional quasi Hopf algebras with radical of prime codimension*”, Mainz, Germany, June 2005. Joint Meeting of AMS, DMV, ÖMG. Special session on Hopf algebras and quantum groups.

- “*Nilpotent fusion categories*”, CIRM (Luminy - Marseille), April 2008. Dynamical Quantum Groups and Fusion Categories.
- “*Fusion categories applied to Hopf algebras*”, University of Southern California, February 2009. Conference on Hopf Algebras and Related Topics (in honor of Professor Susan Montgomery).
- “*Semisimplicity in symmetric tensor categories*”, Sde - Boker, May 2010. Conference in Hopf Algebras and Noncommutative Algebra (in honor of Professor Miriam Cohen).
- “*On Symmetric Tensor Categories*”, Boston, January 2012. AMS Special Session on Tensor Categories and Representation Theory.
- “*Classifying fusion categories*”, American Institute of Mathematics, Palo Alto, March 2012.
- “*On two properties of symmetric tensor categories*”, Tel Aviv University, June 2012. The 19th Amitsur Memorial Symposium.
- “*Tensor categories in positive characteristic*”, BIRS Workshop, Banff, April 2014. Subfactors and Fusion Categories.
- “*Symmetric tensor categories*”, Iowa State University, December 2018.

Mini-Courses

- A series of four 2-hour lectures, University of Cordoba, Argentina, September 2000, September 2001.
- Winter Master Class on Enveloping Algebras and Related Topics, The Weizmann Institute of Science, January 20 - February 10, 2008. A series of four 2-hour lectures on “*Tensor categories*”.

Organizing Conferences

- Quantum groups, Technion, July 5 - 12, 2004. (Member of the organizing and scientific committee.)
- Conference in Hopf Algebras and Noncommutative Algebra, Sde - Boker, May 24 - 27, 2010. (Member of the organizing and scientific committee.)
- Annual meeting of the Israeli Mathematical Union, Bar - Ilan, May 2012. (Organizer of the special session Algebra and Number Theory.)
- Conference on Galois groups and Brauer groups, Technion, January 6 - 11, 2013. (Member of the organizing and scientific committee.)
- A workshop on group theory in memory of David Chillag, Technion, October 27 - November 2, 2014.