PROFESSIONAL VITA: JOAN S. BIRMAN

December 14, 2007

Title: Research Professor, Barnard College-Columbia University, 2004-2007
Professor Emeritus, Barnard College.
Address: 602 Mathematics, 2990 Broadway, Columbia Univ. N.Y., N.Y. 10027
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Personal data:

Birth: May 30, 1927, in New York, New York
Citizenship: USA
Home address: 100 Wellington Avenue,New Rochelle, N.Y. 10804-3708
Spouse: Joseph L. Birman
Children: Kenneth Birman, Deborah Birman Shlider, Carl David Birman

Education:

BA Barnard College, l948.
MA Columbia University, 1950 (Physics)
PhD Courant Institute of New York University,1968 (Math).
Dr. Sci. Honoris Causa, Israel Institute of Technology (Technion), June 1997

Professional History:

Systems Analysis Dept.,Gen. Precision Equipment,1950-1953.
Systems Analysis Dept., W.L.Maxson Corp.,1953-55.
Staff Member(part time), Technical Research Group, 1955-60.
Assistant Professor Mathematics, Stevens Institute, 1968-71.
Assoc. Professor Mathematics, Stevens Institute of Technology, 1972-73.
Professor Mathematics, Barnard College (Columbia University), 1973-2004
Chairman, Dept. Math., Barnard College, 1973-87, 1989-1991, 1995-1998.)
Professor Emeritus, Barnard College, 2004-
Research Professor, Barnard College–Columbia University, 2004-2007

Professional Memberships:

American Mathematical Society and Mathematical Association of America
European Academy of Sciences (elected April 2003)
Fellow, New York Academy of Sciences
Honorary Foreign Associate, Moscow Math. Soc. (elected September 1996).
American Women in Mathemetics

Current Editorial positions:

Editorial Board, *Geometry and Topology*, 1996-
Editorial Board, *Algebraic and Geometric Topology*, 2000-
Board of Directors, Mathematical Sciences Publishing Company, 2005-

Current Grants: NSF 0405586.

Honors, Awards:

Sloan Foundation Fellow, 1974-6
Japan Society for the Promotion of Science, Fellow (Sept.1980).
Senior Science Faculty Fellow,Great Britain, spring, 1981.
Institute for Scientific Exchange,Torino,Italy, summer 1986.
Institute for Advanced Study, Spring 1987.
Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette,France, summer 1991.
Guggenheim Foundation Fellow, 1994-5
Chauvenet Prize, Mathematical Assn. of America, January 1996
Dr. Sci. Honoris Causa, Israel Institute of Technology (Technion), June 1997
New York City Mayor's Award in Science and Technology, January, 2006

Visiting Positions:

Visiting Assistant Professor,Princeton Univ.,1971-72.
Visiting Professor, Univ. Paris Sud, Fall 1980
Lady Davis Visiting Professor, Technion, Spring 1981.
Visiting Professor, Univ. Paris VII, Fall, 1987.
Visiting Professor, Hebrew Univ. of Jerusalem 5/88-6/88
Institute for Advanced Study, Princeton, New Jersey, Spring term 1988.
Visiting Professor, Technion, Spring term 1995.
Visiting Member, Math. Sci. Res. Inst., Berkeley, CA, Spring term 1996.

Selected list of Committees and Elected Offices:

Council of the Amer.Math.Soc., Member-at-Large, 1990-1993
Topology Panel, Int. Congress of Mathematicians 1990.
Executive Committee, Council of the American Math Society, 1992-1996.
Long Range Planning Committee, Amer. Math Society, 1993-1995 (Chair,94-5)
Overseers' Committee to Visit the Harvard Mathematics Department, 1992-98
Human Rights Committee, New York Academy of Sciences, 1995-

PhD Theses supervised:

1. Richard Fein, Stevens Institute of Technology, 1974
   Marcello Kupferwasser, Columbia University, 1975
   Jerome Powell, Columbia University, 1978
   Jozef Przytycki, Columbia University, 1981
   John McCarthy, Columbia University, 1983
   Pei Jun Xu, Columbia University, 1987
   Rolland Trapp, Columbia University, 1987
   Elizabeth Finkelstein, Columbia University, 1993
   Ted Stanford, Columbia University, 1993
   Zung-He Chen, Columbia University, 1994
   Efstratia Kalfagianni, Columbia University, 1994
   Ka Yi Ng, Columbia University, 1996
   Tat Sang Fung, Columbia University, 1996
   Matt Greenwood, Columbia University, 1996
   Hessam Hamidi-Tehrani, Columbia University, 1997
   Matt Zinno, Columbia University, 2001
   Clement Radu Popescu, Coumbia University, 2001
   Tara Brendle, Columbia University, 2002
   Nancy Wrinkle, Columbia University, 2002
   Nathan Broaddus, Columbia University, 2003
   Keiko Kawamuro, Columbia University, 2006.

Selected List of Invited Lectures:

Ostrom Lecturer, Washington State University (Pullman), 1993
A celebration of Women in Mathematics, MIT, March 1994
Principle Lecturer, KAIST Workshop, Taejon, Korea, August 1-12,
1994 Dressler Lecturer, Kansas State University, November,
1994 Netanyahu Lecture, Technion (Haifa, Israel) April 3,
2003 Cantrell Lectures, University of Georgia, April 2003
2003 Cornell Topology Conference, May 2003
2005 Colloquium, Harvard-MIT-Brandeis-Northeastern, March 2005
2006 Groups, Diff. and Dynamics (Univ. Tokyo, Japan), September 2006
2006 Texas Topology and Geometry Conference, Rice University, Oct. 2006
2007 Colloquium, Technion (Haifa, Israel) January 15, 2007
2007 Colloquium, University of Chicago, Feb 2, 2007.
2007 Principle speaker, BRAIDS conference, Singapore, June 2007
2007 Principal speaker, Magnus conference, CUNY, Sept. 2007

Conferences Organized:

BRAIDS, Santa Cruz, Cal., 1986 (NSF Research Conference)
BRAIDS (in Toplogy and Algebraic Geometry), Jerusalem, May 1995.
VASSILIEV INVARIANTS, Oberwolfach, Sept. 1995.
MSRI Low Dimensional Topology (1996-7)
3-MANIFOLDS, AMS meeting, Barnard College & Columbia Univ., Nov., 2000
BRAIDS, Banff B.C., Oct. 2004

Publications

Research Manuscripts:

1. "On braid groups", *Com. Pure and App. Math.*, **22**, No. 1 (1969), pp. 41-72.
2. "Mapping class groups and their relationship to braid groups", *Com.Pure and App. Math.*, **22** (1969), pp. 212-238.
3. "Automorphisms of the fundamental group of a closed, orientable 2-manifold", *Proc. Amer. Math. Soc.* **21**, No. 2 (1969), pp. 351-354.
4. "Non-conjugate braids can define isotopic knots", *Com. Pure and App. Math.* **22**, No. 2 (1969), pp. 239-242.
5. "Abelian quotients of the mapping class group of a 2-manifold", *Bull. AMS***76**, No. 1 (1970), pp. 147-150.
6. "On Siegal's modular group" *Math. Annalen* **191** (1971), pp.59-68.
7. "Mapping class groups of closed surfaces as covering spaces", (with Hugh M. Hilden), *Annals of Math Studies* **66** (1971), 81-115.
8. "On the homeotopy group of a non-orientable surface", (with David Chillingworth), *Proc. Cambridge Phil. Soc.* **71**, (1972), pp. 437-448. Erratum:Math Proc. Cambridge Phil Soc. **136** (2004), 441.
9. "A normal form in the homeotopy group of a surface of genus 2, with an application to 3-manifolds" *Proc. AMS* **34**, No. 2 (1972), pp. 397-384.
10. "On lifting and projecting homeomorphisms"(with H.M. Hilden), *Archives of Math.* **23**, No. 4 (1972), pp. 428-434.
11. "Isotopies of homeomorphisms of Riemann surfaces and a theorem about Artin's braid group", (with Hugh M.Hilden), *Bull.AMS* **78**, No. 6 (1972)s.
12. "On isotopies of homeomorphisms of Riemann surfaces", (with H.M. Hilden), *Annals of Math.* **97**, No. 3 (1973), pp. 424-439.

13. "Poincare's conjecture and the homeotopy group of a closed, orientable 2-manifold" *J. Australian Math. Soc.* **XVII**, part 2 (1974), pp.214-221.

14. "An inverse function theorem for free groups", *Proc. AMS* **41**, No. 2 (1983), pp. 634-638.

15. "The homeomorphism problem for S^3", with Hugh M. Hilden, *Bull AMS* **79**, No. 5 (1973), pp. 1006-1010.

16. "Plat presentation for link groups", *Com.Pure and Applied Math.* **XXVI** (1973) pp. 673-678.

17. "Heegaard splittings of branched covering of S^3", with Hugh M. Hilden, *Trans.AMS* **213** (1975), pp. 315-353.

18. "On the equivalence of Heegaard splittings of closed, orientable 3-manifolds", *Annals of Math Studies* **84**, Ed. L.P. Neuwirth, Princeton Univ. Press (1975), pp.137-164.

19. "A note on the representation of simply-connected 3-manifolds as branched covering spaces of S^3", *Proc. AMS* **55**, No. 2 (1976), pp. 440-442.

20. "On the stable equivalence of Heegaard splittings of plat presentation of links", *Canad. J. Math.* **XXVIII**, No. 2 (1976), pp. 264-290.

21. "Heegaard splittings of prime 3-manifolds are not unique" (with J.M. Montesinos and F. Gonzales-Acuna) *Mich. J. Math.***23**, No. 26 (1976).

22. "On the μ-invariant of Z-homology spheres", (with R. Craggs) *Bull.AMS* **82**, No. 2 (1976), pp. 253-255.

23. "The μ-invariant of 3-manifolds and certain structural properties of the group of homeomorphisms of a closed, oriented 2-manifold" (with R. Craggs) *Trans.AMS* **237** (1978), pp. 283-309.

24. "Special Heegaard splittings for closed, oriented 3-manifolds", *Topology* **17** (1978), pp. 157-166.

25. "Special representations for 3-manifolds" (with Jerome Powell), in *Geometric Topology* Ed. Cantrell, Academic Press (1979), pp. 23-51.

26. "On minimal Heegaard splittings" (with J.M. Montesinos) *Mich. Math. J.* **27** (1980), pp. 47-57.

27. "A representation theorem for fibered knots and their monodromy maps", in *Topology of Low Dimensional Manifolds*, Ed. R. Fenn, Springer-Verlag Lecture Notes No. 722, 1981.

28. "Knotted periodic orbits in dynamical systems I; Lorenz's equations" (with R.F. Williams) *Topology* **22**, No. 1 (1983), pp. 47-82. Erratum, http://www.math.columbia.edu/ jb

29. "Knotted periodic orbits in dynamical systems II; Knot holders for fibered knots" (with R.F. Williams), *Contemporary Mathematics* **20** (1983), pp. 1-60.

30. "Fixed points of pseudo-Anosov diffeomorphism of surfaces" (with Mark Kidwell) *Advances in Math.* **46**, No. 2 (1982), p. 217-220.

31. "One sided Heegaard splittings and homeotopy groups of surfaces" (with J.H. Rubinstein), *Proc. London Math. Soc. (3)*, **49** (1984), p. 517-536.

32. "Abelian and solvable subgroups of mapping class groups of surfaces" (with Alex Lubotzky and John McCarthy), *Duke Math. J.* **50**, No. 4 (Dec. 1983), pp. 1107-1120).

33. "An algorithm for simple curves on surfaces" (with Caroline Series), *J. London Math. Soc. (2)* **29**, (1984), pp. 331-342.

34. "Geodesics with bounded intersection number on surfaces are sparsely distributed" (with Caroline Series), *Topology* **24** (1985), p. 217-225.

35. "3-fold branched coverings and the mapping class group of a surface" (with B. Wajnryb), Springer- Verlag Lecture Notes **1167**, 1986.

36. "Geodesics with multiple self-intersections and symmetries on Riemann surfaces" (with Caroline Series), London Math Soc. Lecture Notes **12**, 1988, pp.3-11.

37. "Dehn's algorithm revisited, with applications to simple curves on surfaces" (with Caroline Series), *Annals of Math Studies* **111** (1989), pp.451-478.

38. "On the Jones polynomial of closed 3-braids", *Inven. Math.* **81** (1985), pp. 287-294.

39. "Algebraic linearity in the mapping class group of a surface" (with Caroline Series), *J. of Pure and Applied Algebra* **52** (1988),p. 227-275).

40. "Jones' braid-plat formula and a new surgery triple", (with T. Kanenoba), *Proc. AMS* **102**, No.3, (1988), pp.687-695.

41. "Markov classes in certain finite quotients of Artin's braid group" (with B. Wajnryb), *Israel J. Math.* **56**, No.2 (1986), pp. 160-178.

42. "Braids, link polynomials and a new algebra" (with H. Wenzl), *Trans.AMS* **313**, No. 1 (1989) 249-273.

43. "A calculus on links in the 3-sphere" (with W. Menasco), in KNOTS '90, Editor A. Kawauchi, W. De Gruyter, Berlin and New York, 1992.

44. "Studying Links Via Closed Braids I: A Finiteness Theorems"(with W. Menasco), *Pacific J. Math.* **154**, No. 1 (1992), 17-36.

45. "Studying Links Via Closed Braids II: On a Theorem of Bennequin" (with W. Menasco) *Topology and its Applications* **40** (1991), 71-82.

46. "Studying Links Via Closed Braids III: Classifying Links which are Closed 3-Braids" (with W. Menasco) *Pacific J. Math.* Vol **161**, No 1 (1993), 25-113.

47. "Studying Links Via Closed Braids IV: "Closed Braid Representatives of Split and Composite Links" (with W. Menasco), *Invent. Math.* **102**, Fasc. 1 (1990), 115-139. See also Erratum, *Invent, Math.* **160**, No. 2 (2005), 447-452.

48. "Studying Links Via Closed Braids V: "Closed Braid Representatives of the Unlink" (with W. Menasco), *Trans. AMS* **329**, No. 2 (1992) pp. 585-606.

49. "Studying Links Via Closed Braids VI: "A Non-Finiteness Theorem" (with W. Menasco), *Pacific J. Math.* **156**, No. 2 (1992) p. 265-285.

50. "Special Positions for Essential Tori in Link Complements" (with W. Menasco), *Topology* **33**, No. 3, (1994), 525-556. Errata: *Topology*

51. "Knot polynomials and Vassiliev's Invariants" (with Xiao-Song Lin), *Invent.Math.* **111** (1993), 225-270.

52. "New points of view on knots and links", *Bull.AMS* / **28**, No. 2 (1993), 253-287.

53. "Linear representations of the braid group" (with D. Long and J. Moody), *Contemporary Mathematics* **169**, (1994), 123-132.

54. "Braided chord diagrams" (with Rolland Trapp), *Journal of Knot Theory and its Ramifications*, **7**, No.1 (1998), 1-22.

55. "Studying surfaces via closed braids" (with Elizabeth Finkelstein), *Journal of Knot Theory and its Ramifications*, **7**, No.3 (1998), 267-334.

56. "A new approach to the word and conjugacy problems in the braid groups" (with J.S.Lee and K.H.Ko), *Advances in Mathematics*, **139**, No. 2 (1998), 322-353.

57. "A new algorithm for recognizing the unknot" (with Michael Hirsch), *Geometry and Topology*, **Vol.2**(1998), 178-220.

58. "Holonomic and Legendrian parametrizations of knots" (with Nancy Wrinkle), *Journal of Knot Theory and its Ramifications*, **9**, No.3 (2000), 293-309.

59. "On transversally simple knots" (with Nancy Wrinkle), *Journal of Differential Geometry*, **55** (2000), 325-354.

60. "The infimum, supremum and geodesic length of a braid conjugacy class", (with K.H. Ko and S.J. Lee), *Advances in Mathematics*, **164** (2001), 41-56.

61. "On Markov's theorem", with William Menasco, *Journal of Knot Theory and its Ramifications*, **11**, No. 3 (2002), 295-310.

62. "Toward an implementation of the B-H algorithm for recognizing the unknot", with M. Rampichini, P. Boldi and S. Vigna, J.Knot Theory and its Ramifications **11**, No. 4 (2002), 601-645.

63. "Obstructions to trivializing a knot and representations of braid groups", with John Moody, Israel Journal of Mathematics, **142** (2004), 125-162.

64. "Stabilization in the braid groups I: MTWS", with William Menasco, Geometry and Topology, **10** (2006), 413-540.

65. "Stabilization in the braid groups II: Transversal simplicity of knots", with William Menasco, Geometry and Topology **10** (2006), 1425-1452.

66. "Conjugacy in Garside groups-I: Cycling, Powers and Rigidity", with Volker Gebhardt and Juan Gonzalez-Meneses, Groups, Geometry and Dynamics, **1**, No. 3 (2007), 221-279. Preprint arXiv:math.GT/0605230.

67. "Conjugacy in Garside groups-II: Structure of the Ultra Summit Set", with Volker Gebhardt and Juan Gonzalez-Meneses, Groups, Geometry and Dynamics, **2**, No.1 (2008), 13-61. Preprint arXiv:math.GT/0606652.

68. "Conjugacy in Garside groups-III: Periodic braids", with Volker Gebhardt and Juan Gonzalez-Meneses, Journal of Algebra, **316** (2007) 746776. Preprint arXiv:math.GT/0609616.

69. "A note on closed 3-braids", with William W.Menasco, Communications in Contemporary Mathematics **10** Suppl. 1 (2008), 1-15. Preprint arXiv math.GT/0703669.

70. "Calculating the image of the second Johnson-Morita representation", with Tara E. Brendle and Nathan Broaddus, in "Groups of Diffeomorphisms", Advanced Studies in Pure Mathematics **52** (2008), Mathematical Society of Japan, 119-134. Preprint arXiv math:GT/0708.3861.

71. "Symplectic Heegaard splittings and linked abelian groups", with Dennis Johnson and Andrew Putman, in "Groups of Diffeomorphisms", Advanced Studies in Pure Mathematics **52** (2008), Mathematical Society of Japan, 135-220. Preprint arXiv math/GT/0712.2104

72. "Lorenz knots, T-links and twisted torus links", with Ilya Kofman, Preprint arXiv math.GT/0707.4331.

Books:

1. Braids, links and mapping class groups, Ann. Math Studies 82, Princeton University Press, 1975. List of Errata can be downloaded from http://www.math.columbia.edu/ jb

2. Editor English language translation of Seifert and Threlfall: A Textbook of Topology, Academic Press, 1980

3. Editor (with A. Libgober), Braids, Contemporary Mathematics 78, Amer. Math Society, 1988

4. Editor (with W. Abikoff and K. Kuiken), The mathematical legacy of Wilhelm Magnus, Contemporary Mathematics 169, 1993.

5. Guest Editor (with Mina Teicher), Braids in Knot Theory and Algebraic Geometry, *Topology and its Applications*

Expository and review articles:

1. "The algebraic structure of surface mapping class groups", *Discrete groups and automorphic forms*, Ed. W. Harvey, Academic Press 1977, pp. 163-198.

2. "Mapping class groups of surfaces; a survey", Annals of Math Studies **111**, Princeton University Press, 1974.

3. "Nielsen's investigations of surface mapping class groups", J. *Nielsen: Collected Works*, p. 407-416, Birkhauser, 1986.

4. "Mapping class groups of surfaces", Contemporary Mathematics 78, BRAIDS, 1988

5. "Recent Developments in Knot and Link Theory", Mathematical Intelligencer, Volume 13, Number 1, 1991, p. 52-60.

6. "A progress report on the study of links via closed braids" , to appear in the Proceedings of the March 1990 conference to celebrate 300 Years of the Mathematische Gesellschaft in Hamburg.

7. "On the Work of Vaughan Jones", Proc.International Congress of Mathematicians 1990, pages 9-18, Springer-Verlag, New York, 1992.

8. "On the Combinatorics of Vassiliev invariants", in *Braid Groups, Knot Theory and Statistical Mechanics II*, Editors Yang and Ge, World Scientific Press, 1994.

9. "Scientific Publishing: A Mathematician's Viewpoint", *Notices of the American Mathematical Society*, **47**, No. 7, August 2000, 770-774.

10. "Braids:A Survey", with Tara Brendle, in *Handbook of Geometric Topology*, Editors Menasco and Thistlethwaite, Elsevier 2005.

11. "Braids, knots and contact structures", lecture notes for a talk given at the First East Asian Conference on Knots and Related Topics in Seoul, Korea, February 2004. Posted on arXiv.

12. "The topology of 3-manifolds, Heegaard distance and the mapping class group of a 2-manifold", in "Problems on mapping class groups", Editor Benson Farb, Proc. Symp. Pure Mathematics **74**(2006), 133-149. arXiv math.GT/0502545.

Book Reviews:

1. Burde and Zieschang's "Knots" and Kauffman's "On Knots", *Bull.AMS* **19**, No.2 (1988) p.550-558.

2. "Coxeter Graphs and Towers of Algebras", by Goodman, de la Harpe and Jones, *Bull.AMS*

3. "Knots", by Charles Livingston, *MAA Monthly* August 1995.