

**BERNARDO GABRIEL MINDLIN**  
**CURRICULUM VITAE**

**Bernardo Gabriel Mindlin**

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**Place and date of birth:** Quilmes, Argentina; 09/02/63; **Nationality:** Argentine  
**kids:** Julia, Iván.

**Studies:**

- Ph. D. In Physics, Drexel University, Philadelphia (1991)
- Licenciado en Ciencias Físicas (Master), Universidad de La Plata, Argentina (1987)

**Areas of interest:**

Analysis and modeling of nonlinear systems. Applications to biophysics. Physics of birdsong.

**Employment:**

- Professor, Physics Department, FCEyN, Universidad de Buenos Aires, from August 1993 (full professor)
- Researcher of CONICET, Argentina, from December 1993 (Superior Investigator).
- Research Associate Physicist, INLS, University of California, San Diego, 2003-2004
- Professor, Universidad de Navarra, Pamplona, España, October 1992 - July 1993.
- Chercheur associe, CNRS, France (May 1997- August 1997, Dec 2001-March 2002)
- Assistant Professor, University of Navarra, Pamplona, Spain, Diciembre 1991 - Octubre 1992.
- Teaching Assistant, Drexel University, Philadelphia, July 1988 - December 1991.

**Gestión** Secretario de Postgrados, FCEyN, UBA, 2018-present

**Books:**

*Nonlinear Dynamics: a two way trip from Physics to Math*, H. Solari, M. Natiello and G. B. Mindlin, IOP, London (1996)

*The Physics of Birdsong*, Gabriel B. Mindlin, Rodrigo Laje, Springer, Heidelberg ISBN 3-540-25399-8 (2005)

*Causas y Azares: historia del caos y los sistemas complejos*, Gabriel Mindlin, Editorial Siglo XXI, Bs As, Argentina, colección Ciencia que Ladra (2008).

*Dinamica No lineal*, Gabriel B. Mindlin, Editorial Universidad Nacional de Quilmes, (2018) ISBN. 978-987-558-503-4.

**Awards:**

- **De Robertis**, Secretaría de Ciencia y técnica de la Nación Argentina , 1994.
- **Ernersto Galloni**, Academia Nacional de Ciencias Exactas y Naturales (Argentina), 1997.
- **Senior Fellow**, Santa Fe institute, New Mexico, USA, 2002-2004
- **Premio estímulo Científico Joven, Fundacion Bunge y Born 2004**
- **Arthur Taylor Winfree award, ICTP, Trieste 2004**
- **Fellow AAAS, 2010.**

*Advisor of the following PhD thesis.*

1. “Mecanismos de transición a la complejidad espacio-temporal en fluidos”: 10/05/2000, Darío Krmpotic, UNLP.
2. “Estructura topologica de flujos caóticos”: 6/6/2001. Denisse Sciamarella, UBA.
3. “Sistemas Ópticos Excitables”: 12/12/2002, Alejandro Yacomotti, UBA.

4. "Estadística y procesamiento de información en sistemas excitables con ruido": 10/10/2002, Manuel Eguía, UBA.
5. "Generalización de la resonancia estocástica", 14/12/2004, J. Mendez, UBA
6. "La física del canto de las aves", Laje, R. 01/10/2005, UBA
7. "Producción de voz, control neuronal y biometría", Marcos Trevisan, 26 de julio de 2006
8. "Efectos no lineales en la generación del canto de las aves", Ana Amador, UBA, mayo 2009
9. "Efectos hormonales en la maduración del canto de las aves", Jorge Alliende, 10/2/2010
10. "Biomimética vocal", Jacobo Sitt, 15/2/2010, UBA
11. "Oscilaciones no lineales en el canto de las aves", Leandro Alonso, 15/6/2012, UBA
12. "Modelos de baja dimension para canto de aves y aplicación a interfaces cerebro maquina" Ezequiel Arneodo, 12/03/2012, UBA
13. "Enfriamiento de núcleos telencefálicos para testear la relación de escalas temporales en un modelo de canto de las aves", Matias Goldin, 03/2014, UBA

Selected works:

- Bush, A., Döppler, J. F., Goller, F., & Mindlin, G. B. (2018). Syringeal EMGs and synthetic stimuli reveal a switch-like activation of the songbird's vocal motor program. *Proceedings of the National Academy of Sciences*, 115(33), 8436-8441.
- T. Gardner, G. Cecchi, M. Magnasco, R. Laje and G. B. Mindlin "Simple gestures for birdsongs", *Phys. Rev. Letts.* 87 art 208101 (2001)
- Amador, Ana, et al. "Elemental gesture dynamics are encoded by song premotor cortical neurons." *Nature* (2013).

**Patents:**

1. "Topological voiceprints for speaker identification", G. B. Mindlin, M. Trevisan, and M. Eguía, UCSD-UBA-UNQ Patent application filled by UCSD, application number 60/497,007 Priority date, Aug 20, 2003. August 20, 2004.
2. "Procedimiento para el reconocimiento de la identidad de un hablante por medio de la reconstrucción de propiedades ergonómicas mediante el uso de la voz", inventores G. B. Mindlin, M. Trevisan and M. Eguía, CONICET; INPI, Argentina, 22 diciembre 2009, Nro. AR 047710 B1

**Articles in refereed journals:**

- 1 I H. Vucetich, R. Mercader, G. Lozano, G.B. Mindlin, A. López García, J. Desimoni. "Mossbauer Null Redshift Experiment", *Phys. Rev. D* 38 n. 10 (1988).
- 2 D.L. González, M.O. Magnasco, G.B. Mindlin, H. Larrondo and L. Romanelli. "Gyration Number and Topology of the Period Doubling Bifurcation", *J. Opt. Soc. Am. B*, 5 n. 5 (1988).
- 3 González, M.O. Magnasco, G.B. Mindlin, H. Larrondo and L. Romanelli. "A Universal Departure From the Classical Period Doubling Spectrum", *Physica D* 39 (1989).
- 4 **G.B. Mindlin, X Hou, H. Solari, R. Gilmore and N.B. Tufillaro. "Classification of Strange Attractors by Integers", *Phys. Rev. Letts.* 64 n. 20 (1990).**
- 5 X. Hou, R. Gilmore, G.B. Mindlin and H. Solari. "An Efficient Algorithm for Fast  $O(N \ln N)$  Box Counting", *Phys. Letts. A* 151 n. 1,2 (1990).
- 6 **C. Green, G.B. Mindlin, E. D'Angelo, H. Solari and J.R. Tredicce. "Spontaneous Symmetry Breaking in a Laser The Experimental Side", *Phys. Rev. Letts.* 65 n. 25 (1990).**
- 7 G.B. Mindlin, H. Solari, M. Natiello, R. Gilmore and X. Hou. "Topological Analysis of Chaotic Time Series Data From the Belousov Zhabotinskii reaction", *J. Nonlinear Sci.* 1 147-173 (1991).
- 8 F. Papoff, A. Fioretti, E. Arimondo, G.B. Mindlin, H. Solari and R. Gilmore. "Structure of Chaos in the Laser with Saturable Absorber", *Phys. Rev. Letts.* 68, n. 8, 1128-1131 (1992).
- 9 E. D'Angelo, E. Izaguirre, G.B. Mindlin, G. Huyat, L. Gil, J. Tredicce. "Spatio Temporal Dynamics in the Presence of An Imperfect  $O(2)$  Symmetry", *Phys. Rev. Letts.* 68, n.25, 3702-3705 (1992).
- 10 G. B. Mindlin, R. Gilmore, "Topological Analysis and Synthesis of Chaotic Time Series Data", *Physica D* 58, 229-242 (1992).

- 11 F. T. Arecchi, S. Boccaletti, G. B. Mindlin, C. Perez Garcia " Periodic Alternation in Systems with Imperfect Symmetry", Phys. Rev. Letts., vol. 69, number 26, 3723-3726 (1992)
- 12 G.A. Cecchi, D.L. González, M. Magnasco, G.B. Mindlin, O. Piro, A. Santillan, "Periodically Kicked Hard Oscillators", Chaos, vol. 3, number 1, 51 (1993).
- 13 R. Lopez Ruiz, G. B. Mindlin, C. Perez Garcia, J. Tredicce, "A Mode-Mode Interaction for a CO<sub>2</sub>Laser with Imperfect O(2) Symmetry", Phys. Rev. A, vol. 47, number 1, 500-509 (1993).
- 14 T. Ondarcuhu, G. B. Mindlin, H. Mancini, C. Perez Garcia, "Dynamical Patterns in Benard Marangoni Container with Square Symmetry", Phys. Rev. Letts., vol. 70, 3892-3895 (1993).
- 15 G. B. Mindlin, R. Lopez-Ruiz, R. Gilmore and H. Solari, "Horseshoe Implications", Phys. Rev. E, {bf 48} 4297 (1993)
- 16 G. B. Mindlin, Ondarcuhu, H. Mancini, C. Perez Garcia, A. Garcimartin, "Comparison of Data from Benard-Marangoni Convection in a Square Container with a Model Based on Symmetry Arguments" IJBC, 4(5) 1121-1134 (1994)
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- 19 Lopez Ruiz, G. B. Mindlin, C. Perez Garcia, J. Tredicce, "Nonlinear Interaction of Transversal Modes in a CO<sub>2</sub> Laser", Phys. Rev. A, 49, 4916 (1994)
- 20 M. Huerta, D. Krmptotic, G. B. Mindlin, H. Mancini, D. Mazza, C. Perez "Dynamics of Patterns in a Benard Marangoni Experiment", Physica D, vol. 96 200 (1996)
- 21 G. B. Mindlin and H. G. Solari, "Topologically Inequivalent Embeddings", Phys. Rev. E, 52, 1497 (1995)
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- 23 G. B. Mindlin, H. G. Solari, "Torii and Klein Bottles in 4 Dimensional Chaotic Flows", Physica D,102, 177 (1997)
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- 31 M. Eguia, G. B. Mindlin, "From excitability to determinism in low frequency fluctuations", Phys. Rev. E., 60 (2) 1551-1557 (1999)
- 32 D. Sciamarella and G. B. Mindlin, "Topological structure of chaotic flows from human speech chaotic data", Phys. Rev. Letters, 82, 1450 (1999)
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- 34 D. Strier, A. Duarte, H. Ferrari and G. B. Mindlin, "Nitrogen stars: Morphogenesis of a liquid drop", Phys. Rev. . Physica A 283 262-266 (2000)
- 35 Eguia M. C. Y G. B. Mindlin, "Distribution of Interspike times in noise driven excitable systems", Phys. Rev. E., 61, 6490-6499 (2000)
- 36 Sigman M. And G. B. Mindlin " Dynamics of three coupled excitable cells with D<sub>3</sub> symmetry", IJBC, 10, 1709-1728 (2000)
- 37 P. Mininni, D. Gomez and G. B. Mindlin, "Stochastic Relaxation Oscillator Model for the Solar Cycle", Physical Review Letters, 85, 5476 (2000)

- 38 Trevisán M., Eguía M., Mindlin G. B., “Nonlinear aspects of análisis and síntesis of speech time series”, Phys. Rev. E 6302 6216 (2001).
- 39 Mendez J., Laje R., Aliaga J., Giudici M. And G. B. Mindlin, “The dynamics of periodically forced semiconductor lasers with optical feedback”, Phys. Rev. E, 63 art 66218 (2001)
- 40 Sciamarella D., Mindlin G. B., “The structure of chaotic flows”, Phys. Rev. E 64 036209 (2001)
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- 42 R. Laje, T. Gardner and G. B. Mindlin, “The effect of feedback in the dynamics of the vocal folds”, Phys Rev. E, 64 art 056201 (2001)
- 43 T. Gardner, G. Cecchi, M. Magnasco, R. Laje and G. B. Mindlin “Simple gestures for birdsongs”, Phys. Rev. Letts. 87 art 208101 (2001)**
- 44 M. C. Eguia, S. Ponce Dawson and G. B. Mindlin, “Computing with excitable systems in a noisy environment”, Phys. Rev. E **65** art 047201 (2002)
- 45 A. Ventura, G. B. Mindlin and S. Ponce Dawson, “A generic model for 2d excitability”, Physical Review E, 65, 046231 (2002)
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- 52 G. B. Mindlin, T. Gardner, F. Goller, R. Suthers, “Experimental test of a model for birdsong production”, Phys. Rev. E, 68, 041908 (2003)
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- 57 S. Bouzat, H. Wio and G. B. Mindlin, “Characterization of spatiotemporal chaos in an inhomogeneous active medium”, Physica D 199, 185-193 (2004) 1.
- 58 [Limits on the excitable behavior of a semiconductor laser with optical feedback](#)  
J. M. Méndez, J. Aliaga, and G. B. Mindlin, Phys. Rev. E **71**, 026231 (2005)
- 59 Trevisan M., Eguia M. and Mindlin G. B., “Topological voiceprints for speaker identification”, Physica D 200, 75-80 (2005).
- 60 P. E. Jercog, M. A. Trevisan, G. B. Mindlin, Physica A, Subharmonics in the solutions of a model of the song motor nuclei in songbirds, 145-150, 356, 2005
- 61 M. A. Trevisan, S. Bouzat, I. Samengo, G. B. Mindlin, Physical Review E, Dynamics of learning in coupled oscillators tutored with delayed reinforcements, 011907-1/7, 72, 2005
- 62 A. Amador, M. A. Trevisan, and G. B. Mindlin. Simple neural sustrate predicts complex rhythmic structure in duetting birds. Phys. Rev. E 72, 031905 (2005)
- 63 Zysman D., Méndez J., Aliaga J and G. B. Mindlin, “Synthesizing birdsong”, Phys. Rev. E, 72, 261-264 (2005)
- 64 R. Laje and G. B. Mindlin, Physical Review E, “Modeling source-source and source-filter acoustic interaction in birdsong”. Volumen 72 036218 (2005)
- 65 A. Granada, M. Gabitto, G. Garcia, J. Allende, J. Méndez, M.A. Trevisan and G.B. Mindlin, [Physica A: Volume 371, Issue 1](#) , 84-87, The generation of respiratory rhythms in birds (2006)

- 66 M. Trevisan, G. B. Mindlin and F. Goller, Nonlinear model predicts diverse respiratory patterns of birdsong, *Phys. Rev. Letts*, **96**, art 054102 (2006)
- 67 Respiratory patterns in oscine birds during normal respiration and song production M. A. Trevisan, J. M. Mendez, and G. B. Mindlin *Phys. Rev. E* **73**, 061911 (2006)
- 68 [Dynamical systems techniques reveal the sexual dimorphic nature of motor patterns in birdsong](#) J. M. Mendez, J. A. Allende, A. Amador, and G. B. Mindlin *Phys. Rev. E* **74**, 041917 (2006)
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- 70 Lateralization as a symmetry breaking process in birdsong, Trevisan M, Cooper B, Goller F and Mindlin G. B., *Physical Review E*, *Phys. Rev. E* **75**, 031908 (2007)
- 71 [Bilateral source acoustic interaction in a syrinx model of an oscine bird](#), Rodrigo Laje, Denisse Sciamarella, Juan Zanella, and Gabriel B. Mindlin, *Phys. Rev. E* **77**, 011912 (2008)
- 72 The dynamical origin of physiological instructions used in birdsong production, E. Arneodo, L. Alonso, J. Allende and G. B. Mindlin, *Pranama* **70**, 6, 1-9 (2008)
- 73 Frequency modulation during song in a suboscine does not require vocal muscles, A. Amador, F. Goller and G. B. Mindlin, *J. Neurophysiol.*, **99**, 2383-2389 (2008)
- 74 [Dynamical origin of spectrally rich vocalizations in birdsong](#), J. D. Sitt, A. Amador, F. Goller, and G. B. Mindlin, *Phys. Rev. E* **78**, 011905 (2008)
- 75 Beyond Harmonic Sounds in Birdsong, A. Amador and G. B. Mindlin, *CHAOS* **18**, 043123 1-6 (2008)
- 76 New Perspectives on the physics of Birdsong, M. A. Trevisan and G. B. Mindlin, *Phil. Trans. R. Soc. A* **28 August 2009 vol. 367 no. 1901 3239-3254** (2009)
- 77 Neurophysiological Bases of Exponential Sensory Decay and Top-Down Memory Retrieval: A Model. Ariel Zylberberg,<sup>1</sup> Stanislas Dehaene,<sup>2,3\*</sup> Gabriel B. Mindlin,<sup>1</sup> and Mariano Sigman<sup>1</sup>. *Front Comput Neurosci.* 2009; **3**: 4 (2009)
- 78 Low-dimensional dynamical model for the diversity of pressure patterns used in canary song, Leandro M. Alonso,<sup>1</sup> Jorge A. Allende,<sup>1</sup> F. Goller,<sup>2</sup> and Gabriel B. Mindlin<sup>1</sup>, *Phys. Rev. E* **79**, 041929 (2009)
- 79 Source-tract coupling in birdsong production, Ezequiel M. Arneodo and Gabriel B. Mindlin, *Phys. Rev. E* **79**, 061921 (2009)
- 80 [Physiologically driven avian vocal synthesizer](#), Jacobo D. Sitt, Ezequiel M. Arneodo, Franz Goller, and Gabriel B. Mindlin *Phys. Rev. E* **81**, 031927 (2010)
- 81 Dynamical origin of complex motor patterns, Alonso Leandro, Allende J., Gabriel B. Mindlin, EPJD, invited paper, colloquium, *Eur. Phys. J. D*, [Volume 60, Number 2](#), 361-367, DOI: 10.1140/epjd/e2010-00225-2
- 82 Hormonal acceleration of song development illuminates motor control mechanism in canaries, Jorge A. Allende, Jorge M. Méndez, Franz Goller, Gabriel B. Mindlin, *Developmental Neurobiology* [Volume 70, Issue 14](#), pages 943–960, December 2010
- 83 Smooth Operator: Avoidance of Subharmonic Bifurcations through Mechanical Mechanisms simplifies Song Motor Control in Adult Zebra Finches, Coen Elemans, Rodrigo Laje, Gabriel Mindlin, and Franz Goller, *The Journal of Neuroscience*, October 6, 2010, **30**(40):13246-13253; doi:10.1523/JNEUROSCI.1130-10.2010
- 84 Average dynamics of a driven set of globally coupled excitable units, Alonso L. and Mindlin G. B., *Chaos* **21**, 023102 (2011); doi:10.1063/1.3574030 (5 pages) Online Publication Date: 7 April 2011
- 85 Acoustic signatures of sound source-tract coupling, Ezequiel M. Arneodo, Yonatan Sanz Perl, and Gabriel B. Mindlin, *Phys. Rev. E* **83**, 041920 (2011) [9 pages]
- 86 **Reconstruction of physiological instructions from Zebra finch song, Yonatan Sanz Perl, E. M. Arneodo, A. Amador, F. Goller and G. B. Mindlin, *Phys. Rev. E*, *Phys. Rev. E* **84**, 051909 (2011)**
- 87 Interaction Between Telencephalic Signals and Respiratory Dynamics in Songbirds, Jorge Méndez, G. B. Mindlin and Franz Goller, *J. Neurophysiol.*, Published online before print March 2012
- 88 [Prosthetic Avian Vocal Organ Controlled by a Freely Behaving Bird Based on a Low Dimensional Model of the Biomechanical Periphery](#), *PLoS Comp. Biol.* **8**(6): e1002546 doi:10.1371/journal.pcbi.1002546 (2012)
- 89 YONATAN SANZ PERL, Arneodo E., Amador A., Mindlin G. B., *Int. J. Bifurcation Chaos* **22**, 1250235 (2012) [8 pages] DOI: 10.1142/S0218127412502355

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115 Bush, A., Döppler, J. F., Goller, F., & Mindlin, G. B. (2018). Syringeal EMGs and synthetic stimuli reveal a switch-like activation of the songbird's vocal motor program. *Proceedings of the National Academy of Sciences*, 115(33), 8436-8441.

### **Consulting:**

1. Argentine Secretary of State and Wild Life Foundation, "The sound impact of turistic helicopters in the Iguazu Falls National Park", Technical report (2001).
2. Judge Dr. Bonadio, "Identification of editions in a recorded tape", Technical report (2002)

### **Direction of students and researchers:**

#### **Ph D, defended**

- *Dario Krmpotic, Ph. D.* UNLP (2000)
- *Denisse Sciamarella, Ph. D.*, U. Buenos Aires (2001)
- *Manuel Eguia, Ph. D* U. Buenos Aires (2002)
- *Alejandro Yacomotti, Ph. D.* U. Buenos Aires (2002)
- *Jorge Mendez, Ph. D* U. Buenos Aires (2004)
- *Rodrigo Laje, Ph. D.* Buenos Aires (2005)
- *Marcos Trevisan, Ph. D.*, Buenos Aires (2006)
- *Ana Amador, Ph. D*, Buenos Aires (2008)
- *Jorge aliende, Ph. D*, BsAs (2010)
- *Jacobo Sitt, Ph.D*, BsAs (2010) 15/02/2010 biomimetica vocal
- *Alonso Leandro, PhD*, Buenos Aires (2012)
- *Ezequiel Arneodo, Ph. D.*, Buenos Aires (2012)
- *Yonatan Sanz, Ph. D.* Thesis in progress (2014)
- *Matias Goldin, Ph.D*, Buenos Aires (2014)
- *Rodrigo Alonso* (2018)
- *German Dima* (2018)

#### **Master thesis, defended**

- *Marina Huerta, tesis de licenciatura (master thesis)* (1994), U. Buenos Aires
- *José Caminos, tesis de licenciatura (master thesis)* (1995), UNLP
- *Nicolás Merener, tesis de licenciatura (master thesis)* (1997), U. Buenos Aires
- *Mariano Sigman, tesis de licenciatura (master thesis)* (1997), U. Buenos Aires
- *Manuel Eguia, tesis de licenciatura (master thesis)* (1998), U. Buenos Aires
- *Alejandro Yacomotti, tesis de licenciatura (master thesis)* (1998) U. Buenos Aires
- *Marcos Trevisán, tesis de licenciatura (master thesis)* (2000), U. Buenos Aires
- *Jorge Brea, tesis de licenciatura (master thesis)* (2002), U. Buenos Aires
- *Pablo Jercog, tesis de licenciatura (master thesis)* (2002), U. Buenos Aires
- *Adrián Granada, tesis de licenciatura (master thesis)* (2005)
- *Ana Amador, tesis de licenciatura (master thesis)* (2004)
- *Adrián Granada, tesis de licenciatura (master thesis)* (2005)
- *Jorge Alliende, tesis de licenciatura (master thesis)* (2006)
- *Mariano Gabitto, tesis de Licenciatura (master thesis)* (2007)
- *Leandro Alonso, master thesis (master 2007)*
- *Rodrigo Alonso (master biology, UBA, 2012)*
- *Nicolas Adreani (master, biology, UBA, 2012)*

- German Dima (master, Physics, 2013)
- Javier Roulet (master, Physics, 2016)
- Agustin Sanchez (master, Physics, 2016)
- Cecilia Herbert (master, Physics, 2016)
- Gonzalo Uribarri (master, Physics, 2016)
- Juan Doppler (master, physics, 2017)

#### **Invited Researchers, and post docs**

- Ana Macho, Ph. D student from University of Navarra, invited researcher (1996)
- Tim Gardner, Ph. D. Student from Rockefeller University, invited researcher (2000)
- Laje R, JTP (2006)
- Mendez Jorge (post doc, CONICET2006)
- Ezequiel Arneodo (post doc, Bunge y Born, 2012-2014)
- Alan Bush (2016-)
- Cecilia Jarne (2015-2017)

#### **Students (Ph. D. and master thesis) with work in progress**

- Juan Doppler, PhD. In progress (2013)
- Gonzalo Uribarri, PhD. In Progress (2013-)

#### **Presentations in conferences in the last years:**

1. Measures in Spatio Temporal Complexity, Bryn Mawr, USA 1995, "Low dimensional chaos in a Benard Marangoni Convection Experiment", G. B. Mindlin.
2. Chaos in Gravitational N-Body Systems, La Plata, Argentina, 1995. "Topological Analysis of Data", G. B. Mindlin and P. Boyd (Invited talk)
3. Medyfinol-96, Tucuman, September 1996, From Time Series to Physical Models: the Case of a Pulsating star, G. B. Mindlin (Invited talk)
4. Instabilities and Nonequilibrium Structures, Valparaiso, Chile (1997), "RoAp pulsating stars" (Invited talk)
5. LAWNP 99, Cordoba, October 1999 (Invited talk "Logic gates using noise driven excitable units").
6. SIAM dynamical systems meeting, Snowbird, Utah (USA), May 1999 (co organizer of a mini symposium , presentation of "Interspike Time Distribution in Noise Driven dynamical Systems").
7. SIAM dynamical systems meeting, Snowbird, Utah (USA), May 2001, Contributed presentation, "simple motor gestures in birdsong", T. Gardner and G. B. Mindlin
8. Society for Neuroscience's 31 annual meeting, San Diego, California, November 10 2001, T. Garner, G. Cecchi, M. Magnasco, R. Laje and G. B. Mindlin, "Simple motor gestures in birdsong"
9. Rencontre du non lineaire 2002, I. H. Poincare, Paris, D. Sciamarella and G. B. Mindlin, "Technique d'homologie pour la description topologique de flots chaotiques", Rencontre du non lineaire 2002, 243-248 (2002)
10. School on Nonlinear dynamics, IMCB, Brasilia, 1-5 July 2002 (invited lecturer, course on Normal forms)
11. Plenary Talk, Argentinean association of Physicists, Huerta Grande, Sept. 2002, " The physics of Birdsong".
12. Argentinean Biophysical Society meeting, SAB 2002, Buenos Aires, 5 Dec, Plenary talk
13. Medyfinol 2002, 9-13 Dec 2002, Colonia, Uruguay, Invited talk
14. SIAM dynamical systems meeting, Snowbird, Utah (USA), May 2003, Contributed presentation "Diversity within birdsong"
15. Meeting of the NE-Brasilian society of Physics, Plenary talk, Nov. 2003.
16. Internacional conference on voice physiology and biomechanics: modelling ocmplexity. Marsella. Aug. 2004
17. Workshop TOCS, Porto Alegre, Brasil agosto 2004 (charla invitada "Physics and neural control of birdsong")



18. Medyfinol 2004, La Serena, Chile, December 5-10, 2004 (invited talk: Sub harmonics and rhythms in birdsong)
19. Lawnp 05, Bariloche, Oct. 2005, (invited talk , “Complexity of behavior with simple neural sustrates in birdsong”)
20. X congress of the Panamerican Association for Biochemistry and Molecular Biology, Pinamar, Argentina, Dec. 2005. “Synthesizing birdsong” (Zysman, Mendez, Aliaga and Mindlin)
21. 8vo TALLER ARGENTINO DE NEUROCIENCIAS  
5 AL 9 DE ABRIL DE 2006, Córdoba, organizador de mini simposio (invitados, Goller F. and Margoliash D.)
22. Experimental Chaos conference, San Pablo, Brasil, 29/05/2006-01/06/2006. “Simple neural architectures leading to diversity in birdsong”, with M. Trevisan.
23. PNLD, (Perspectives in Nonlinear Dynamics) Trieste (16-27 july 2007). Course “physics and neural control of birdsong” in the workshop, Invited speaker.
24. Neuroscience meeting, November 2007, San Diego, USA (presentation of two posters) (924.18/QQ8)  
Frequency control during song does not require syringeal muscles in the Great Kiskadee  
(Wednesday, Nov 7 2007 2:00 PM - 3:00 PM) \*A. AMADOR<sup>1</sup>, F. GOLLER<sup>2</sup>, G. B. MINDLIN and  
(926.1/RR15) Constraints between motor patterns in birdsong (Wednesday, Nov 7 2007 1:00 PM - 2:00 PM),  
G. B. MINDLIN<sup>1</sup>, J. A. ALLIENDE<sup>2</sup>, A. AMADOR<sup>2</sup>, J. M. MENDEZ<sup>2</sup>, M. A. TREVISAN<sup>2</sup>, F. GOLLER
25. Neurotaller, April 2008, La Falda, Cordoba, Argentina, (presentation of two posters)
26. 1st CAPES and ELS-IINN/UFRN Summer School, 2<sup>nd</sup> July, 29 August 2008, Natal, Brazil. Course on “The Physical and neural control of birdsong”.
27. Summer school 2009, Physics Department UFPE, Recife, Brazil (February 2009), School on Nonlinear Dynamics
28. Neuroscience meeting, November 2008, Washington, USA, , \*Mon, Nov 17, 4:00 - 5:00 PM  
492.8/UU6 - Beyond harmonic sounds in a simple model for birdsong production\_ A. AMADOR<sup>1,2</sup>, J. D. SITT<sup>2</sup>, F. GOLLER<sup>3</sup>, G. B. MINDLIN<sup>2</sup>
29. Invited talk, Meeting of the Acoustical Society of America, 18-22 May 2009, Portland, Oregon, USA.  
3aSC2. Source-filter interactions in birds—Theory and experimental evidence. Gabriel Mindlin, Ezequiel Arneodo \_Dept. of Phys., Univ. of Buenos Aires, gabo.mindlin@gmail.com\_, and Franz Goller \_Univ. of Utah, Salt Lake City, UT, goller@biology.utah.edu\_
30. Neuroscience meeting, October 2009, Chicago, Mon, Oct 19, 3:00 - 4:00 PM  
483.3/GG68 - Hormonal acceleration of song development in canaries, \*J. ALLIENDE GONZALEZ<sup>1</sup>, J. M. MÉNDEZ<sup>1,2</sup>, F. GOLLER<sup>2</sup>, G. B. MINDLIN<sup>1</sup>;
31. Real time birdsong synthesizer driven by physiological instructions, A. Amador and G. B. Mindlin, Neuromechanics symposium, University of Chicago, may 17-18 2010, Chicago.
32. XXII REUNIÓN NACIONAL DE FÍSICA SOCIEDAD BOLIVIANA DE FÍSICA, curso de sistemas complejos, G. B. Mindlin, 25-30/10/2010, Potosi, Bolivia
33. Dynamical origin of physiological gestures in birdsong, Plenary talk, Dynamics days Southamerica 2010, San Pablo, Brasil (25-30 July 2010)
34. XII Latin American Workshop on Nonlinear Phenomena (LAWNP-2011), October 10 to October 14, 2011, San Luis Potosi, Mexico (Plenary talk)
35. Motor Systems Poster Number 160 | Session 1 Subject-controlled bioprothetic avian vocal organ" Ezequiel M. Arneodo, Yonatan Sanz Perl, Gabriel B. Mindlin XXVI congreso annual, Huerta grande, Cordoba, 18-22 octubre 2011
36. Motor Systems Poster Number 161 | Session 2  
"Acoustic observables of sound source-tract coupling" Ezequiel M. Arneodo, Yonatan Sanz Perl , Gabriel B. Mindlin XXVI congreso annual, Huerta grande, Cordoba, 18-22 octubre 2011
37. Motor Systems Poster Number 164 | Session 2 "Syllable breaking after cooling telencephalic nuclei unveils the presence of a second timescale in the birdsong motor pathway" Matías A Goldin, Jorge A Allende , Gabriel B Mindlin
38. Sun, Nov 13, 4:00 - 5:00 PM 303.04/XX37 - Cooling telencephalic nuclei to test the interplay between timescales in a birdsong model, M. A. GOLDIN, J. A. ALLIENDE, G. B. MINDLIN, SFN 2011, Nov 12-16 Washington DC.
39. Mon, Nov 14, 4:00 - 5:00 PM 517.04/ZZ11 - Using a song production model to study tuning properties of selective neurons in zebra finches, A. AMADOR, Y. SANZ PERL, G. B. MINDLIN, D. MARGOLIASH, SFN 2011, Nov 12-16 Washington DC.

40. Bio-prosthetic avian vocal organ based on a model of the biomechanics ".  
Meeting: 12<sup>th</sup> Experimental Chaos and Complexity Conference. May 2012, Ann Arbor (MI), USA. Authors: Ezequiel M. Arnedo, Yonatan Sanz Perl, Franz Goller, Gabriel B. Mindlin.
41. A. Amador, Y. Sanz Perl, G.B. Mindlin and D Margoliash. "*Motor coding unveiled by a low dimensional model of song production*". 10th International Congress of Neuroethology, College Park, MD, USA, August 5-10, 2012.
42. TREFEMAC La falda, cordoba 2012. La fisica del canto de la aves en neurociencias, GB Mindlin, charla planaria invitada, 2-4 mayo 2012
43. Congreso Internacional FENS Forum of Neuroscience. M.A.Goldin, L.M. Alonso, J.A.Alliende, F.Goller, G.B.Mindlin. "Testing a dynamical model of birdsong motor control with telencephalic cooling". Barcelona, España. 14 al 18 de Julio de 2012
44. A. AMADOR, Y. SANZ PERL, G.B. MINDLIN AND D. MARGOLIASH
45. Descifrando códigos neuronales con un modelo físico de canto de aves
46. XI Congreso Regional de Física Estadística y Aplicaciones a la Materia Condensada: TREFEMAC 2013 Lugar: La Plata Año: 2013
47. "Gesture dynamics are encoded by premotor cortical neurons in birdsong production", A. Amador, Y. Sanz Perl, Margoliash. D, Mindlin G. B., Plenary talk XVII Conference on Nonequilibrium Statistical Mechanics and Nonlinear Physics, December 3-7 2012, Santiago, Chile
48. XII Latin American Symposium on chronobiology, "Mathematical models and biological clocks", Chair, Tunuyan, Mendoza, Argentina October 29 (2013)
49. Society for Neuroscience, KKK19 196.08 Predictive and preceding motor activity in biophysical models of vocal production in songbirds, K. Brown, G. B. Mindlin and Margoliash D. November 10 (2013)
50. 47. A. AMADOR, Y. SANZ PERL, G.B. MINDLIN AND D. MARGOLIASH Using a low-dimensional birdsong model to unveil neural coding in zebra finches Annual Main Meeting of the Society for Experimental Biology Lugar: Valencia, España; Año: 2013;
51. A model for the song system in Serinus Canaria. G. Alonso, Goller F., Gabriel B. Mindlin, ICN, Montevideo, Uruguay 2016, March 30, April 3
52. Birdsong in Motor coordinates, Invited talk at StatPhys 2016, Lyon, France (Lyon 18-22 July 2016)
53. Listening to a bird's dream, invited talk, Medyfinol, Valdivia, Chile, December 5th to 9th, 2016
54. "Physics and neuroscience of birdsong" invited talk. "Fronteras en Biociencia", Instituto de Biomedicina de Buenos Aires (IBioBA) y Max Planck Institute, Noviembre 2016, Buenos Aires.
55. Workshop on dynamical Modeling, Cologne (3rd International Workshop on Dynamic Modeling: Cologne, 18-19 July 2017) Gabriel Mindlin: "A dynamical system's approach to birdsong production"
56. Dynamics of Complex Systems - 2017 (20 June 2017) Bangalore, India "The physics of birdsong"
57. ENFE, Brazil, 17 through September 20, 2017 Ilheus. Plenary talk: *listening to the dreams of birds*.

#### Invited talks

1. INSA, Rouen, France (1994) "Templates and Torii", invited by G. Gouesbett
2. University of Navarra, Spain (1994) "Hidden Symmetries", invited by C. Perez-Garcia
3. Universidad Complutense, Spain (1995) Dept. Of applied math. , invited by H. Herrero
4. INLN, Nice invited by J. Tredicce (1996)
5. U. de Navarra, invited by H. Mancini (1997)
6. KTH, Universitet Stockholms, invited by M. Natiello (1997)
7. Princeton University, Applied Math. Department, Invited by P. Holmes (1999)
8. INLS, University of California at San Diego, (USA) invited by H. Abarbanel (1999)
9. I. Balseiro at Bariloche (ARG), invited by H. Wio (2000)
10. Drexel University (USA), invited by Michel Vallieres (2001)

11. INLN (Nice, France), invited by J. Tredicce (January 2002)
12. LIMSI (Orsay, France) invited by D. Sciamarella (February 2002)
13. UCSD, Neuroscience division, Department of Biology (USA), invited by Nick Spitzer (April 2003)
14. UCSD, INLS, (USA), Invited by H. Abarbanel.
15. University of Chicago, invited by D. Margoliash, (October 2003)
16. Encontro de Fisica Nordeste Brasil – Fortaleza Brazil. (plenary talk) (November 2003.)
17. The physics of and neural control of Birdsong, IB, Centro atomico Bariloche, Oct. 2004
18. Escuela CAB-IB 2004 Bariloche, Argentina (Lecturer, course: the behavior as emergent of excitable systems) October 2004
19. INLN, Nice, invited by J. Tredicce (January 2005)
20. Techtips, UCSD “Voiceprints for voice identification”, invited by Laura Wolszon, January 2005
21. Experimental and Computational Neurodynamics Summer School, August 15 - 26, 2005, UCSD, La Jolla, CA. A four lectures course for graduate students in neuroscience
22. Experimental Chaos conference, San Pablo, Brasil, invited lecture, 29/05/2006-01/06/2006
23. invited talk, 8<sup>th</sup> taller argentine de nuerociencias, Córdoba (2006)
24. BIOMAT, Córdoba, Argentina (2007). Birdsong and computational neuroscience.
25. BIOMAT, Córdoba, Argentina (2008). Low dimensional dynamics in the physiological gestures controlling birdsong.
26. Invited talk, Meeting of the Acoustical Society of America, 18-22 May 2009, Portland, Oregon, USA.
27. XXII REUNIÓN NACIONAL DE FÍSICA SOCIEDAD BOLIVIANA DE FÍSICA, Plenary, G. B. Mindlin, 25-30/10/2010, Potosi, Bolivia
28. Dynamical origin of physiological gestures in birdsong, Plenary talk, Dynamics days Southamerica 2010, San Pablo, Brasil (25-30 July 2010)
29. XII Latin American Workshop on Nonlinear Phenomena (LAWNP-2011), October 10 to October 14, 2011, San Luis Potosi, Mexico (Plenary talk)
30. TREFEMAC 2012 (10° Congreso Regional de Física Estadística y Aplicaciones a la Materia Condensada) La Falda, 2-4 May 2012 (Plenary Talk)
31. Medyfinol 2012, Santiago de Chile, Charla plenaria, 7/12/12, Santiago de Chile
32. Elemental motor gesture dynamics are encoded by song premotor cortical neurons in songbirds *by Gabriel B. Mindlin*, BCCN/BFNT AG-Seminar , Max Planck Institute for Complex Systems 18/12/12, 2013 MPI for Dynamics and Self-Organization Göttingen, Nonlinear Dynamics Group
33. Friday, 15 February 2013 Perception, motor control, and learning: Theory and experiment in bird song  
Neuromechanics of birdsong production: A new sensorimotor model. Daniel Margoliash, The University of Chicago and Gabriel Mindlin, Universidad de Buenos Aires  
Chained melody: “Sequence generation in the songbird forebrain and the emergence of higher-order syntactical structure”, Graduate center, CUNY, NY, USA
34. Faculty at 2nd Caribbean School of Neuroethology, 2013 IBRO-LARC\_ISN School of Neuroscience, May 12-25 2013
35. Invited colloquium, Instituto Balseiro, Bariloche, Arg, 2014.
36. Course ICTP San Pablo, 4 lectures “Birdsong as a model for learning” 4/05/2014-9/05/2014, San Pablo, Brazil. IFT-UNESP. Mini school on Dynamical systems in Biology.
37. 99 RNF AFA, Tandil, 2014, Charla plenaria: “Canto en coordenadas motoras”, 22 al 25 de septiembre de 2014 Tandil, Buenos Aires. Centro Cultural Universitario.
38. **Ranwel Caputto Plenary Lecture Chair: Arturo Romano**, Instituto de Fisiología Biología Molecular y Neurociencias, Universidad de Buenos Aires **“Motor coordinates to study birdsong” Gabriel Mindlin, 3 october 2014, Huerta Grande, Cordoba Argentina.**
39. Birdsong: rhythms and clues, from neurons to behavior. Washington 14 November 2014, Washington DC, USA. Birdsong in Motor coordinates, G. B. Mindlin, invited talk.
40. Winter school in quantitative biology , ICTP, Trieste 1-12 Dec 2014 (invited series of lectures)
41. MURI winter school 2015: dynamics of multifunction brain networks”, UCSD , January 7-9 2015, G. B. Mindlin, invited course.
42. Seewiesen Colloquia, Max Planck Institute fur Ornithologie, Jan 22 2015 (Germany)
43. Seminario Cardini, Instituto Leloir, Buenos Aires, 25 Noviembre 2015
44. ICN, Montevideo, Uruguay 2016, 30 april, march 3. April 3, Listening to the dreams of birds, Invited satellite II meeting, Neuroethology of Southern Cone
45. ICN, satellite auditory processing, song production and motor control, April 29<sup>th</sup>, Montevideo Uruguay.

46. StatPhys Lyon, France, July 2016, Invited speaker.
47. Medyfinol, Valdivia, Chile, Nov 2016, Invited talk
48. Coloquio Insrtituto Balseiro, "Escuchando los sueños de un ave" Feb 2017.

#### **Visits to Institutions in the last years**

1. Seewiesen, Max Planck Institute fur Ornithologie 2015
2. INSERM-CEA, Paris, May 2015
3. University of Utah, Dept of biology, yearly 2005-2015
4. University of Chicago, yearly, 2009-2015
5. Institute Nonlinear Science, UCSD (January 2003-February 2004).
6. Insitute nonlineaire de Nice, France (January-march 2002)
7. Rockefeller University, Center for Physics and Biology (2001)
8. Drexel University, Physics Department (2001)
9. Rockefeller University, Center for Physics and Biology (2000)
10. Princeton University, Department of applied mathematics (1999)
11. University of California at San Diego, Institute for Nonlinear Science (1999)
12. Universidad de Navarra, Department of Physics and Applied Mathematics (1997)
13. Uppsala University, Dept. of Quantum Chemistry (1997)
14. University of Nice, INLN (1997)

#### **Organization of Conferences and Schools**

1. Argentine-French school of Nonlinear dynamics and lasers (I) 1996. Courses by J. Tredicce and P. Coulet
2. Argentine-French school of Nonlinear dynamics and lasers (II) 1998. Courses by J. Tredicce and S. Balle
3. Minisymposium "Observation, analysis and modeling of excitable systems", in the SIAM conference on Applications of Dynamical systems, Utah (1999)
4. Third Giambiagi school of Physics, Physics Department, University of Buenos Aires (Physics and Biology). Courses by A. Winfree, H. Abarbanel, R. Do Santos and W. Kristan, July 2001.
5. 8vo TALLER ARGENTINO DE NEUROCIENCIAS  
5 AL 9 DE ABRIL DE 2006, simposio (F. Goller, D. Margoliash)
6. PNLD, (Trieste, 2007) Internacional comité.
7. Dynamics Days (2008), Internacional advisory comité.
8. SAN-TAN (soeciedad argetnina de neuro ciencias- taller argentine de neurociencias), primera reunion conjunta 2009, comite organizador.
9. Dynamics days asia, international advisory committee (2014)
10. School on Physics Applications in Biology (January 2016, San Pablo, Brazil, ICTP-SAIFR)

#### **Referee and Committees**

- Referee for Physical Review Letters, Physical Review A, Physical Review E, Physica D, Optics Communications, Chaos, International Journal of Bifurcations and Chaos, Proc. Royal Soc. Of Sci., biology.
- Jury in the PhD thesis of: C. Letellier (U. De Paris VII), M. Zimmermann (Uppsala University, 1993), A. Donofrio (1994), M. J. Sanchez (UBA, 1994), S. Gatica (UBA,1995), E. Vergini (UBA, 1995), V. Presa (UBA, 1996), P. Dmitruk (UBA, 1999), G. Carlo (UBA, 2000), H. Castellini (U. Rosario), A. Duarte (CAB, Balseiro), J. Aparicio (UBA, 1999), F. Simonotti (UBA,2000), D. Strier (UBA, 2002), A. Chernomoretz (UBA, 2002), and others since then.
- Member of committee for hiring assistant professors ( JTP-de) in UBA (1998)
- Member of committee for hiring assistant professors ( JTP-de) in UBA (2002)

- Referee for the la “Agencia Nacional de Promoción Científica“, Argentina (1999-2000-2001)
- Committee member for PhD scholarships, CONICET (1999-2000, 2000-2001)
- Reviewing Editor of the HFSP Journal (2006-2009) (Journal of the Human Frontiers Science Program)
- Physics Committee, Conicet 2008-2009
- Physics Committee, Conicet, head (2009).
- Editor, Papers in Physics (2012-)
- Member of the Scientific Council and steering committee, ICTP-SAIFR (Brazil, 2015-2019)

### **Institutional participation**

- Professor member of the committee ruling the Physics Department at UBA (1996-1998, 1998-2000, 2003-2005, 2015-2016)
- Committee member of the Graduate School of the School of Sciences, U. Buenos Aires (2001-2015), committee member of the graduate program at the Physics Department, School of Sciences, UBA (2001-present)
- Vice chairman, Physics Department, June 2005-2007
- Conicet, Comision de fisica (ingresos, 2015-2016)
- FCEN, commision ad hoc distribucion de cargos (2018)
- Conicet, commission de promocion a investigador superior 2018
- Secretario de posgrado, FCEN, 2017-

### **Comments on my work**

- **Nature Science Update**, 2 nov 2001, “Canaries change their tune” by P. Ball
- **Physics News update**, 14 Nov 2001, ” Singing Like a Canary” by Phil Schewe, James Riordon, and Ben Stein
- **Mathematical American association, Math trek**, Canary Songs, by Ivars Peterson, November 26, 2001
- **New Scientist**, 10 Nov. 2001
- **New Scientist**, by Muir 8 **January 2003** (on the work “Diversity within a birdsong”, PRL 89, 288102)
- **Physical Review Focus**, 8 **January 2003**, by JR Minkel, “Deconstructing Birdsong”, on the work “Diversity within a birdsong”)
- **AAS science hour**, broadcasted on Feb 2003
- **On the same work: ABC news, CNN, Reuters, Boston Globe, Clarin, Granma and others.**
- **Nature Science Update**, 2 Jan 2004, songbird duets resonate to beat, by P. Ball
- **PhysicsWeb, Canaries sing simple harmonics**, nov 2001, by Katie Pennicott
- **PhysicsWeb, Physicists look at birdsong**, February 2006, by Belle Dumé.
- **Songbirds' brains coordinate singing with intricate timing, study shows**, February 27 2013 | UChicago News
- **Songbird Brain Activity Sheds Light On Complex Human Behavior, February Describen en pájaros cómo el cerebro controla el canto**, 28 Febrero 2013 | Noticias Exactas.
- **Neuroscience: The units of a song**, Nature (2013) doi:10.1038/nature11957 | Nature News and Views
- **Songbirds' brains coordinate singing with intricate timing**, February 27 2013 | Science Codex
- **Songbirds' Brains Coordinate Singing With Intricate Timing**, February 27 2013 | Science Daily
- **Las neuronas de los pájaros se encienden con su propio canto**, 27 de Febrero 2013 | SINC
- 28 2013 | Red Orbit
- **Editor’s choice 2013, Nature, The units on Song, by T. Troyer.**
- **F1000 Prime**, on “ Temperature induced syllable breaking unveils interacting timescales in birdsong motor pathway”, by Goldin Alonso Alliende, Goller and Mindlin G. B., **by John Lisman**

- **Physics Today**, “Birds can recognize a model’s reproduction of their own song”, by Johanna L. Miller. *Physics Today* 66(5) 16 (2013)
- **F1000Prime on** “Elemental gesture dynamics are encoded by song premotor cortical neurons”, by Amador et al, *Nature* 2013, written on April 19 2016 by Leonard Maler
- **Physics Today**, Specialized vocal organs give some birds their unique songs 5/9/17 by Melisa Baldwin
- **AIP press release** Nonlinear physics bridges thoughts to sounds, by Julia Majors, September 19, 2017
- **Science update**, “Birdsong dreams” <http://www.scienceupdate.com/2018/08/dream-4/> (april 2018)
- **The Smithsonian** <https://www.smithsonianmag.com/science-nature/zebra-finches-dream-little-dream-melody-180969925/> (zebra finches dream a little dream of melody, by Katherine Wu) August 2018

#### Teaching at the Universidad de Buenos Aires:

(Two terms per years, continuously since 1993)

1. Quantum Mechanics
2. Modern Physics
3. Physics 2 (Chemists)
4. Physics 3 (Physicists)
5. Physics 2(Biologists)
6. *Nonlinear Dynamics*

#### Grants in the last years:

1. UBA X099 (2004-2007) director y UBA X208 (2001-2003) director
2. CONICET PIP 2089, director
3. Antorchas (inicio de carrera) (1999-2001)
4. FONCyT pict 03-08133 (2002-2005) Researcher.
5. NIH. The production of complex sounds in birdsong, period 2005-2010, PI Franz Goller, University of Utah. PI subcontract, Gabriel Mindlin.
6. NIH. The production of complex sounds in birdsong, period 2010-2015, PI Franz Goller, University of Utah. Co PI, Gabriel Mindlin.
7. X145 DINAMICA NO LINEAL APLICADA A LA BIOFISICA 30 de mayo 2008
8. UBACYT Dinamica no lineal aplicada a la biofisica, 2011-2013
9. Bi centennial PICT, ANCyT, 2010-2014
10. Neuromechanics of learned sensorimotor vocal integration, NIH (PI Dan Margoliash), 2013-2017
11. UBACYT 2014-2017 20020130100094BA, Biofisica de la produccion vocal. (UBA)
12. PICT 2014 1802-E2 (Mindlin) MINCyT
13. PUE (responsable Cientifico) “Bio-prostética integrada” 2017-