

January 29, 2015

Curriculum vitae

Personal information

Name: Eliyahu Farber

Birthday: December 10th, 1958

Place of birth: Holon, Israel

Marital status: Married, three children

Higher education

1998-2001 Ph.D. in Physics, Tel-Aviv University, School of Physics and Astronomy.

Supervisor: Prof. Guy Deutscher

Title: Symmetry of the order parameter in High Tc Superconductors from penetration depth measurements

Employment

Joint position: Departments of Electrical and Electronic Engineering – Physics, Ariel University

P. O. Box 3, Ariel 40700, Israel

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2007.04 - now Senior Lecturer, Ariel University

2003- now Head of laboratory for superconductivity and optical spectroscopy, thin films growth/characterization.

2002.11 – 2007.03 Lecturer, the college of Judea and Samaria,

2001.07-2002.10 - Post doc, Joint research: Tel Aviv University (Prof. G. Deutscher) and Stuttgart University (Prof. Dr. M. Dressel)

Professional Activity

a. Academic administration

2006 – 2011 Member of EE department Teaching Committee – Ariel University Center

2007 – 2010 Member of Computation committee - Ariel University Center

b. Chair in National and international conferences and workshops

1. THz and mm-waves Technology and applications. CJS, Ariel, Israel (2006).

Chair and member of the organizing & and scientific committee.

2. Workshop for Electronic Materials (nano-physics) and Superconductivity, part of MMT conference, Ariel University Center (2008).

Chair and member of the organizing & and scientific committee of the workshop.

3. Workshop for Electronic Materials (nano-physics) and Superconductivity, part of MMT conference, Ariel University Center (2010).

Chair and member of organizing & and scientific committee of the workshop

Education Activities

a. Courses taught

- 1) Electromagnetic Fields – B.Sc. level
- 2) Introduction to microwave and radio frequency – B.Sc./M.Sc. level
- 3) Classical Physics, mechanics – B.Sc. level
- 4) Classical Physics, electricity - B.Sc. level
- 5) Introduction to solid state physics I & II - B.Sc. level
- 6) Material Engineering - B.Sc. level
- 7) Semiconductors devices - B.Sc. level

b. Research students

M.Sc. students:

- 1) 2005-2007 Mr. Ytav Aslanov, Joint supervision with Prof. Amir Boag, Tel Aviv University, EE school.
- 2) 2006-2009- Mr. Nimrod Bachar, Joint supervision with Prof. Michael Roth, The Hebrew University.
- 3) 2008-2011 Mr. Dan Lavi, Ariel University Center, EE department.
- 4) 2008-2011 Mr. Moshe Mizrachi, Ariel University Center, EE department.
- 5) 2009-now Mr. Elichai Glassner, Ariel University Center, EE department.
- 6) 2009-now Mr. Guy Avigad, Ariel University Center, EE department.
- 7) 2011- 2013 Mr. Eldad Holdengreber, Ariel University Center, EE department.
- 8) 2011 – now, Yakir Dahan, Ariel University Center, EE department.
- 9) 2013 – now, Vitaly Khavkin, Ariel University Center, EE department.
- 10) 2012 – now, Raziel Itzhak, Joint supervision with Prof. Boris Shapiro, Bar Ilan University, Physics department.
- 11) 2012 – now: Bezalel Koplun, Ariel University Center, EE department.
- 12) 2013 – now: Boaz Kaizer, Joint supervision with Dr. Jacob Rodnitzky sorek nuclear center.

Ph.D. students

- 1) 2009- 2014, Dr. Nimrod Bachar- Joint supervision with Prof. Guy Deutscher, Tel Aviv University, School of Physics and astronomy.
- 2) 2010- 2014, Dr. Daniel Sherman- Joint supervision with Prof. Aviad Frydman, Bar Ilan University, Physics department.
- 3) 2012- now, Mr. Moshe Mizrachi, Joint supervision with Prof. Zeev Zalevsky, Bar Ilan University, EE department.
Thesis subject: VHF Coupler for wide range frequency cellular communication
- 4) 2013 - now, Mr. Eldad Holdengreber, Joint supervision with Prof. Shmuel Schacham, Ariel University, EE department.

Articles

List of refereed Articles

Published or accepted

1. Phase shift combiner for multi-channel VHF communication, E. Holdengreber, M. Mizrahi, E. Glassner, Y. Koral, S. E. Schacham and E. Farber, **accepted** for publication, International Journal of Microwave and Wireless Technologies (2015).
2. Design and Implementation of an RF Coupler Based on YBCO Superconducting Films, E. Holdengreber, M. Mizrahi, E. Glassner, Y. Dahan, H. Castro and E. Farber, IEEE Transactions on Applied Superconductivity, 25, 1500905 (2015), **accepted** for publication.
3. Unconventional superconductivity in nano grains of Aluminum, N. Bachar, U. Pracht, M. Dressel, G. Deutscher and E. Farber, J. Low Temp. Phys. 179, 83 (2015).
4. Observation of a bulk nodal-gap in overdoped $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ thin films, N. Bachar, Y. Bechor, B. Gorshunov and E. Farber, J. Low Temp. Phys. 179, 108 (2015).
5. Effect of Coulomb interactions on the disorder-driven superconductor-insulator transition, D. Sherman, B. Gorshunov, S. Poran, N. Trivedi, E. Farber, M. Dressel, and A. Frydman, Phys. Rev. B 89, 035149 (2014).
6. Direct evidence of a bulk nodal gap in the overdoped regime of $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ thin films from THz Spectroscopy
N. Bachar, E. Farber, E. Zhukova, B. Gorshunov and M. Roth, Europhys. Lett. 67006, 104 (2013).
7. Broadband microwave measurements of Overdoped $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ films using Corbino Geometry
E. Farber, N. Bachar, H. Castro and Dan. Lavi, J. Superconductivity and Novel Magnetism, 6, 1111-14, (2013).

8. Tunneling Density of States of Indium Oxide Films Through the Superconductor to Insulator Transition, D. Sherman, G. Kopnov, E. Farber, D. Shahar and A. Frydman, *J. Superconductivity and Novel Magnetism*, 26, 1473-7, (2013).
9. Ca doped YBCO films in THz frequency range, E. Farber, N. Bachar, E. Zhukova, B. Gorshunov, *J. Phys. Conf. Ser.* 400, 022018 (2012).
10. Anomaly in the complex conductivity of overdoped $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ thin films from THz Spectroscopy, N. Bachar, E. Zhukova, B. Gorshunov. E. Farber , M. Roth, *J. Superconductivity and Novel Magnetism*, 24, 1225 (2011).
11. Terahertz conductivity of overdoped $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$
N. Bachar, E. Farber , M. Roth , E. Zhukova, B. Gorshunov, H. Castro and A. Abramovich, *J. Low Temp Phys.* 158, 735 (2010).
12. Non-monotonic driven vortex noise in HTSC
P. Giraldo, E. Farber, H. Castro, *Physica B*, 404, 3099 (2009).
13. The Surface Impedance for Various Doping of $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ Thin Films
E. Farber, H. Castro, M. Lewkowicz, B. Gorshunov, A. Abramovich, and J. P. Contour, *J. Phys. Conf. Ser.* 150, 052051 (2009).
14. Anomalous Transport Properties in Superconducting Overdoped YBCO thin Films. J. Galvis, H. Castro, E. Farber. *MICROELECTRONICS JOURNAL*, 39, 1385-1387 (2008).
15. Terahertz Detection Mechanism of Inexpensive Sensitive Glow Discharge Detectors, D. Rozban, N. S. Kopeika, A. Abramovich and E. Farber. *J. Appl. Phys.* 103, 93306 (2008).
16. $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ thin films: from phase fluctuations to a complex order parameter, E. Farber, M. Levkowicz, H. Castro, B. Gorshunov, A. Abramovich and J. P. Contour, *J. Phys. Chem solid.* 69, 3082-3084 (2008).
17. Inexpensive detectors for terahertz imaging, A. Abramovich, N. Kopeika, D. Rozban and E. Farber, *Applied Optics*, 46, 2207 (2007).
18. Microwave and Sub-millimeter Wave Measurements of $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ Films: Evidence of Time-reversal Symmetry Breaking, E. Farber and N. Bachar, *Physica C*, 460, 912 (2007).

19. Robust finite gap in overdoped $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ Thin Films. E. Farber, G. Deutscher, B Gurshunov and M. Dressel. *J. Phys. Chem. Solid.* 67, 428, (2005).
20. Evidence for a Bulk Complex Order-Parameter in $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ Thin Films. E. Farber, G. Deutscher, B Gurshunov and M. Dressel. *Europhys. Lett.* 67, 834 (2004).
21. Microwave measurements of overdoped $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ thin films. E. Farber and G. Deutscher. *J. Low Temp. Phys.* 131, 563 (2003).
22. Low temperature dependence of the penetration depth in $YBa_2Cu_3O_{7-\delta}$ thin films revisited by mm-wave transmission and surface impedance measurements. S. Djordjevic, E. Farber, G. Deutscher, N. Bontemps, O. Durand, J. P. Contour, *Eur. Phys. J. B* 25, 407-416 (2002).
23. Microwave surface impedance of high-quality $YBa_2Cu_3O_{7-\delta}$ thin films. E. Farber J. P. Contour and G. Deutscher, *Physica C* 317-318, 550 (1999).
24. Penetration depth variation in high quality $YBa_2Cu_3O_{7-\delta}$ thin films. E. Farber, S. Djordjevic, N. Bontemps, O. Durand, J. P. Contour and G. Deutscher, *Journal of Low Temperature Physics.* 117, 515 (1999).
25. Penetration depth measurement in high quality $YBa_2Cu_3O_{7-\delta}$ thin films. E. Farber G. Deutscher, J. P. Contour, and E. Jerby, *Eur. Phys. J. B* 5, 159 (1998).
26. Microwave transmission and harmonic generation in granular high T_c superconducting thin films: evidence for viscous flux flow motion and weak links. Golosovsky M. Davidov D. Farber E. Tsach T, Schieber M, *Physical Review B* 43, 10390 (1991).
27. Harmonic generation by field modulation of the microwave complex impedance of the high T_c superconductors. Golosovsky M, Davidov D, Farber E, Tsach T, Schieber M. *Physica A* 168, 353 (1990).

Submitted and under preparation

28. Frequency multiplexing spatial super-resolved sensing for RADAR applications, M. Mizrahi, E. Holdengreber, E. Farber and Z. Zalevsky, **submitted** for publication, *IEEE transactions on Microwave Theory and Techniques* (2015).

- 29. N. Bachar et al., nano grains in Aluminum films, PRL. Under preparation (2015)
- 30. The complex conductivity of $Y_{0.95}Ca_{0.05}Ba_2Cu_3O_{7-\delta}$ thin films, E. Farber and N. Bachar, under preparation (2015).
- 31. High Temperature Superconducting Bow-Tie THz Antenna, E. Holdengreber, M. Mizrahi, S. E. Schacham and E. Farber, under preparation, IEEE Transactions on Applied Superconductivity (2015)

Proceedings-refereed-full papers

- 32. Microwaves measurements of high Tc superconductors. E. Farber, G. Deutscher, G. Koren and E. Jerby, Proceedings of the Nineteenth convention of electrical and electronics engineers in Israel, Jerusalem. IEEE, November 1996, P. 444.
- 33. MM Wave Transmission of $YBa_2Cu_3O_{7-\delta}$ Thin Films. S. Djordjevic, E. Farber, G. Deutscher, N. Bontemps, O. Durand, J. P. Contour “2000 international workshop on superconductivity” Matsue, Japan (June 19-22, 2000)
- 34. VHF coupler for wireless communication. M. Mizrahi, E. Glassner, N. Bachar, E. Farber, A. Abramovich and Y. Koral, IEEE COMCAS, (2009)
- 35. High resolution high power w-band spectroscopy system (92-100GHz). E. Gross, A. Abramovich, C. Bruma, E. Farber, IEEE COMCAS, (2009)
- 36. Attenuated Total Reflectance (ATR)-FTIR spectral measurements in MIR and FIR (THz) range, A. Shulzinger, A. Abramovich and E. Farber, IEEE COMCAS, (2009)
- 37. W-Band Spectroscopy of Turbulence Sand and Dielectrics for Imaging Purposes E. Gross, A. Abramovich, C. Bruma, E. Farber, Optical engineering conference 2010, Jerusalem college of technology, 27 Jul 2010.
- 38. The TeraMOS Sensor for Monolithic Passive THz Imagers, Dan Corcos, Igor Brouk, Maria Malits, Alexander Svetlitza, Sara Stolyarova, Amir Abramovich, Eli Farber, Nimrod Bachar, Danny Elad, and Yael Nemirovsky, IEEE COMCAS, (2011)
- 39. Quasi-Dynamical Multi-Channel Coupler Based on High Temperature Superconducting Films, E. Holdengreber, M. Mizrahi, E. Farber, 2012 IEEE 27th Convention of Electrical and Electronics Engineers in Israel

Lectures and presentations at Meetings and Invited Talks

1. Microwaves measurements of high Tc superconductors

E. Farber, G. Deutscher, G. Koren and E. Jerby, Nineteenth convention of electrical and electronic engineers in Israel, Jerusalem, November 1996.

2. Microwave surface impedance of high-quality $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ thin films

E. Farber J. P. Contour and G. Deutscher, *Euroconference on Anomalous Complex Superconductors*, Crete, Greece September 1998.

3. Penetration depth variation in high quality $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ thin films

E. Farber, S. Djordjevic, N. Bontemps, O. Durand, J. P. Contour and G. Deutscher. *MOS-99* Stockholm, Sweden, July 1999.

4. Low temperature behavior of the penetration depth in high quality $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ thin films: *unconventional symmetry or fluctuation effects?*

E. Farber and G. Deutscher, Minerva Workshop, “High temperature superconductivity: From Fundamentals to applications” Haifa, Israel. April 1999. **Invited**

5. Surface impedance of $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ thin films. Given at Groningen University, The Netherlands (2000)

6. Evidence for id_{xy} order parameter component from penetration depth Measurements.

E. Farber and G. Deutscher, “Advances in high temperature superconductivity” Cosponsored by the Heinrich Hertz Minerva center and Israel science foundation. Ramat-Gan, Israel. May 2001. **Invited**

7. Evidence for a complex order parameter in the superconducting gap of overdoped $(\text{Y}_{1-x}\text{Ca}_x)\text{Ba}_2\text{Cu}_3\text{O}_7$ thin films

E. Farber and G. Deutscher, Given at the Walther-Meissner-Institute, Garching, Germany 2001.

8. The symmetry of the order parameter in YBCO thin films from microwave measurements. E. Farber, Minerva meeting, Munich, Germany (2002), **Invited.**

9. Microwave measurements of overdoped $\text{Y}_{0.9}\text{Ca}_{0.1}\text{Ba}_2\text{Cu}_3\text{O}_{7-\delta}$ thin films.

E. Farber and G. Deutscher, *MOS-2002* Hsinchu, Taiwan, August 2002.

10. The order parameter in overdoped $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ films from microwave and millimeter wave measurements.

E. Farber, IPS (Israel Physical Society), 50th annual meeting, 2004.

11. Robust finite gap in overdoped $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ Thin Films

E. Farber, G. Deutscher, B Gurshunov and M. Dressel. **SNS 2004** (*spectroscopies in Novel Superconductors*) sitges, Spain, July 11-16, 2004.

12. THz measurements using a quasi-optical system based on BWO sources.

A. Mishi, E. Farber, A. Abramovich, THz Conference SOREQ NRC, Nes Ziyona, Israel (2005) **Invited**.

13. Material characterization using FTIR method.

A. Abramovich, E. Farber, THz Conference SOREQ NRC, Nes Ziyona, Israel (2005) **Invited**.

14. Doping Dependence of Paring Symmetry in $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ Thin Films

E. Farber. IPS (Israel Physical Society), 51th annual meeting, 2005. **Invited**

15. Doping dependence of the penetration depth in $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$: indication for a complex order parameter.

E. Farber, 24th International Conference on Low Temperature Physics, Orlando, Florida, USA (2005).

16. Microwave and Sub-millimeter Wave Measurements of $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ Films: Evidence of Time-reversal Symmetry Breaking

E. Farber and N. Bachar, The 8th International Conference on Materials and Mechanisms of Superconductivity and High Temperature Superconductors, Dresden Germany July 9 - July 14, 2006.

17. Spectroscopic characterization and recognition of materials, powders and aerosols in THz band using Fourier Transform Infra Red (FTIR) system.

A. Abramovich and E. Farber, "Electricity 2006" November 15-17, 2006 Eilat, Israel.

18. The Order Parameter in Overdoped $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ Films,

E. Farber, The 52nd meeting of IPS, December 17th, 2006.

19. $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ thin Films: From Phase Fluctuations to a complex Order Parameter, **E. Farber**, SNS 2007, Sendai, Japan, Aug. 20-24, 2007.

- 20.** Design of inexpensive diffraction limited Focal Plane Arrays for mm wavelength and THz radiation using Glow Discharge Detector pixels
A. Abramovich, N. S. Kopeika, D. Rozban, **E. Farber**, Homeland Security conference, Ariel 2008.
- 21.** Quasi-Optical system & complex material functions on THz region
N. Bachar, E. Farber, M. Lewkowicz, M. Roth, and A. Abramovich, Homeland Security conference, Ariel 2008.
- 22.** The Surface Impedance for Various Doping of $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ Thin Films
E. Farber, H. Castro, M. Lewkowicz, B. Gorshunov, A. Abramovich, and J. P. Contour, LT-25, Amsterdam (2008).
- 23.** THz measurements of overdoped $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-x}$, superconductors
N. Bachar, E. Farber and M. Roth, MMT Session for Nano Physics and Superconductivity (2008).
- 24.** Terahertz conductivity of overdoped $Y_{1-x}Ca_xB_2Cu_3O_{7-\delta}$
N. Bachar, E. Farber and M. Roth, QFS-2009, International Symposium on Quantum Fluids and Solids, Northwestern University, USA (2009).
- 25.** Far infrared conductivity of overdoped YBCO thin films, N. Bachar, E. Farber and M. Roth, the 55th meeting of IPS (Israel Physical Society), December 13, 2009.
- 26.** VHF coupler for wireless communication. M. Mizrachi, E. Glassner, N. Bachar, E. Farber, A. Abramovich and Y. Koral, IEEE COMCAS, (2009).
- 27.** High resolution high power w-band spectroscopy system (92-100GHz). E. Gross, A. Abramovich, C. Bruma, E. Farber, IEEE COMCAS, (2009).
- 28.** Complex conductivity of overdoped $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ thin films from time and frequency domain THz spectroscopy, N. Bachar, E. Farber and A. Abramovich, Workshop for Electronic Materials (nano-physics) and Superconductivity, MMT conference Ariel 2010, **Invited**.
- 29.** Anomaly in the complex conductivity of overdoped $Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ thin films from THz Spectroscopy, N. Bachar, E. Farber, M. Roth, Quantum phenomena in complex matter, Superstripes 2010.
- 30.** The complex conductivity of $Y_{1-x}Ca_xB_2Cu_3O_{7-\delta}$ thin films, E. Farber and N. Bachar, ICSM 2012.

31. High frequency measurements and devices based on superconductors, E. Farber, 26th TIMCO meeting, Darmstadt (2012), **Invited Plenary Lecture**.
32. Quasi dynamical coupler for wireless communication based on YBCO superconducting thin films. LT-27, Buenos Aires (2014).
33. Nodal-gap in overdoped $Y_{0.9}Ca_{0.1}Ba_2Cu_3O_{7-\delta}$ thin films, E. Farber and N. Bachar, AToMs – 2014, Bariloche, Argentina (2014).

Grants

2001- 2003 A grant for 3 years together with Guy Deutscher (principle), Israeli ministry of energy, 150,000 USD.

2004-2007 A grant for 3 years from the Israeli ministry of infrastructure, 150, 000 USD. E. Farber (principle), Amir Abramovich .

2005-2006 Grant of the Israeli ministry of defense, together with MAMAG SOREQ, 100,000 USD. E. Farber, Amir Abramovich.

2006-2008 Israeli Russian grant for 2 years, Israeli Ministry of Science. Subject: THz spectroscopy of the order parameter in HTSC, 100,000 USD. E. Farber (principle). Boris Gorshunov, Institute of General Physics, Russia.

2008-2011 Three year grant from the Israeli ministry of defense. Subject: VHF coupler for wireless communication, 250,000 USD.

2011-2014 Israeli ministry of defense. Subject: VHF **superconducting** coupler for wireless communication, 150,000 USD. E. Farber (principle), Amir Abramovich.

2013- 2015 – Israeli Meimad grant (Magnet). Subject: multichannel communication system using a single antenna, 250,000 USD, E. Farber (principle), Amir Abramovich..