LAU
الجامعة اللبنانية الأميركية
Lebanese American University

# Walid G. Malaeb

## EDUCATION:

**Ph.D., Dept. of Complexity Science and Engineering** ***University of Tokyo*** **2009**
*Japanese Government Scholarship (Monbusho)*

*Concentrations:* Physics, Materials Science, Superconductivity, Photoemission Spectroscopy
*Thesis:* Iron-Pnictide and Cuprate High-temperature Superconductors Investigated by Photoemission Spectroscopy.

**M.Sc., Dept. of Physics** ***Beirut Arab University*** **2005**

*Concentrations:* Physics, Materials Science, Superconductivity
*Thesis:* Thermal and Electrical Properties of New High-temperature Superconductor Materials.

**B.Sc., Dept. of Physics** ***Beirut Arab University*** **2002**

Ranking first and honored The Jamal Abdel Nasser Award for Scientific Distinction.

## WORK EXPERIENCE:

- Assistant Professor of Physics, *September 2022 – present*
  Dept. of Physical Sciences, Lebanese American University, Lebanon.
- Associate Professor of Physics, *April 2019 – August 2022*
  Physics Dept., Beirut Arab University, Lebanon.
- Assistant Professor of Physics, *September 2015 – March 2019*
  Physics Dept., Beirut Arab University, Lebanon.

- Project Researcher, *December 2009 – August 2015*
  The Institute for Solid State Physics (ISSP), University of Tokyo, Japan.

## RESEARCH EXPERIENCE:

- Studying the electronic structure of high-temperature superconductors (HTS) using Photoemission Spectroscopy (PES) especially in its angle-resolved mode (ARPES) with special focus on copper-oxide and iron-pnictides superconductors (2006 – present). Experience in Synchrotron Radiation experiments at *Photon Factory* (PF) – KEK, *Hiroshima Synchrotron Radiation Laboratory* (HiSOR) and *Ultra Violet Synchrotron Orbital Radiation* facility (UVSOR) in Japan, *Stanford Synchrotron Radiation Lightsource* (SSRL) in USA and *BESSYII* at *Helmholz Zentrum Berlin (HZB)* in Germany in addition to the advanced Laser sources used in PES experiments at The Institute for Solid State Physics (ISSP), The University of Tokyo and other radiation sources like x-rays and UV rays from Helium discharge sources.

- Photoemission Spectroscopy studies on topological heterostructures for spintronics applications (2022 – present) in collaboration with the Center for Spintronics Research Network (CSRN), The University of Tokyo.

- Synthesizing and investigating the electrical, structural, mechanical, magnetic and thermal properties of novel HTS and nanomaterials for various applications (2015 – present).

## PUBLICATIONS:

41- A. Kamar, A. Srour, M. Roumié, **W. Malaeb**, R. Awad, A. Khalaf, "Comparative study of structural and superconducting properties of (Cu0.5Tl0.5)Ba2Ca2Cu3O10-δ phase substituted by copper fluoride and thallium fluoride", **Applied Physics A**, 127 (8), 1-15 (2021).

40- A. Srour, H. Basma, S. Noureldeen, **W. Malaeb**, R. Awad, "ESR Investigations of (BaSnO3)x/(Cu, Tl) 1223 composite in the normal and superconducting state", **Phase Transitions**, https://doi.org/10.1080/01411594.2021.1931205 (2021).

39- B. Assi, Z. Bitar, **W. Malaeb**, R. S. Hassan, N. Yaacoub, R. Awad, "Investigating the role of diamagnetic Cd2+ ions on the structural, optical, and magnetic properties of YIG", **Physica Scripta**, https://doi.org/10.1088/1402-4896/abfde1 (2021).

38- A. Nasser, A. Srour, N. El Ghouch, **W. Malaeb**, R. Al-Oweini, R. Awad, "Investigation of the physical properties of (Cu0.5Tl0.5)Ba2Ca2Cu3O10-δ impregnated with mono cobalt(II)-substituted Undecatungstosilicate Nanoparticles", **Applied Physics A**, 126, 951 (2020).

37- W. Labban , **W. Malaeb** , K. Habanjar , M.S. Hassan , R. Sakagami , Y. Kamihara, R. Awad, "Investigations of arsenic substitution on the physical, electrical and magnetic properties of Bi-2212 superconductors", **Phase Transitions,** 93, 1055-1066 (2020).

36- R. Al Youssif, T. Sahab, G. Zissis, **W. Malaeb**, M. Hamady, "Calculation of Net Emission Coefficient for High Intensity Discharge Lamps", **Journal of Light and Engineering,** 28, 80-86 (2020).

35- **W. Malaeb**, H. Basma, R. Awad, T. Hibino, Y. Kamihara, "Improvement of the superconducting properties of GdBa2Cu3O7-δ with nano-sized ferrites addition", **Journal of Superconductivity and Novel Magnetism,** 32, 3065–3069 (2019).

34- **W. Malaeb**, R. Awad, T. Hibino, Y. Kamihara, T. Kondo, S. Shin, "Electronic structure of the iron-based superconductor (La,Eu)FeAsO1-xFx investigated by laser photoemission spectroscopy", **Physica B: Physics of Condensed Matter,** 536, 781–784 (2018).

33- **W. Malaeb**, H. Basma, M. ME. Barakat, R. Awad, "Investigation of the mechanical properties of $GdBa_2Cu_3O_{7-\delta}$ added with nano-sized ferrites $ZnFe_2O_4$ and $CoFe_2O_4$ using ultrasonic measurement", **Journal of Superconductivity and Novel Magnetism** 30, 3595-3602 (2017).

32- A. Srour, **W. Malaeb**, M. Rekabi, and R. Awad, "Mechanical properties of the $(BaSnO_3)_x/Cu_{0.5}Tl_{0.5}Ba_2Ca_2Cu_3O_{10-\delta}$ superconductor phase", **Physica Scripta** 92, (10), 104002 (2017).

31- T. Shimojima, **W. Malaeb** *et al.*, "Antiferroic electronic structure in the nonmagnetic superconducting state of the iron-based superconductors", **Science Advances** 3: e1700466 (2017).

30- **W. Malaeb**, I. Kazah, R. Awad and M. Fujioka, "Mechanical properties of the iron-based superconductor$SmFeAsO_{1-x}F_x$", **Journal of Physics: Conference Series** 869, 012042 (2017).

29- A. Srour, **W. Malaeb**, S. Marhaba, and R. Awad, "Thermoelectric power of $(Cu_{0.5}Tl_{0.5})$-1223 superconducting phase added with $BaSnO_3$ nanoparticles", **Journal of Physics: Conference Series** 869, 012017 (2017).

28- A. Nakamura, T. Shimojima, T. Sonobe, K. Ishizaka, **W. Malaeb** *et al.,* "Multiple-pseudogap phases in hydrogen-doped LaFeAsO system", **Physical Review B** 95, 064501 (2017).

27- A. Srour, R. Awad, **W. Malaeb**, M.M. Barakat, "Physical Properties of $(BaSnO_3)_x/Cu_{0.5}Tl_{0.5}Ba_2Ca_2Cu_3O_{10-\delta}$ Superconductor Composite", **J. Low. Temp. Phys.** 189, 217–229 (2017).

26- B. Feng, Y.-H.Chan, Y. Feng, R.-Y.Liu, M.-Y. Chou, K. Kuroda, K. Yaji, A. Harasawa, P. Moras, A. Barinov, **W. Malaeb** *et al.,* "Spin Texture in Type-II Weyl Semimetal $WTe_2$", **Physical Review B** 94, 195134 (2016).

25- M. Nakayama, Takeshi Kondo, Z. Tian, J.J. Ishikawa, M. Halim, C. Bareille, **W. Malaeb** *et al.,* "Slater to Mott crossover in the metal to insulator transition of $Nd_2Ir_2O_7$", **Physical Review Letters** 117,056403 (2016).

24- T. Yoshida, **W. Malaeb** *et al.,* "Coexistence of a pseudogap and a superconducting gap for the high−$T_c$ superconductor $La_{2-x}Sr_xCuO_4$ studied by angle-resolved photoemission spectroscopy", **Physical Review B** 93, 014513 (2016).

23- T. Kondo, M. Nakayama, R. Chen, J.J. Ishikawa, E.G. Moon, T. Yamamoto, Y. Ota, **W. Malaeb** *et al.*, "Quadratic Fermi node in a 3D strongly correlated semimetal", **Nat. Commun.**6, 10042 (2015).

22- T. Kondo, **W. Malaeb** *et al.*, "Point nodes persisting far beyond $T_c$ in Bi2212", **Nat. Commun.**6, 7699 (2015).

21- T. Yoshida, S. Ideta, T. Shimojima, **W. Malaeb** *et al.*, "Anisotropy of the superconducting gap in the iron-based superconductor $BaFe_2(As_{1-x}P_x)_2$", **Sci. Rep.** 4, 7292 (2014).

20- **W. Malaeb**, T. Shimojima, Y. Ishida, T. Kondo *et al.,* "Evidence of a universal relation between electron-mode coupling and $T_c$ in $Ba_{1-x}K_xFe_2As_2$superconductor from Laser ARPES", **Physical Review B** 90, 195124 (2014).

19- S. Ideta, T. Yoshida, M. Nakajima, **W. Malaeb** *et al.*, "Electronic structure of $BaNi_2P_2$ observed by ARPES", **Physical Review B** 89, 195138 (2014).

18- Y. Ota, K. Okazaki , Y. Kotani, T. Shimojima, **W. Malaeb** *et al.*, "Evidence for excluding the possibility of *d*-wave superconducting-gap symmetry in Ba-doped $KFe_2As_2$"**Physical Review B** 89, 081103R (2014).

17- T. Shimojima, T. Sonobe, **W. Malaeb** *et al.*, "Pseudogap formation above the superconducting dome in iron pnictides" **Physical Review B** 89, 045101 (2014).

16- S. Ideta, T. Yoshida, M. Nakajima, **W. Malaeb** *et al.*, "Effects of Zn substitution on the electronic structure of $BaFe_2As_2$ revealed by angle-resolved photoemission spectroscopy", **Physical Review B** 87, 201110R (2013).

15- T. Kondo, Y. Nakashima, **W. Malaeb** *et al.,* "Anomalous doping variation of the nodal low-energy feature of superconducting $(Bi,Pb)_2(Sr,La)_2CuO_{6+\delta}$ crystals revealed by laser-based ARPES", **Physical Review Letters** 110, 217006 (2013).

14- T. Kondo, Y. Nakashima, Y. Ota, Y. Ishida, **W. Malaeb** *et al.,*"Anomalous dressing of Dirac fermions in the topological surface state of $Bi_2Se_3$, $Bi_2Te_3$, and Cu-doped $Bi_2Se_3$", **Physical Review Letters** 110, 217601 (2013).

13- M. Sakano, M. S. Bahramy, A. Katayama, T. Shimojima, H. Murakawa, Y. Kaneko, **W. Malaeb** *et al.,* "Strongly spin-orbit coupled two-dimensional electron gas emerging near the surface of polar semiconductors", **Physical Review Letters** 110, 107204 (2013).

12- **W. Malaeb**, T. Shimojima, Y. Ishida, K. Okazaki *et al.*, "Abrupt change in the energy gap of superconducting $Ba_{1-x}K_xFe_2As_2$ single crystals with hole doping", **Physical Review B** 86, 165117 (2012).

11- K. Okazaki, Y. Ota, Y. Kotani, **W. Malaeb** *et al.*, "Octet-line node structure of superconducting order parameter in $KFe_2As_2$", **Science** 337, 1314 (2012).

10- R. Yoshida, M. Fukui, Y. Haga, E. Yamamoto, Y. Onuki, M. Okawa, **W. Malaeb** *et al.*, "Observation of two fine structures related to the hidden order in the spectral functions of $URu_2Si_2$", **Physical Review B** 85, 241102R (2012).

9- T. Shimojima, F. Sakaguchi, K. Ishizaka, Y. Ishida, **W. Malaeb** *et al.*, "Angle-resolved photoemission study on the superconducting iron-pnictides of $BaFe_2(As,P)_2$ with low energy photons", **Solid State Communications** 152, 695 (2012).

8- Y. Ishida, H. Kanto, A. Kikkawa, Y. Taguchi, Y. Ito, Y. Ota, K. Okazaki, **W. Malaeb** *et al.*, "Common origin of the circular-dichroism pattern in ARPES of $SrTiO_3$ and $Cu_xBi_2Se_3$", **Physical Review Letters** 107, 077601 (2011).

7- I. Nishi, M. Ishikado, S. Ideta, **W. Malaeb** *et al.*, "ARPES study of $PrFeAsO_{0.7}$: Comparison with LaFePO", **Physical Review B** 84, 014504 (2011).

6- **W. Malaeb**, T. Yoshida, A. Fujimori *et al.*, "Three-dimensional electronic structure of superconducting iron pnictides observed by angle-resolved photoemission spectroscopy", **Journal of the Physical Society of Japan** 78, 123706 (2009). ***(Among JPSJ top 20 most downloaded articles in Dec. 2009).***

5- **W. Malaeb**, T. Yoshida, T. Kataoka *et al.*, "Electronic structure and electron correlation in $LaFeAsO_{1-x}F_x$ and $LaFePO_{1-x}F_x$", **Journal of the Physical Society of Japan** 77, 093714 (2008). ***(Among JPSJ top 20 most downloaded articles in Sept. 2008).***

4- **W. Malaeb**, T. Yoshida, T. Kataoka *et al.*,"Photoemission study of the electronic structure of $LaFeAsO_{1-x}F_x$ and $LaFePO_{1-x}F_x$", **Journal of the Physical Society of Japan** 77 (2008): Proceedings of the Intl. Symposium on Fe-Pnictide Superconductors.

3- **W. Malaeb**, T. Yoshida, M. Hashimoto *et al.*, "Temperature dependence of the chemical potential in $La_{2-x}Sr_xCuO_4$", **Journal of Physics: Conference Series** 108, 012018 (2008).

2- R. Awad, A.I. Abou-Aly, S. Isber, **W. Malaeb**, "Investigation of specific heat and thermopower properties of Tl-1223 substituted by sodium", **Solid State Communications** 145, 201 (2008).

1- R. Awad, A.I. Abou-Aly, S. Isber, **W. Malaeb**, "Effect of the partial replacement of Ca by alkaline element Na on Tl-1223 superconductor", **Journal of Physics: Conference Series** 43, 474 (2006).

## SELECTED PRESENTATIONS:

- Special seminar at Freie Universitat Berlin, "Photoemission spectroscopy studies on high-Tc superconductors and topological materials", May 31st/2024.

- Invited talk at Hiroshima Synchrotron Radiation Center (HiSOR) 28th Symposium entitled: "Annealing effects in topological $\alpha$-Sn/InSb heterostructures revealed by photoemission spectroscopy", March 15th/2024 ***(invited).***

- Special seminar at The University of Tokyo, Japan "Uncovering the electronic structure of iron-pnictide superconductors using synchrotron & laser ARPES", December 22nd /2022 ***(invited).***

- United Arab Emirates University (UAEU) Abu Dhabi physics seminar, online talk entitled "High-Tc superconductivity: uncovering the underlying physics using photoemission spectroscopy", February 11th /2022 ***(invited).***

- New York University Abu Dhabi (NYUAD) physics seminar, online talk entitled "High-Tc superconductivity: uncovering the underlying physics using photoemission spectroscopy", November 17th /2021 ***(invited).***

- ThinkED (UAE) special online seminar entitled "University Scholarships: apply the right way", June 12th /2021 ***(invited).***

- Keio University special seminar, lecture for graduate students, Yokohama, Japan, July 8th and 22nd /2019 ***(invited)***.

- Second National Workshop on Innovative Materials and Applications (NWIMA-2), Lebanese University (Al-Fanar), Lebanon, May 3rd /2019 ***(invited)***.

- Keio University special seminar, lecture for graduate students, Yokohama, Japan, July 13th/2018 ***(invited)***.

- First National Workshop on Innovative Materials and Applications (NWIMA-1), American University of Beirut, Lebanon, May 4th– 5th/2018 ***(invited)***.

- 6th International conference on superconductivity and magnetism (ICSM2018), Antalya-Turkey, April 29th– May 4th/2018.

- International conference on Strongly Correlated Electron Systems (SCES17), Prague, Czech Republic, July 17th – 21st / 2017.

- Frontiers in Theoretical and Applied Physics (FTAPS 2017), The American University of Sharjah, United Arab Emirates, February 21st – 25th/ 2017.

- 5th international conference on superconductivity and Magnetism (ICSM2016), Fethiye-Turkey, April 24th– 30th/2016.

- International Conference on Strongly Correlated Electron Systems (SCES), Grenoble-France, July 6th– 11th/2014.

- Brookhaven National Lab seminar, Long Island-New York, Sept. 9th/2013 ***(invited)***.

- International workshop on Recent developments in Fe-based high-temperature superconductors, Riverhead New York, Sept. 3rd – 6th/2013 ***(invited)***.

- International Conference on Materials and Mechanisms of Superconductivity ($M^2S$), Washington D.C., July 29th– Aug 3rd/2012.

- Qatar Foundation special seminar, Doha, Qatar, Oct.11th/2011 ***(invited)***.

- 9th International Conference on Materials and Mechanisms of Superconductivity, Tokyo, Japan, Sept. 7th– 12th/2009.

- Nanyang Technological University – University of Tokyo joint symposium, Singapore, Feb. 2009.

- A3 workshop, Joint Research on Novel Properties of Complex Oxides, Shanghai, China, Dec. 7th– 8th/2008.

- International Conference on FeAs High Tc Superconducting Multilayers and Related Phenomena, Roma-Italy, Dec. 9$^{th}$ – 13$^{th}$/2008 ***(invited)***

## TEACHING EXPERIENCE:

**List of courses previously and/or currently taught since 2015:**

**Undergraduate courses:**
Physics for Everyday Life, Introduction to Astronomy, Introductory Physics, Biophysics, Principles of Physics, Physics for Life Sciences, Physical Optics, Material Properties and Heat, Electricity & Magnetism, Classical Mechanics & Waves, Radiation Science, Resonance Spectroscopy, Superconductivity & its Applications, Accelerators, Circuit Analysis, Modern Physics, Electronics, Electrodynamics, Solid State Physics, Relativity, Electromagnetic Waves, Statistical Mechanics.

**Graduate courses:**
Selected Topics in Materials Science, Condensed Matter Physics, Advanced Statistical Physics, Advanced Electrodynamics, High Energy Physics, Superconductivity & Superfluidity, Research Ethics.

## OTHER ACEDEMIC ACTIVITIES:

- Experience as main and co-supervisor of PhD and MSc theses.
- Experience as supervisor of several research projects for senior physics students.
- Experience as a member of the defense jury of PhD and MSc Theses.
- Experience as a member of the undergraduate and graduate curriculum development of the physics program.
- Experience as a member and/or head of several committees including Research Committee, Laboratories Committee, Libraries Committee, and Community Service Committee.
- Experience as an academic advisor of physics students for several years.

## RELATED PROFESSIONAL EXPERIENCE:

- Appointed since 2018 until present by The Embassy of Japan in Lebanon as a member of the jury that selects students who receive the Japanese Government Scholarship (Monbusho).
- Visiting Assistant/Associate Professor at Kamihara group, Keio University, Japan 2016 – 2019.

## GRANTS AND HONORS:

- CNR-Italy fellowship, Nov-Dec 2024.
- ERASMUS+ mobility training program at Freie Universitat Berlin, May 2024.
- Japan Society for the Promotion of Science (JSPS) fellowship, 2022.
- The Grant Research Programme (GRP) from The National Council for Scientific Research (CNRS), Lebanon, 2018-2020.
- Japanese Government Scholarship (Monbusho) for Ph.D. study, 2006 - 2009.
- Jamal Abdel Nasser Award for Scientific Distinction from Beirut Arab University, 2002.
- Beirut Arab University full scholarship for undergraduate study, 2000 - 2002.

## LANGUAGES:

- Native Arabic, Advanced English, Intermediate Japanese and very basic French.

## REFERENCES:

**Haidar Harmanani**
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