Prof. Dr. Hafedh BELMABROUK

Professor
Department of Physics
College of Science, Al-Zulfi - 11932
Majmaah University

Main Campus **P.O. Box 1712**
Al-Zulfi-11932 **Saudi Arabia**

Telephone:	**+966164044129**
Mobile	+966508141426
Fax:	+96664227484
E-Mail:	Ha.Belmabrouk@mu.edu.sa
Office:	1502 (Majmaah)
Link to Homepage:	

Research Interests:

- Fluid Mechanics, Microfluidics and biosensor
- Heat Transfer in Transistors
- Mechanical Engineering
- Nonlinear Optics

Language Skills

- Arabic
- French
- English

Qualification (Career and University Education)

1988	Engineer (multi-skilled)	Ecole Centrale de Lyon, Lyon, France
1988	M.Sc. Degree (Fluid Mechanics and Heat Transfer)	Ecole Centrale de Lyon, Lyon, France
1992	PhD Degree (Fluid Mechanics)	Ecole Centrale de Lyon, Lyon, France Title: ***Turbulence scale measurements using two-point Laser Doppler velocimetry*** Supervisor: **Prof. Michel Lance** **With the support of Renault, Peugeot and the French Institute of Petroleum**
2001	Post Doctorate "University Habilitation to supervise theses" (*Physics, Fluid Mechanics)*	University of Tunis AlManar

Career

Full-time Faculty Member	
August 2015 – Continue	*Professor,* Department of Physics, Majmaah University, College of Science, Al Zulfi, Saudi Arabia Consultant at the Deanship of Scientific Research, Majmaah University (MU) Data and Statistics related to Scientific Research at MU Quality indicators related to Scientific Research at MU Strategic Plan related to Scientific Research at MU
November 2006 – August 2015	*Professor,* Department of Physics, Faculty of Sciences of Monastir (FSM), University of Monastir, Tunisia
October 2001 – November 2006	*Associate Professor,* Department of Physics, FSM, Tunisia
October 1994 – October 2001	*Assistant Professor,* Department of Physics, FSM, Tunisia
October 1992 – September 1994	*Assistant,* Department of Physics, FSM, Tunisia

Administrative Experience (Extra-Responsibilities)

2012–2014	**Director General of the National Centre for Nuclear Science and Technology (Tunisia)** – **Administrative Management** – **Project Management** – **Monitoring of the Construction of Buildings** – **Service Delivery to Industry** – **Nuclear Laws** – **Nuclear Safety** – **International Treaties and Conventions** – **Capacity Building** – **Technology Transfer**
2011–2012	**Deputy Dean and Training Director, Faculty of Sciences of Monastir** – **Enhancement of the Relationship between Universities and Companies**
2002–2005	Chairman, **Department of Physics, Faculty of Sciences of Monastir**

Short Visits

24 – 25 May 2014	26th General Conference of the **Arab Atomic Energy Agency**, Sousse, Tunisia
19 – 22 May 2014	53d Executive Council of the **Arab Atomic Energy Agency**, Sousse, Tunisia
13 May 2014	A "Practical Arrangements" agreement has been signed to further strengthen IAEA's support, capacity building and cooperation with the ANNuR network http://www.iaea.org/newscenter/news/strengthening-arab-network-nuclear-regulators 
12 – 17 May 2014	International Conference on Human Resource Development and Capacity Building for Nuclear Power Programmes: Building and Sustaining Capacity, **International Atomic Energy Agency (IAEA)**, Vienna, Austria
2 – 4 May 2014	International Conference on **Spectroscopy and Applications** Co-chairman and a member of the organizing committee
29 April 2014	Signature of an Agreement Letter between "**Commissariat à l'Energie atomique et aux Energies Alternatives (CEA)" and CNSTN**
7 – 11 April 2014	Workshop of **small and medium-sized reactors** (organized by **China National Nuclear Corporation and Arab Atomic Energy Agency**)
16– 19 Dec. 2013	52d Executive Council of **Arab Atomic Energy Agency**
12– 13 Dec. 2013	3d International Platform on Integrating Arab e-infrastructure in a Global Environment, e-AGE 2013 (organized by **Arab States Research and Education Network -ASREN**)
21 Oct. – 1 Nov. 2013	Workshop on Basic Professional Training in Nuclear Safety for ANNuR and FNRBA, Collaboration with Korea Institute of **Nuclear Safety** KINS, DaeJeon, Republic of Korea
23–27 Sept. 2013	Workshop on Enhanced Use of **Research reactors** for Education and Training Purposes, (IAEA - RAF Project), Rabat, Morocco
16–20 Sept. 2013	**International Atomic Energy Agency (IAEA)** - 57th General Conference, Vienna, Austria

29 July – 2 August 2013	INPRO Dialogue Forum on **Global Nuclear Energy Sustainability**: Licensing and safety Issues for Small and Medium-sized Nuclear Power Reactors (SMRs)
21–23 May 2013	5th Plenary Meeting of the Forum of **Nuclear Regulatory Bodies in Africa** (FNRBA)
17–21 March 2013	Technical Meeting on **Country Nuclear Power Profiles** Vienna (Austria)
23–27 Dec. 2012	Eleventh Arab Conference on the Peaceful Uses of Atomic Energy Khartoum (Sudan)
20–22 Dec. 2012	50th Executive Council of Arab Atomic Energy Agency (AAEA) Khartoum (Sudan)
10–14 Dec. 2012	Seminar on the **Additional Protocol and Safeguards Regulations** International Nuclear Safeguards and Engagement Program Pacific Northwest National Laboratory (PNNL) Richland, Washington (USA)
17–22 Sept. 2012	**International Atomic Energy Agency (IAEA)** - 56th General Conference Vienna (Austria)

OTHER ACTIVITIES AND INTERESTS

2002-2012	Member of the Scientific Council of the "Faculty of Sciences of Monastir" (2002-2012: 4 consecutive mandates)
2005-2009	Member (2003-2005), deputy president (2005-2007) then president (2007-2009) of the Steering Committee of a section of **Tunisian Physical Society**
2011-2012	Coordinator of the applied master degree (Advanced Instrumentation, Renewable Energy)
2011-2012	Member of the Scientific Council of the "University of Monastir"
2012-2015	Member of the Scientific Council of the **National Agency for Metrology**
2013-2014	**President of the Steering Committee of the Arab Network of Nuclear Regulators ANNuR**
2013-2014	**Member of the Executive Council of the Arab Atomic Energy Agency**
2012-2013 and 2016-2017	Member of the National Consultative Commission for the Promotion to the rank of full Professor (2012 and 2013 sessions) Energy Engineering

Publication (2015)

Topic 1 : Heat transfer in transistors

2015 F. Nasri, M.F. Ben Aissa, **H. Belmabrouk** (2015) "Effect of second-order temperature jump in Metal-Oxide-Semiconductor Field Effect Transistor with Dual-Phase-Lag model", Microelectronics Journal, (2015)

2015 F. Nasri, M.F. Ben Aissa, **H. Belmabrouk** (2015) "Microscale thermal conduction based on Cattaneo-Vernotte model in Silicon On Insulator and Double Gate MOSFETs", Applied Thermal Engineering, Vol. 76, pp. 206-211, (2015)

2015 F. Nasri, F. Echouchene, M.F. Ben Aissa, I. Graur, **H. Belmabrouk** (2015) "Investigation of Self-Heating Effects in a 10-nm SOI-MOSFET With an Insulator Region Using Electrothermal Modeling", Electron Devices, IEEE Transactions on, Vol. 62, Issue 8, pp. 2410-2415, (2015)

2015 F. Nasri, M.F. Ben Aissa, M.H. Gazzah, **H. Belmabrouk** (2015) "3D thermal conduction in a nanoscale Tri-Gate MOSFET based on Single-Phase-Lag model", Applied Thermal Engineering, Vol. 91, pp. 647-653, (2015)

Topic 2 : Fluid Mechanics, Microfluidics and Biosensors

2015 M.H. Gazzah, L. Brahim, **H. Belmabrouk** (2015) "Evaluation des modèles de turbulence dans un jet turbulent débouchant dans un co-courant d'air: concept de génération d'entropie", Int. J. Scientific Research & Engineering Technology (IJSET), Vol. 3, Issue 2, pp. 84-88, (2015)

2015 M. Selmi, F. Echouchene, M.H. Gazzah, **H. Belmabrouk** (2015) "Flow Confinement Enhancement of Heterogeneous Immunoassays in Microfluidics", IEEE Sensors Journal, Vol. 15, No. 12, pp. 7321-7328, (2015)

Topic 3 : Retinal image processing

2015 M. Ben Abdallah, J. Malek, A.T. Azar, P. Montesinos, **H. Belmabrouk**, J. Esclarín Monreal, K. Krissian (2015) "Automatic Extraction of Blood Vessels in the Retinal Vascular Tree Using Multiscale Medialness" Int. J. Biomedical Imaging, Article ID 519024 (2015)

2015 M. Ben Abdallah, J. Malek, **H. Belmabrouk**, A.T. Azar, J. Esclarin Montreal (2015) "Performance Evaluation of several Anisotropic Diffusion Filters for Fundus Imaging", Int. J. Intelligent Engineering Informatics, Vol. 3, Issue 1, pp. 66-90, (2015)

2015 H. Guedri, J. Malek, **H. Belmabrouk** (2015) "Three-dimensional reconstruction of blood vessels of the human retina by fractal interpolation", Journal of Nanotechnology in Engineering and Medicine, Vol. 6, No. 3, (2015)

2015 H. Guedri, F. Echouchene, **H. Belmabrouk** (2015) "3D Model Reconstruction of Blood Vessels in the Retina with Tubular Structure", Int. Journal on Electrical Engineering and Informatics, Vol. 7, No. 4, pp.724-734, (2015)

Topic 4: Physics, Material Science

2015 R. Belghouthi, S. Taamalli, F. Echouchene, H. Mejri, **H. Belmabrouk** (2015) "Modeling of polarization charge in N-face InGaN/GaN MQW solar cells", Material Science in Semiconductor Processing, Vol. 40, pp. 424-428, (2015)

2015 C. Cassagne, M. Chniti, CB. de Araújo, **H. Belmabrouk**, G. Boudebs (2015) "Nonlinear optical characterization of tetraphenylporphyrin in the picosecond regime", 17th International Conference on Transparent Optical Networks (ICTON), IEEE, (2015)

Publication (2016)

Topic 1 : Heat transfer in transistors

Topic 2 : Fluid Mechanics, Microfluidics and Biosensors

2016 M. Selmi, F. Echouchene, **H. Belmabrouk** (2016) "Analysis of Microfluidic Biosensor Efficiency Using a Cylindrical Obstacle", Sensor letters, Vol. 14, No 1, pp. 26-31, (2016)

2016 N. Aoun, **H. Belmabrouk** (2016) "Study and modelling of the pH-ElecFET microsensors for the lactate detection", Moroccan Journal of Chemistry, Vol. 4, No 1, pp. 234-241, (2016)

2016 M. Selmi, R. Khemiri, F. Echouchene, **H. Belmabrouk** (2016) "Electrothermal effect on the immunoassay in a microchannel of a biosensor with asymmetrical interdigitated electrodes", Applied Thermal Engineering, Vol. 105, pp. 77-84, (2016)

2016 M. Selmi, R. Khemiri, F. Echouchene, **H. Belmabrouk** (2016) "Enhancement of the analyte mass transport in a microfluidic biosensor by deformation of fluid flow and electrothermal force", Journal of Manufacturing Science and Engineering, Transactions of the ASME, Vol. 138, No 8, pp. (2016)

2016 N. Aoun, F. Echouchene, AK. Diallo, J. Launay, P. Temple-Boyer , **H. Belmabrouk** (2016) " Finite-Element Simulations of the pH-ElecFET Microsensors", IEEE Sensors Journal, Vol. 16, No 17, pp. 6519-6526, (2016)

2016 M. Bouzid, F. Nasri, **H. Belmabrouk**, (2016) "Numerical Study of Electro-Chemical System for Enzymatic Activities Detection", Sensor letters, Vol. 14, No 11, pp. 1079-1083, (2016)

2016 M. Selmi, M.H. Gazzah, **H. Belmabrouk** (2016) "Numerical study of the electrothermal effect on kinetics reaction of immunoassay for a microfluidic biosensor", Langmuir, Vol. 32 (50), pp. 13305-13312 (2016)

Topic 3 : Retinal image processing

2016 H. Guedri, J. Malek, **H. Belmabrouk** (2016) "Reconstruction of the human retinal blood vessels by fractal interpolation", Journal of Theoretical and Applied Information Technology, Vol. 83, No. 2, pp.227-233, (2016)

2016 H. Guedri, J. Malek, **H. Belmabrouk** (2016) "Modelling the contour of the human retina by fractal interpolation", Int. Journal of Imaging & Robotics, Vol. 16, No. 3, pp.86-96, (2016)

2016 M. Ben Abdallah, J. Malek, A.T. Azar, **H. Belmabrouk**, J. Esclarín Monreal, K. Krissian (2016) "Adaptive noise-reducing anisotropic diffusion filter" Neural Computing and Applications, Vol. 27, No. 5, 1273-1300, (2016)

Topic 4: Physics, Material Science

2016 S. Taamalli, A. Saim, **H. Belmabrouk**, V. Teboul (2016) "Finite size effects and cooperativity in a model diatomic supercooled liquid", Journal of Applied and Theoretical Physics Research, Vol. 1, No. 1, pp.16-20, (2016)

2016 M. Bouzid, L. Sellaoui, M. Khalfaoui, **H. Belmabrouk**, A. Ben Lamine (2016) "Adsorption of ethanol onto activated carbon: Modeling and consequent interpretations based on statistical physics treatment ", Physica A, Vol. 444, pp. 853-869, (2016)

2016	A. Rached, A. Bhouri, S. Sakr, J-L. Lazzari, **H. Belmabrouk** (2016) "Self-consistent vertical transport calculations in AlxGa1-xN/GaN based resonant tunneling diode", Superlattices and Microstructures, Vol. 444, pp.853-869, (2016)
2016	M. Hjiri, I. Guezguez, K. Iliopoulos, A. El-Ghayoury, **H. Belmabrouk**, M.A. Karpierz, B. Sahraoui (2016) "Optical limiting efficiency of an electroactive bis-iminopyridine ligand and its zinc complex", Photonics Letters of Poland, Vol. 8, No. 1, pp. 5-7 (2016)
2016	H. Lagha, **H. Belmabrouk**, H. Chazal (2016) "Measurement of temperature dependence of complex susceptibility and its anisotropy in ferromagnetic material", Journal of Modern Materials, Vol. 1, No 1, pp. 2-8 (2016)
2016	H. Lagha, **H. Belmabrouk**, H. Chazal (2016) "Development of compact thermal model with two exchange surfaces", J. Electrical Systems, Vol. 12, No 4, pp. 757-7698 (2016)
2016	H. Lagha, **H. Belmabrouk**, H. Chazal (2016) "Measurement of Temperature Dependence of Complex Susceptibility and its Anisotropy in Ferromagnetic Material", Vol. 11, No 9, pp. 6694-6700 (2016)

Topic 5 : Quantum Information

2016	A Ghilen, **H. Belmabrouk**, M Azizi, (2016) "Incorporation and model checking of a quantum authentication and key distribution scheme in EAP-TLS", Proceedings of the Mediterranean Conference on Information & Communication Technologies, Springer International Publishing, pp. 457-467, (2016)
2016	A Ghilen, M Azizi, **H. Belmabrouk**, R Bouallegue (2016) "A new SSL/TLS conversation within OpenVPN based on a quantum scheme for authentication and key agreement", International Journal on Human Machine Interaction, Vol. 3, No 1, pp. 9-17, (2016)

Teaching Experience		
Physics		
Statistical Physics	BS Physics	Majmaah University, College of Science, Al-Zulfi, Saudi Arabia
Fourier optics	Master Physics	FSM, Univ Monastir, Tunisia
Wave optics	BS Physics	FSM, Univ Monastir, Tunisia
Optics in anisotropic media	BS Physics.	FSM, Univ Monastir, Tunisia
Geometrical optics	BS Physics.	FSM, Univ Monastir, Tunisia
Quantum mechanics	BS Physics	FSM, Univ Monastir, Tunisia
Special Relativity	BS Physics	FSM, Univ Monastir, Tunisia
Intro. quantum mechanics	BS Physics	FSM, Univ Monastir, Tunisia
Nuclear Physics Lab.	BS Physics	FSM, Univ Monastir, Tunisia
Computer Science - Matlab	BS Physics	FSM, Univ Monastir, Tunisia
Metrology	BS Physics	FSM, Univ Monastir, Tunisia
Electricity	BS Physics	FSM, Univ Monastir, Tunisia
Electromagnetism	BS Physics	FSM, Univ Monastir, Tunisia
Physics Lab	BS Physics	FSM, Univ Monastir, Tunisia
Mechanical Engineering		
Air conditioning	Master Instrumentation and Energy	FSM, Univ Monastir, Tunisia
Applied thermodynamics	Master Instrumentation and Energy	FSM, Univ Monastir, Tunisia
Advanced heat transfer	Master Instrumentation and Energy	FSM, Univ Monastir, Tunisia
Heat transfer	BS Physics	FSM, Univ Monastir, Tunisia
Renewable energy	BS Physics	FSM, Univ Monastir, Tunisia
Thermodynamics	BS Physics	FSM, Univ Monastir, Tunisia
Waves and vibrations	BS Physics	FSM, Univ Monastir, Tunisia
Fluid mechanics	BS Physics	FSM, Univ Monastir, Tunisia
Solid mechanics	BS Physics	FSM, Univ Monastir, Tunisia
Mechanics	BS Physics	FSM, Univ Monastir, Tunisia

Supervision of Research Students:

Ph.D. Research Thesis: (Listed as Enrolment Year)

Topic 1 : Fluid Mechanics and turbulent flows

2003 Ayda Boughamoura-Ben Messaoud (Defended on February 2003, co-supervisor)

Computation of the flow and heat transfer in a piston-driven pipe with a sudden expansion

2011 Fraj Echouchene (Defended in December 2011)

Numerical study of cavitation in a Diesel injectors

Topic 2 : Nano heat transfer in MOSFET transistors;

2015 Faouzi Nasri (Defended in July 2015)

Heat transfer simulation in a nanoscale MOSFET transistor

2016 Hajer Lagha (Defended in July 2016)

Study of magnetic components integrated into a PCB: integration of magnetic and thermal functions

Topic 3 : Biosensors and micro fluidics

2016 Mariem Ben Abdallah (Defended in January 2016)

Noise modeling and detection of blood vessels in retinal angiography pictures

2016 Marwa Selmi (Defended in April 2016)

Simulation of microfluidic flows: application to microelectronics

2016 Hichem Guedri (To be defended in July 2017)

Development of a fractal model for 3D reconstruction of the retinal vasculature

Topic 4 : Solid Physics and solar cell

2010 Sonia Ben Afia-Sakly (Defended in January 2010)

Optoelectronic and magnetic properties of II-VI semiconductors

2016 Ameni Rached (Defended in February 2017)

2016 Rabeb Belghouthi (to be defended in July 2017)

Electronic, optical and thermal properties of the multi-junction solar cells based on III-V nanostructures

2016 Sonia Taamalli (to be defended in April 2017)

Molecular dynamics simulation of silica properties at limits

Topic 5 : Nonlinear optics

2014 Imen Guezguez (Defended in September 2014)

Experimental analysis of nonlinear optical properties of some organic compounds

2016 Meherzia Chniti (Defended in November 2016)

Nonlinear optical properties of porphyrin compounds containing Co and Zn