Published name: M. S. Afify

	Personal Data
Full name: Date of birth: Email & Mobile: Address: ORCID:	Mahmoud Saad Afify Ali Ibrahim 1 st of January 1988 mahmoud.afify@fsc.bu.edu.eg & +20 10 1088 6358 Department of Physics, Faculty of Science Benha University, 13518 Benha, Egypt 0000-0002-2088-0354 Employment
Feb 2020 - till now	Lecturer of Theoretical Plasma Physics, Department of Physics, Faculty of Science, Benha University, Egypt
Jun 2015 - Jan 2020	Assistant Lecturer, Department of Physics, Faculty of Science, Benha University, Egypt
Dec 2010 - May 2015	Assistant Researcher, Department of Physics, Faculty of Science, Benha University, Egypt
	Education
Jan 2016 - Jan 2020	Ph.D. in Theoretical Plasma Physics , Joint Supervision between Benha University and Port Said University
	Awarded in January 2020, Department of Physics, Faculty of Science, Benha University, Egypt.
<u>Field:</u>	Theoretical Plasma Physics
Thesis title:	Dynamical Behavior of Multicomponent Plasma
Thesis supervision:	Prof. Dr. W. M. Moslem & Prof. Dr. M. A. Hassouba
Jul 2011 - May 2015	M.Sc. in Experimental Physics , Joint Supervision between University of Benha and Atomic Energy Authority
	Awarded in May 2015, Department of Physics, Faculty of Science, Benha University, Egypt.
<u>Field:</u>	Experimental Plasma Physics and Simulation
Thesis title:	Investigation of Plasma Propulsion in Hollow Anode Z-Pinch Device
Thesis supervision:	Prof. Dr. M. Abd Al-Halim & Prof. Dr. H. El-Tayeb
Sept 2005 - Jul 2009	BSc of Physics with "Excellent with honors" (1^{st} Rank) from Benha University, Egypt
	Professional Career

• "Alexander-von-Humboldt Research Fellowship for Postdoctoral Researchers beginning in 2023".

Professional Experience

Visiting Professor at the Institute of Basic and Applied Sciences, Egypt-Japan University of Science and Technology (E-JUST), New Borg El-Arab City, 21934 Alexandria, Egypt-Spring 2022.

- Syllabus and course materials developed.
- Monitored student's progress and provided feedbacks for improvements.
- Provided assignments and homework for students.
- Drafted examination papers and graded student tests.
- Engaged students in class discussions, seminars and quizzes.

- Issues with teaching and academics were promptly resolved.
- Assisted in college administration duties as needed.
- Ascertain that students adhered to attendance, discipline, and academic policies.

Training

• Computational and Data Science supported by the Egyptian Government Fellowship at Middle Tennessee State University, Jan 2018-Jul 2018.

Research Interests

- Computational Plasma Physics: particle-in-Cell (PIC) simulation, MHD Mathematical Modeling.
- Magnetic reconnection: acceleration and heating of electrons in the diffusion regions via self similar expansion technique and the link between whistler modes, soliton waves, and magnetic reconnection in collisionless plasmas.
- Space & Astrophysics: electrostatic and electromagnetic excitations, instabilities, uniform and nonuniform plasmas.
- High Energy Density Plasma: plasma pinches, slug model, inertial electrostatic confinement.
- Laser-Matter Interaction: plasma expansion approach, the macroscopic collisional radiative equilibrium (CRE) model, and plasma spectroscopy.
- Mathematical Physics: dynamical systems, nonlinear partial differential equations, reductive perturbation technique, renormalization method, direct k-expansion method, KdV, KP, ZK, mZk, and NLS equations.
- Nonlinear Dynamics solitons, shocks, envelope solitons, spin polarized waves, and rogue waves.
- Dusty Plasmas (Complex Plasmas): basic properties, solitons, shocks, stability, strongly coupled effect, laser-ablation process, and polarization effect.

Current Projects

- Electron beam instabilities as generation mechanism of whistler, solitons, and magnetic reconnection in collisionless plasma.
- Intense laser pulse-matter interaction near extreme ultraviolet (EUV).
- The characteristics of radiofrequencies capacitively coupled plasmas in the presence of magnetic field. Supervisions
- Completed thesis (2021) Partial supervision of the MSc research work of Aya Elbadawy. Official supervision by N El-Siragy, M. Shihab, & M. S. Afify, Department of Physics, Faculty of Science, Tanta University, Egypt.
- PhD thesis under preparation: Partial supervision of the PhD research work of Atef Bassyouni Official supervision by M. Hassouba, W. M. Moslem, & M. S. Afify. Department of Physics, Faculty of Science, Benha University, Egypt.

Teaching Experience

• I taught many undergraduate courses in physics; such as Plasma Physics, Numerical Methods, General Physics, Electricity, Magnetism, Optics, Electrodynamics, Atomic and Molecular Physics, Oscillations and Waves, Matter Properties, Astronomy and meteorology.

Presentations

- Invited instructor for the third summer course in plasma physics principles at British University in Egypt (BUE), July-2022.
- Invited speaker in the 7th Plasma Physics School, Port Said University, Port Said, Egypt. **Presented two talks** entitled "Observation of electrostatic waves in plasma", Mar-2022.
- Invited speaker in the 6th Plasma Physics School, Port Said University, Port Said, Egypt. Presented two talks entitled "The cutting edge of plasma physics" and "Plasma sources and wave propagation", Apr-2021.
- Invited speaker in the 5th Plasma Physics School, Port Said University, Port Said, Egypt. **Presented a talk** entitled "Quantum plasma", Mar-2020.
- Speaker in 1th One Day Plasma Conference, El-Fayroz Resort, Port Said, Egypt.Presented a talk entitled "Semiconductor heating problem in view of quantum plasma", Mar-2019.

Conferences & Schools

- HPC & Data-Centric Computing Workshop, Faculty of Graduate Studies for Nanotechnology, Sheikh Zayed Branch, Cairo University, Egypt, 30-July (2022).
- The 7th Plasma Physics School, Port Said University, Port Said, Egypt, 6 8 Mar (2022).
- International conference on pure and applied physics ICPAP 2021, Cairo, Egypt, 6 9 Dec (2021).
- The 6th Plasma Physics School, Port Said University, Port Said, Egypt, 3 5 Apr (2021).
- Particle Therapy Masterclass, Benha University, Obour city, Egypt, 23 24 Mar (2021).
- 2nd Scientific International Conference of Faculty of Science, Benha University, Egypt, 27 28 Sep (2020).
- 5th Plasma Physics School, Port Said University, Port Said, Egypt, 8 11 Mar (2020).
- Spectroscopy Workshop, National Laser Institute, Cairo University, Cairo, Egypt, 23 24 Nov (2019).
- 4th Plasma Physics School, Port Said University, Port Said, Egypt, 1 4 Mar (2019).
- The 45th IEEE International Conference on Plasma Science (ICOPS), Denver, CO, USA, 3) 24 28 Jun (2018).
- The 1st Plasma Physics School, Port Said University, Port Said, Egypt, 25 27 May (2016).
- The Scientific Forum of Challenging in Physics and Energy, Mansoura University, Egypt, 13 15 Apr (2016).
- The 1th Work Shop of Physics, Physics Department, Benha University, Egypt, 1 2 Mar (2014).

Awards & Honors

- Winning the climate change competition launched by Benha University, October 2022.
- "Prof. Dr. Tomador Al-Khalafawi's prize in the field of plasma physics, Mar 2022"
- Benha University Prize for International Publishing July 2022, January 2022, July 2021, July 2020, & July 2019.
- Benha University award for distinction; for ranking the 1^{st} in Physics program for 4 years in sequence, April 2010.

Memberships

• IEEE Nuclear and Plasma Sciences Society Membership & IEEE Membership (student), 2018.

Reviewer

- IOP Publishing: Physica Scripta
- IEEE: IEEE Transactions on Plasma Science
- Zeitschrift für Naturforschung A: A Journal of Physical Sciences
- Taylor and Francis Online: Waves in Random and Complex Media
- De Gruyter: International Journal of Nonlinear Sciences and Numerical Simulation
- Hindawi: Advances in Mathematical Physics

Complete List of Publications of Mahmoud S. Afify

A) Publications with peer review process:

- Atteya, A., EL-Labany, S. K., Karmakar, P. K., Afify*, M. S. (2023): Evidence of oblique electron acoustic solitary waves triggered by magnetic reconnection in Earth's magnetosphere, Physica Scripta 98, 015601.
- [2] Afify^{*}, M. S., Tolba, R.E., Moslem, W. M. (2022): The mechanism that drives electrostatic solitary waves to propagate in the Earth's magnetosphere and solar wind, Contributions to Plasma Physics, e202200041.
- [3] Shihab*, M., Elbedewe, A., El-Siragy, N. M., Afify, M. S. (2022): Ion transit effects on sheath dynamics in the intermediate radio-frequency regime: excitations of ion-acoustic waves and solitons, Plasma Sources Science and Technology 31, 025003.
- [4] Afify, M. S., Iqbal^{*}, Z., Murtza, G. (2021): A mechanism for spin electron acoustic soliton observed in a spin-polarized nanosized electron-hole plasma, Physica Scripta 96, 125638.
- [5] Afify^{*}, M. S. (2021): Induced magnetic field by the interaction between electromagnetic waves and a plasma metamaterial: quantum effect, Physica Scripta 96.
- [6] Abdelghany, A. M., Shihab, M., **Afify**^{*}, **M. S.** (2021): Dynamics of dust-ion acoustic cnoidal and solitary pulses in a magnetized collisional complex plasma, Waves in Random and Complex Media.
- [7] Shihab^{*}, M., Elbadawy, A., **Afify, M. S.**, El-Siragy, N. (2021): Kinetic Simulation of He radio frequency capacitively coupled plasma, Delta Journal of Science 43, 89-96.
- [8] Afify^{*}, M. S., Elkamash, I. S., Shihab, M., Moslem, W. M. (2021): Evolution of ion-acoustic soliton waves in Venus's ionosphere permeated by the solar wind, Advances in Space Research 67, 4110-4120.

- [9] Afify*, M. S., Tolba, R.E., Moslem, W. M. (2020): Criteria of the electron pumping in electron-hole quantum plasma, Physica Scripta 95, 085604.
- [10] Afify*, M. S., Moslem, W. M., Tolba, R.E., Hassouba, M. A. (2019): Generation of soliton, cnoidal, and periodic waves during pumping GaAs by an electron beam, Chaos, Solitons & Fractals 124, 18-25.
- [11] Afify*, M. S., Moslem, W. M., Hassouba, M. A. (2019): Non-linear dynamics of electron-hole plasma induced by an electron beam, Plasma Research Express 1, 035010.
- [12] Afify*, M. S., Moslem, W. M., Hassouba, M. A., Abu-El Hassan, A.(2018): Optimum performance of electron beam pumped GaAs and GaN, Physics of Plasmas 25, 052116.
- [13] Aser, M. S., Abdel-Kader, M. E., Shagar, A. M., Eltayeb, H. A., Algamal, H. A., Abd Al-Halim^{*}, M. A. (2018): Characterisation of electric discharge in hollow electrode Z-pinch device by means of Rogowski coils, Pramana 91.
- [14] Abd Al-Halim^{*}, M. A., Afify, M. S. (2017): Dynamics of current sheath in a hollow electrode Z-pinch discharge using slug model, The European Physical Journal D 71.

B) Submitted publications with peer review process:

[1] Afify^{*}, M. S., Salem, S. (2022): The dynamics of dust particles during the laser-induced plasma process: Self-similar expansion in a liquid,

C) Publications without peer review process:

- Bassyouni^{*}, A., Moslem, W. M., Hassouba, M. A., Afify, M. S. (2022): Linear analysis of electrostatic waves in the Earth's magnetopause. 3rd Scientific Conference for Applied Science and Climate Change Challenges, Faculty of Science, Benha University, Obour City, Qalyubia, Egypt, 8-9 October 2022.
- [2] Hassan, A. A., Afify*, M. S. (2021): Modeling solitary waves observed in the Earth's magnetotail: MMS space observations. International conference on pure and applied physics ICPAP, Cairo, Egypt, 6-9 December 2021.
- [3] Iqbal, Z., Afify^{*}, M. S. (2021): Electromagnetic instability in spin polarized electron-hole plasma. International conference on pure and applied physics ICPAP, Cairo, Egypt, 6-9 December 2021.
- [4] Afify*, M. S., Moslem, W. M., Hassouba, M. A. (2019): Semiconductor heating problem due to an interaction with electron beam. 1st One Day Plasma Conference, El-Fayroz Resort, Port Said, Egypt, 4 March 2019.
- [5] Afify*, M. S., Moslem, W. M., Hassouba, M. A. (2018): Physical Solution to Electron Beam Defects During the Pumping Process of GaAs Semiconductor Plasma. The 45th IEEE International Conference on Plasma Science (ICOPS 2018), Denver, CO, USA, 24-28 June 2018.

* =Corresponding author