

Mahmoud Hussien

RESEARCH ASSISTANT

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Education

Assiut University

Asyut, Egypt

MASTER OF SCIENCE, PHYSICS

Mar. 2020 – Till now

- **Area of Specialization:** Experimental Solid-State Physics
- **Thesis:** Synthesis, characterization, and investigation of optical and electrical properties of $\text{Mo}_x\text{A}_{1-x}\text{S}_2$ (A = Co, Mn, Fe or Cd) nanoparticles for Energy Applications.
- **Supervisor:** Prof. Abdulaziz Abualfadl Abdulaziz

Assiut University

Asyut, Egypt

BACHELOR OF SCIENCE, PHYSICS

Sept. 2013 – Jun. 2018

- **Honors thesis:** Modification of electrical properties by optical parameters in solids.
- **Academic supervisor:** Prof. Abdelmonem Sayed A. Soltan
- **Cumulative GPA:** 3.62/4.00
- **Rank:** Second

Teaching Experience

Department of Physics, Faculty of Science, Assiut University

Asyut, Egypt

TEACHING ASSISTANT

Jul. 2019 – Present

• Teaching undergraduate student labs such as:

- | | |
|---------------------------------|----------------------------|
| - Mechanics Lab | - Optics Lab |
| - Thermodynamics Lab | - Modern Physics Lab |
| - Electricity and Magnetism Lab | - Physical electronics Lab |
| - Semiconductors Physics Lab | - Solid state physics Lab |

This work included grading student reports and devising exams. These tasks were performed for a range of class levels, from introductory to advanced upper level

• Tutoring topics in physics for science and engineering undergraduates, including:

- | | |
|------------------|-----------------------------|
| - Mechanics | - Electricity and Magnetism |
| - Thermodynamics | - Light and Optics |
| - Modern Physics | - Electronics |

At the level of Serway and Jewett's textbook Physics for Scientists and Engineers with Modern Physics

Research Experience

Joint Institute for Nuclear Research

Dubna, Moscow

THE FOURTH STAGE OF THE INTERNATIONAL STUDENT PRACTICE INTERN

1 – 24 Mar. 2022

- Attended a short course on condensed matter physics and worked on a research project titled "Studies of structural changes in heavy ion irradiated materials". I learned the possibilities of positron and introduction to other complementary methods used in the field of studies of nuclear materials. These possibilities were focused on the determination of defect concentration, evaluation of defect concentration profile, and detection of the kind/size of defects.

Assiut University

Asyut, Egypt

MASTER PROGRAM

Sept. 2019 – Apr. 2021

- My research point is located in the field of solid-state physics, especially the synthesis and characterization of molybdenum disulfide (MoS_2), a member of the transition metal dichalcogenides (TMDCs) family, which have potential applications in nanoelectronics, optoelectronics, and energy storage. Furthermore, I have investigated the effects of doping MoS_2 with

different transition metal ions, such as cobalt, iron, cadmium, and manganese, on its physical properties, such as band gap, conductivity, magnetization, and capacitance. I have also explored the possible mechanisms of doping and the optimal doping conditions for enhancing the performance of MoS₂ nanomaterials. I have employed various synthesis techniques, such as hydrothermal, sol-gel, co-precipitation, ball milling, and microwave methods, to obtain MoS₂ nanomaterials with different morphologies and properties. I have also used a range of characterization techniques to analyze the thermal, structural, optical, magnetic, surface area, and electrochemical properties of the synthesized MoS₂ nanomaterials. These techniques include differential thermal analysis (DTA), thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), Fourier transform infrared (FTIR) spectroscopy, ultraviolet-visible (UV-Vis) spectroscopy, vibrating sample magnetometer (VSM), X-ray diffraction (XRD), scanning electron microscopy (SEM), Brunauer–Emmett–Teller (BET) method, cyclic voltammetry (CV), galvanostatic charge–discharge (GCD), and positron annihilation spectroscopy (PAS).

Assiut University

Asyut, Egypt

UNDERGRADUATE RESEARCH

Sept. 2017 – Jun. 2018

- My graduation research project was in the field of theoretical and experimental solid-state physics and discussed in detail how the modification of the electrical quantities such as conductivity, susceptibility, electric displacement, or relative dielectric constant is affected by the optical parameters such as refractive index, absorption coefficient, or reflectivity. Then I designed and fabricated a device to measure the electrical response of various solid materials under different optical conditions.

Publications

A. Abu El-Fadl, [Mahmoud A. M. Hussien](#), A. S. Soltan, and A. Abu-Sehly. Structure, optical and visible-light photocatalytic performance of Mo_{1-x}Co_xS₂ (0 ≤ x ≤ 0.1) nanoparticles synthesized by facile hydrothermal method for methylene blue dye degradation. Submitted to be published in the journal of Ovonic research.

A. Abu El-Fadl, [Mahmoud A. M. Hussien](#), A. S. Soltan, and A. Abu-Sehly. Impacts of substitutional Fe-doping on the structural, morphological, optical, and photocatalytic properties of flower-like MoS₂ nanoparticles synthesized by hydrothermal method. Submitted to be published in the physica scripta.

Conference presentations

Dec. 2021, **Studies of structural changes in heavy ion irradiated materials.** 6th Stage of the international student practice held at Joint Institute for Nuclear Research, Dubna, Moscow, Russia.

Oct. 2020, **Optimizing the Performance of Layered MoS₂-based Nanostructures for Energy Applications.** The Seventh International Conference for Young Scientists in Basic and Applied Sciences held at Faculty of Science, Assiut University, Egypt.

Schools, Workshops, & Conferences

7th Biennial African School of Fundamental Physics and Applications (ASP2022)

Marrakesh, Morocco

28 Nov. – 9 Dec. 2022

- The school organized a **series of weakly online seminars** in the research areas of interest at ASP. I attended these seminars which, were based on close interplay between theoretical, experimental, and applied physics. They thus covered a wide range of topics in nuclear & particle physics, astrophysics & cosmology, accelerators, radiation & medical physics, material physics, renewable energies & energy efficiency, high-performance computing, physics education, and physics communication.

The First High Energy Physics Simulation course

Assiut University, Egypt

15 - 18 Aug. 2022

- One weak event under supervision of Physics Department held at Assiut University that targets BSc and MSc students and consist of advanced lectures about introduction to detector physics and Monte Carlo methods, design and simulation of calorimeter detectors using CERN ROOT libraries, reconstruction, particle identification and analysis techniques Hands-on project to design and simulate a calorimeter from scratch.

Advanced Summer Workshop of Physics

Zewail City, Egypt

29 Aug. 2019

- One day event under supervision of Physics of Earth and Universe Program Faculty held at Zewail City that targets BSc and MSc students and consist of three advanced lectures, Special Relativity, General relativity, and Astrophysics and Cosmology, respectively.

3rd Summer School on Basic Physics

Zewail City, Egypt
28 Aug – 8 Sept. 2016

- Two-week program of advance and intensive lecturing on selected physics topics (Classical Mechanics, Quantum Mechanics, Statistical Physics, and Electrodynamics) which is intended to provide fundamental understanding of basic physics to BSc and MSc students across Egypt.

Relativity Day conference

Zewail City, Egypt
10 May 2015

- The conference includes some of the seminars on research points related to Gravitational Theory

Awards, & Grants

Oct. 2020 **The best graduate student oral presentation**, The Seventh International Conference for Young Scientists in Basic and Applied Science

Skills

A) Computer skills

- **Numerical computation:** Matlab
- **Data analysis:** Origin – QualX – X'Pert High score – FullProf Suite – CelRef3
- **Word/text processing software:** LaTeX – Scientific WorkPlace – Microsoft Office
- **Programming:** Python
- **software configuration management:** VESTA

B) Languages

- **English** (Very good)
- **Arabic** (native)

University services

- Aiding the undergraduate administrative office in their tasks for freshman students throughout students' union.
- Scheduling the working hours of the teaching assistants at the different undergraduate physics labs for four semesters.
- Participating in the development of the physics labs and creating online resources for these labs on the faculty website.
- Founding a society of physics students at Faculty of Science, Assiut University to monitor undergraduate students with major physics in their studies.

Memberships

- **STEM program, Faculty of Education, Assiut University** member since 2021
- **Society of Physics Students, Physics Department, Faculty of Science, Assiut University** member since 2021
- **EGYPTIAN SYNDICATE OF SCIENTIFIC PROFESSIONS**, member since 2017

References

- 1) **Prof. Abdulaziz Abu El-Fadl**
 - Physics Department, Faculty of Science, Port Said University
 - [✉ abulfadl@aun.edu.eg](mailto:abulfadl@aun.edu.eg) & [✉ A. Abu El-Fadl](mailto:A. Abu El-Fadl)
- 2) **Prof. Ahmed Ebrahim**
 - Physics Department, Faculty of Science, Assiut University
 - [✉ aebrahim@aun.edu.eg](mailto:aebrahim@aun.edu.eg) & [✉ Ahmed A. Ebrahim](mailto:Ahmed A. Ebrahim)
- 3) **Dr. Abdelnaby Mohamed Elshahawy**
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- 4) **Dr. Krzysztof Siemek**
 - Lecturer at Joint Institute for Nuclear Research, Dubna, Moscow reg. Russia
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