

Mohamed Mahmoud Ali Ahmed

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RESEARCH INTEREST

My project for the M. Sc. degree is based on developing a model to evolve the radiation generation by a cold electron beam traveling above waveguide. The sources of free-electron laser for generation radiation such as Cherenkov free-electron lasers (CFEL), Smith-Purcell, and Surface plasmon Polaritons (SPPs) which is considered as another category of the CFEL. I developed analytical treatment for the nonlinear regime of CFEL. Then, for optimizing the CFEL operation, the interaction length at which the gain reaches its maximum value at the end of the linear regime can be determined. As well as I presented the modeling of a quantum regime for surface plasmon polaritons excited by an electron beam skimming parallel to the surface of a metallic structure analogous to that of Cherenkov radiation. Also, I investigated the influence of the loss effects on SPPs. So, I need to know more details about light-mater interaction theory as well as particle accelerators which are sources for particle beams. I want to complete my study in Surface Plasmon Polaritons, and I would like to proceed in experimental studies on the SPPs in my Ph.D.

EDUCATION

Master's degree in physics Assiut, Egypt
Faculty of Science, Assiut University Feb. 2023

- Specialized in Atomic, Molecular and Optical Physics.
- Thesis: Theoretical studies on the radiation generation by a cold electron beam traveling above a waveguide.

Pre-Master year Assiut, Egypt
Faculty of Science, Assiut University Jun. 2019

- Pre-master Courses: Numerical Analysis, Physical Electronics, Quantum mechanics, Electromagnetic Theory, Plasma Physics, Physics of Corona Discharge, Selected Topics Related to Plasma Physics and Statistical Physics.
- CGPA: 3.31/4

B.Sc. degree in Physics Assiut, Egypt
Faculty of Science, Assiut University Jun. 2017

- First Class Honors.
- CGPA: 3.62/4 (Very good with honor degree).

WORK EXPERIENCE

Teaching Assistant Assiut, Egypt
Assiut University Feb. 2023 – present

- Teaching undergraduate students of different major's labs.
- Grading student reports and devising experimental exams and sheets.

Physics Demonstrator
Assiut University

Assiut, Egypt
Aug. 2018 – Jan. 2023

- Teaching undergraduate students of different major's labs.
- Grading student reports and devising experimental exams and sheets.

ACTIVITIES AND TRAININGS

The First High Energy Physics Simulation course
Former Intern

Assiut, Egypt
15 Aug. - 18 Aug. 2022

- In this workshop, I gained experience in simulating and analyzing data by ROOT software.

International e-conference on plasma theory and simulations (PTS-2020)
Participant

Online
15 Aug. - 18 Aug. 2022

- I presented my first paper entitled “Nonlinear theory of a Cherenkov free-electron laser” in the poster presentation category in the international e-conference on PTS-2020.

The Third Summer School on Basic Physics at Zewail City
Participant

Cairo, Egypt
28 Aug. - 8 Sept. 2016

- I studied three basic courses in this school which are: Quantum Mechanics 1, Electromagnetic theory, and Statistical mechanics.

The Second Annual undergraduate scientific conference at Zewail City
Participant

Cairo, Egypt
17 Sep. - 19 Sep. 2015

SKILLS

- Data analysis software: Origin and Veusz
- Programming Languages: C++ and Fortran
- Numerical computation: Mathcad and MATLAB
- Languages: Arabic (Native) and English (Very Good)

PUBLICATIONS

- Hesham Fares, Mohamed Mahmoud, “Nonlinear theory of a Cherenkov free-electron laser”, Nucl. Instrum. Methods Phys. Res. A, vol. 976, pp. 164256-164262, 2020.
- Hesham Fares, Mohamed Mahmoud, “The energy spread effects of an electron beam on the evolution of Cherenkov free-electron lasers”, Phys. Scr., vol. 96, p. 125628, 2021.
- Mohamed Mahmoud, Abdelhalim A. Turkey, Moustafa Ahmed, Hesham Fares, “Loss effects on quantum surface plasmon polaritons excited by a traveling electron beam”, Phys. Plasmas, vol. 30, p. 023101, 2023.

REFERENCES

Prof. Dr. Hesham Fares Ahmed Hassan

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