

Reham El-Kholy, Ph.D.

Curriculum Vitae

Astronomy Department, Faculty of Science
Cairo University, Egypt
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EDUCATION

- Ph.D.** **Faculty of Science, Cairo University, Egypt** Sep 2016 to Sep 2021
Astronomy Program (Astroparticle Physics)
Advisors: Prof. Z. M. Hayman & Prof. A. V. Guskov
Thesis: Production of Antiprotons in Interactions of Light Nuclei
and the Search for Dark Matter in Space Experiments
- M.Sc.** **Faculty of Science, Cairo University, Egypt** Mar 2013 to July 2016
Astronomy Program (Relativistic Cosmology)
Advisor: Prof. M. I. Wanas
Thesis: The Accelerating Expansion of the Universe: The Problem
and Suggested Solutions
- B.Sc.** **Faculty of Science, Cairo University, Egypt** Sep 2007 to June 2011
Physics & Astronomy Program (Double Major)
Graduated with Honors. GPA: 3.8
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UNIVERSITY TEACHING EXPERIENCE

- Lecturer** *Astronomy* Oct 2021 to Present
Department of Astronomy, Space Science, and Meteorology
Cairo University, Egypt
Classes: Spherical Astronomy, Stellar Dynamics, Computational Astrophysics
- Teaching astrophysics majors; being solely responsible for course content
 - Developed lab exercises in celestial mechanics, general relativity, and astrophysics based on Mathematica
 - Supervising TAs; writing exams; supervising group projects
- Assistant Lecturer** *Astronomy* Oct 2016 to Sep 2021
Department of Astronomy, Space Science, and Meteorology
Cairo University, Egypt
Classes: Numerical Analysis, Spherical Astronomy, General Relativity,

Computational Astrophysics, Astronomical Calculations

- Managed and conducted practical and lab sessions; updated course content
- Graded exams; guided students; led teaching assistants in lab

Teaching Assistant *Astronomy* Sep 2012 to Sep 2016

Department of Astronomy, Space Science, and Meteorology

Cairo University, Egypt

Classes: Spherical Astronomy, General Relativity

- Conducted practical and lab sessions; prepared model answers; graded homework; prepared presentations

OTHER APPOINTMENTS

Ar. Math. Reviewer *Nagwa Ltd.* Sep 2020 to Present

- Reviewing translated K-12 math. curricula for scientific accuracy
- Maintaining mathematics glossaries
- Giving feedback to translators

Student Mentor *Udacity* Feb 2019 to Nov 2019

- Provided technical support to students working on their projects
- Worked with students to create personalized weekly-learning plans
- Motivated students, and kept them engaged and active

En. > Ar. Translator *Springer Nature* May 2013 to Aug 2020

Projects: Arabic Nature Edition, Scientific American

- Translated scientific articles from English into Arabic
- Researched new terms and updated glossaries

TEACHING INTERESTS

General Relativity, Computational Physics, Mechanics, Special Relativity, Astrophysics, Multi-wavelength Astronomy, Cosmology, Particle Physics

MEMBERSHIPS

NICA SPD Collaboration (<http://spd.jinr.ru/>) 2020 to Present

RESEARCH EXPERIENCE

Postdoctoral Research

Oct 2021 to Present

Spin Physics Detector (SPD Collaboration)

Leader: Alexey Guskov, Ph.D.

Topics: - Fast reconstruction of secondary vertices using machine learning algorithms
- Astrophysical modeling of SPD measurements impact on dark matter searches

Doctoral Research

Sep 2016 to May 2021

Cairo University, Egypt & Joint Institute for Nuclear Research (JINR), Moscow, Russia

Advisors: Hayman Metwally, Ph.D. & Alexey Guskov, Ph.D.

Topics: - Measuring antiproton yield in SPD for astrophysical searches for Dark Matter
- Particle identification (PID) using time-of-flight (ToF)

Research Assistant

Feb 2013 to Mar 2016

Astronomy Department, Cairo University, Egypt

Advisor: M. I. Wanas, Ph.D.

Topic: Interpreting dark energy in terms of a geometric unified field theory

RESEARCH INTERESTS

- Antiprotons as a probe for dark matter
- Machine learning applications in astronomy
- Modified gravity alternatives

PUBLICATIONS

Peer-reviewed Research

- Abramov, V.V. *et al.* Possible Studies at the First Stage of the NICA Collider Operation with Polarized and Unpolarized Proton and Deuteron Beams. *Phys. Part. Nuclei* **52**, 1044–1119 (2021). <https://doi.org/10.1134/S1063779621060022>
- Alexakhin, V., Guskov, A., Hayman, Z., **El-Kholy, R.** *et al.* On the Study of Antiprotons Yield in Hadronic Collisions at NICA SPD. *Phys. Part. Nuclei Lett.* **18**, 196–201 (2021). <https://doi.org/10.1134/S1547477121020023>
- Guskov, A., **El-Kholy, R.** On the Possibility to Study Antiproton Production at the SPD Detector at NICA Collider for Dark Matter Search in Astrophysical Experiments. *Phys. Part. Nuclei Lett.* **16**, 216–223 (2019). <https://doi.org/10.1134/S1547477119030117>

- Wanas, M., Osman, S. and **El-Kholy, R.** Unification Principle and a Geometric Field Theory *Open Physics*, **13**, 1 (2015). <https://doi.org/10.1515/phys-2015-0030>

Other Publications

- V.M. Abazov *et al.* Conceptual design of the Spin Physics Detector (2021). <https://arxiv.org/abs/2102.00442>

PRESENTATIONS

Research Talks – Highlights

12th Conference on Nuclear and Particle Physics (NUPPAC' 22)

Sharm El-Sheikh, Egypt, May 2022

The Spin Physics Detector at NICA

First Pan-African Astro-Particle and Collider Physics Workshop (PACP22)

Virtual, March 2022

The Spin Physics Detector at NICA

Dzhelepov Lab. of Nuclear Problems (DLNP), Joint Institute for Nuclear Research (JINR)

Dubna, Russia, August 2020

On the Study of Antiprotons Yield in Hadronic Collisions at NICA SPD

Dzhelepov Lab. of Nuclear Problems (DLNP), Joint Institute for Nuclear Research (JINR)

Dubna, Russia, October 2018

On the Possibility to Study Antiproton Production at the SPD Detector at NICA Collider for Dark Matter Search in Astrophysical Experiments

Center for Theoretical Physics (CTP), British University in Egypt (BUE)

Cairo, Egypt, May 2013

f(T) Theories

UNIVERSITY SERVICE

Foreign Students Coordinator

Feb 2022 to Present

Department of Astronomy, Space Science, and Meteorology, Cairo University

Member of the Strategic Planning executive team

Mar 2015 to Jan 2016

Quality Assurance Unit, Faculty of Science, Cairo University

HONORS & AWARDS

PyTorch Facebook Challenge Finalist , Awarded 2 AI Udacity nanodegrees	Jan 2019
OMAC Initiative Android Finalist , Awarded an Android Udacity nanodegree	Sep 2018
Prof. Gamal Fandy Prize , Top graduate in astronomy	Mar 2012
Dr. Mohammed Nashaey Prize , Top graduate in astronomy	Mar 2012

TEACHING TRAINING

Essentials of Integrated Education Faculty and Leadership Development Center (FLDC), Cairo University	Mar 2021
Exams and Student Evaluation Systems Faculty and Leadership Development Center (FLDC), Cairo University	Apr 2019
Quality Assurance of Higher Education in Egypt National Authority for Quality Assurance and Accreditation of Education (NAQAAE)	May 2015
Visualization Techniques in Teaching DAAD Kairo Academie (DKA)	May 2015
Effective Teaching Skills Faculty and Leadership Development Center (FLDC), Cairo University	Oct 2014
Quality Standards in Teaching Faculty and Leadership Development Center (FLDC), Cairo University	June 2014
E-Learning Faculty and Leadership Development Center (FLDC), Cairo University	Jan 2014

RESEARCH TRAINING

Machine Learning Cross-Skilling Udacity Nanodegree	Jan 2022
Doctoral Research Training <i>Topic:</i> Antiproton Monte Carlo Study Using SPDRoot Joint Institute for Nuclear Research (JINR), Dubna, Russia	Jan – Feb 2020

Statistical Analysis of Bio-Experiments	Sep 2019
Faculty and Leadership Development Center (FLDC), Cairo University	
Arabic and English Editing in Scientific Research	Aug 2019
Faculty and Leadership Development Center (FLDC), Cairo University	
Deep Learning, Deep Reinforcement Learning for Enterprise	Mar – Sep 2019
Udacity Nanodegrees	
Doctoral Research Training	Oct 2018
<i>Topic:</i> Antiproton Monte Carlo Study Using Pythia8	
Joint Institute for Nuclear Research (JINR), Dubna, Russia	
Summer Student Program at JINR	July – Aug 2017
<i>Topic:</i> Event Display at COMPASS	
Joint Institute for Nuclear Research (JINR), Dubna, Russia	
The 8th Advanced Summer School at JINR	May – June 2016
<i>Topic:</i> Cosmic Showers	
Joint Institute for Nuclear Research (JINR), Dubna, Russia	
International Publishing of Scientific Research	Apr 2016
Faculty and Leadership Development Center (FLDC), Cairo University	
Dark Matter – Cairo Workshop	Dec 2015
British University in Cairo (BUE), Cairo, Egypt	
Scientific Working	June 2015
DAAD Kairo Academie (DKA)	

ADDITIONAL TRAINING

University Management	Aug 2020
Faculty and Leadership Development Center (FLDC), Cairo University	
Critical Thinking	Apr 2020
Faculty and Leadership Development Center (FLDC), Cairo University	
Communication and Rhetorical Techniques	June 2015
DAAD Kairo Academie (DKA)	

Strategic Planning

May 2015

Faculty and Leadership Development Center (FLDC), Cairo University

Self-Marketing

May 2015

DAAD Kairo Academie (DKA)

Conference Organization

Jan 2015

Faculty and Leadership Development Center (FLDC), Cairo University

TECHNICAL SKILLS

- C++
 - Python
 - ROOT
 - Mathematica
 - LaTeX
 - Linux
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LANGUAGES

- **Arabic** *Fluent*
 - **English** *Proficient*
 - **Russian** *Basic*
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REFERENCES

Hayman Metwally, Ph.D.

Professor of Space Dynamics

Department of Astronomy, Space Science, and Meteorology

Faculty of Science, Cairo University, Egypt

zmhayman@cu.edu.eg

Alexey Guskov, Ph.D.

Head of the Department of Colliding-Beam Physics

Dzhelepov Laboratory of Nuclear Problems

Joint Institute for Nuclear Research, Russia

alexey.guskov@cern.ch

REFERENCES (continued)

Osama Shalabiea, Ph.D.

Former Head of Department
Department of Astronomy, Space Science, and Meteorology
Faculty of Science, Cairo University, Egypt
shalabiea@sci.cu.edu.eg

Morsi Amer, Ph.D.

Assistant Professor of Astrophysics
Department of Astronomy, Space Science, and Meteorology
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