Kort Gerardo Rodríguez Beck

B.Sc. in Physics Engineering
M.Sc. in Physics
Ph.D. Physics student

kgr6@illinois.edu kortbeck.com go.illinois.edu/kortbeck iNSPIRE ORCID

Education

2022 **University of Illinois at Urbana-Champaign, Department of Physics**,
Ph.D. Physics student, Supervised by Dr. Patrick Draper.

2022 - 2025 **University of Illinois at Urbana-Champaign, Department of Physics**,
Master of Science in Physics.

2016 - 2021 **Autonomous University of Coahuila, Department of Physics and Mathematics**,
B.Sc. in Physics Engineering, Supervised by Dr. Simón Rodríguez Rodríguez.
Thesis project: *Isospin doublet under the (1,0)⊕(0,1) Lorentz group representation as a model for dark matter.*
A gauge structure for fields transforming under the (1,0)⊕(0,1) Lorentz group representation is proposed as a model for dark matter. The spin independent cross section for WIMP - Xe nuclei interaction was calculated in this model and compared with the XENON1T 2017 results.

Publications

August 2022 **Bachelor Thesis. Doblete de isoespín en la representación $(1,0)\oplus(0,1)$ del grupo de Lorentz como modelo de materia obscura**, doi: 10.13140/RG.2.2.13440.30722 .

September 2022 **Comment on "Spin correlations in elastic e^+e^- scattering in QED"**, arXiv: 2209.13986.
The European Physical Journal D, **77**, 85, (2023). doi : 10.1140/epjd/s10053-023-00665-x6.

Workshops and summer schools

June 2023 **Perimeter Institute for Theoretical Physics**, *Ontario, Canada*,
Summer student.
I attended the TRISEP series of lectures for graduate students.

Research experience

August 2022 - present **University of Illinois at Urbana-Champaign, UIUC**, *Urbana, Illinois, USA*,
Member of Dr. Patrick Draper's high energy theory research group.
Currently, we are working on including time-dependent effects in bubble nucleation from tunneling in Field Theory.

August 2021 - August 2022 **University of Colima, UCOL**, *Colima, Colima, México*,
Member of Dr. Alfredo Aranda's research group.
We studied quantum entanglement in scattering processes on quantum field theory.

June - August 2021 **University of Colima, UCOL**, *Colima, Colima, México*,
Summer studnet,
Supervised by Dr. Alfredo Aranda.
I reproduced the following calculations: (1) The differential cross section for all the fundamental QED processes at tree level. (2) The Higgs total branching ratio. (3) The Z branching ratio to fermions to predict how many light neutrino flavors there are, and finally (4) three flavor neutrino oscillation probabilities.

October 2020 **Autonomous University of Coahuila, UAdeC**, *Saltillo, Coahuila, México*,
Research collaboration.
I collaborated with Chemistry Department students on a Food Science research project. My contribution focused on the mathematical modeling of the studied phenomena. Although I am not an author of the publication, I am mentioned in the acknowledgments, doi : 10.1016/j.fpsl.2021.100734.

August 2020 **CICESE**, *Ensenada, Baja California (virtually)*,
Summer studnet,
Supervised by Dr. Paulina Segovia.
I worked in simulations of localized surface plasmons in star shaped silver nanoparticles using COMSOL.

June - August 2020 **Autonomous University of Coahuila**, *Saltillo, Coahuila, México*,
Summer studnet,
Supervised by Dr. Carlos Rodríguez.
I worked in the synthesis and characterization of $BaLaAlO_4$ doped with Erbium. A potential application of this material is produce cheap novel RGB diodes.

June 2020 - Augsut 2021 **Autonomous University of Coahuila, Department of Physics and Mathematics**, *Saltillo, Coahuila, México*,
Thesis research project,
Supervised by Dr. Simón Rodríguez Rodríguez.
A gauge structure for fields transforming under the $(1,0)\oplus(0,1)$ Lorentz group representation is proposed as a model for dark matter. The spin independent cross section for WIMP - Xe nuclei interaction was calculated in this model and compared with the XENON1T 2017 results.

June - July 2018 **Autonomous University of Puebla, BUAP**, *Puebla, México*,
Summer student,
Supervised by Dr. Cecilia Uribe.
I worked in Resistive Plate Chamber detector simulations via Python, in particular muon detection.

Teaching experience

December 2020 **Technological Saltillo Institute**, *Saltillo, Coahuila, México*,
Guest teacher.
I taught a basic introductory course on quantum mechanics for senior Materials Engineering students.

University of Illinois at Urbana-Champaign, Department of Physics, *Urbana, Illinois, USA*,
Teaching Assistant.
Fall 2022 - Laboratory teaching assistant for PHYS 102, College Physics: E&M & Modern.
Spring 2023 - Laboratory teaching assistant for PHYS 102, College Physics: E&M & Modern.
Summer 2023 - Discussion teaching assistant for PHYS 213, University Physics: Thermal Physics.
Fall 2023 - Teaching assistant for PHYS 485, Atomic Physiscs & Quantum Theory.
Spring 2024 - Teaching assistant for PHYS 470, Subatomic Physics.

Science outreach

2018-2021 **Autonomous University of Coahuila, UAdeC**, *Saltillo, Coahuila, México*,
Science outreach.
Co-founder of the first official science outreach group at UAdeC Department of Physics and Mathemtics called "Divulgatrón". We carried out activities in order to share science with all of people. In 2018 and 2019 we participated in the National Reunion for Science outreach organized by the Mexican Society of Physics.

2021 - 2020 **Youth Scientific Society, SCJ**, *Saltillo, Coahuila, México*,
Science outreach, President.
President of the Youth Scientific Society in Saltillo, Coahuila, in association with the International Association of Physics Students (IAPS).

Awards

November 2022 **Consejo Estatal de Ciencia y Tecnología, COECYT Coahuila**, *Saltillo, Coahuila, México*,
Premio Talento Coahuila Jóvenes Científicos. Categoría : Investigación Científica.
Medal and prize of $3,200 USD.
Premio Talento Coahuila Jóvenes Científicos (Coahuila Young Scientists Talent Award) recognizes outstanding trajectories of young students from Coahuila, México, involved in research and science outreach projects.

November 2020 **Autonomous University of Coahuila, UAdeC**, *Saltillo, Coahuila, México*,
Presea Lobo.
Presea Lobo is the greatest recognition awarded by the Autonomous University of Coahuila for students. I was awarded in the leadership category.

Certifications

February 2021 **Fluid Dynamics with ANSYS Fluent**, Virtually.
SEI, Specialized Services in Engineering. Course delivered by Dr. Pedro Lopez from Carleton University.

Skills

Programming C, C++, Python
Software LaTeX, Linux/Ubuntu, Mathematica
Other Experience in numerical simulation

Languages

Spanish **Native language**
English