# Manoa Andriamirado

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## EDUCATION

**Illinois Institute of Technology**     Chicago, IL
*PhD student in Elementary Particle Experiment*     *Aug. 2019 – Present*
Thesis Title: *Probing New Physics with the PROSPECT Reactor Antineutrino Experiment.*
Advisor: Prof. Bryce Littlejohn

**University of Antananarivo**     Antananarivo, Madagascar
*Master of Science in Physics*     *May 2017 – Jul. 2019*
Thesis Title: *Study of Neutron Background in the 3D-projection Scintillator Detector.*
Advisors: Prof. David Martinez Caicedo and Prof. Raboanary Roland

**University of Antananarivo**     Antananarivo, Madagascar
*Bachelor of Science in Physics*     *May 2014 – Mar. 2017*

## APPOINTMENTS

**Research Assistant**     Aug. 2019 – Present
*Illinois Institute of Technology*     *Chicago, IL*

**Teaching Assistant**     Fall 2019
*Illinois Institute of Technology*     *Chicago, IL*

## RESEARCH EXPERIENCES

**Sterile Neutrino Search at the PROSPECT Experiment**     Aug. 2019 – Present
*Illinois Institute of Technology*     *Chicago, IL*
- Led the oscillation analysis for the final sterile neutrino search at PROSPECT.
- Primary editor of final PRL-directed manuscript.
- Primary developer and administrator of PROSPECT's oscillation analysis framework.

**PROSPECT-I Optical Grid Decommissioning and PROSPECT-II R&D**     Jan. - Jun. 2022
*Illinois Institute of Technology*     *Chicago, IL*
- Mentored 4-person undergraduate team in inspecting and documenting optical panel failures.
- Used findings to improve conceptual design of upgraded PROSPECT-II Optical Grid.

**Boosted Dark Matter Search at the PROSPECT Experiment**     Jul. 2019 - Apr. 2021
*Illinois Institute of Technology*     *Chicago, IL*
- Developed new event selection targeting light WIMP-proton scatters in PROSPECT-I.
- Characterized sidereal time variation of candidate WIMP-proton scattering signal and background sidebands.
- Co-produced final results and PRD manuscript with collaboration-external particle theorists.

**DUNE 3DST Near Detector Neutron Response Study**     Dec. 2018 - Jul. 2019
*University of Antananarivo*     *Antananarivo, MG*
- Developed analysis for and characterized response of DUNE ND to neutrino-produced neutrons.

## AWARDS

- **Best Poster**: NuFact 2024.
- **Travel Grant**: National Nuclear Physics Summer School 2022.

## PUBLICATIONS

- **\*Final Search for Short-Baseline Neutrino Oscillations with the PROSPECT-I Detector at HFIR**
  *PROSPECT Collaboration, arXiv:2406.10408*

- **Reactor Antineutrino Directionality Measurement with the PROSPECT-I Detector**
  *PROSPECT Collaboration, arXiv:2406.08359*

- **Final Measurement of the $^{235}$U Antineutrino Energy Spectrum with the PROSPECT-I Detector at HFIR**
  *PROSPECT Collaboration, Phys. Rev. Lett. 131, 021802 (2023)*

- **Calibration strategy of the PROSPECT-II detector with external and intrinsic sources**
  *PROSPECT Collaboration, JINST 18 P06010 (2023)*

- **\*Limits on Sub-GeV Dark Matter from the PROSPECT Reactor Antineutrino Experiment**
  *PROSPECT Collaboration and C. V. Cappiello, Phys. Rev. D 104, 012009 (2021)*

- **\*PROSPECT-II Physics Opportunities**
  *PROSPECT Collaboration, J. Phys. G: Nucl. Part. Phys. 49, 070501 (2022)*

- **Joint Measurement of the $^{235}$U Antineutrino Spectrum by PROSPECT and STEREO**
  *PROSPECT Collaboration, Phys. Rev. Lett. 128, 081802 (2022)*

- **Joint Determination of Reactor Antineutrino Spectra from $^{235}$U and $^{239}$Pu Fission by Daya Bay and PROSPECT**
  *PROSPECT Collaboration, Phys. Rev. Lett. 128, 081801 (2022)*

- **\*Improved Short-Baseline Neutrino Oscillation Search and Energy Spectrum Measurement with the PROSPECT Experiment at HFIR**
  *PROSPECT Collaboration, Phys. Rev. D 103, 032001 (2021)*

- **\*Deep Underground Neutrino Experiment (DUNE) Near Detector Conceptual Design Report**
  *DUNE Collaboration, arXiv:2103.13910*

## SEMINARS

3. **Probing New Physics with the PROSPECT Reactor Antineutrino Experiment**
   *Lawrence Livermore National Laboratory, Livermore, CA, Oct. 4, 2024*

2. **Final Search for Short-Baseline Neutrino Oscillations with the PROSPECT-I Detector at HFIR**
   *Fermilab Joint Experimental and Theoretical Physics Seminar, Batavia, IL, Sep. 27, 2024*

1. **Probing New Physics with the PROSPECT Reactor Antineutrino Experiment**
   *HEP Seminar, University of Pittsburgh, Jan 25. 2024*

## PRESENTATIONS

12. **Final Search for Short-Baseline Neutrino Oscillations with the PROSPECT-I Detector at HFIR**
    *APS DNP Meeting 2024, Boston, MA, Oct. 7-10, 2024*

11. **Final Search for Short-Baseline Neutrino Oscillations with the PROSPECT-I Detector at HFIR**
    *NuFact 2024, Lemont, IL, Sep. 16-21, 2024*

10. **Final Search for Short-Baseline Neutrino Oscillations with the PROSPECT-I Detector at HFIR**
   *APS April Meeting 2024, Sacramento, CA, Apr. 3-6, 2024*

9. **Final Search for Short-Baseline Neutrino Oscillations with the PROSPECT-I Detector at HFIR**
   *APS DNP Meeting 2023 Big Island, HI, Nov. 26- Dec. 1, 2023*

8. **PROSPECT-II Physics Goals**
   *APS April Meeting 2023, Minneapolis, MN, Apr. 15-18, 2023*

7. **PROSPECT-II Physics Goals**
   *APS DNP Meeting 2022 New Orleans, LA, Oct. 27-30, 2022*

6. **Limits on Sub-GeV Dark Matter from the PROSPECT Reactor Antineutrino Experiment (Poster)**
   *Neutrino 2022, Virtual, May 30 - Jun. 4, 2022*

5. **PROSPECT-II Oscillation Physics Goals and Beyond**
   *APS April Meeting 2022, Virtual, Apr. 9–12, 2022*

4. **Recent Physics Results from the PROSPECT Experiment**
   *Topics in Astroparticle and Underground Physics 2021, Virtual, Aug. 26 - Sep. 3, 2021*

3. **Limit on sub-GeV Dark Matter from the PROSPECT Experiment**
   *New Perpective 2021, Virtual, Aug. 16-19, 2021*

2. **Cosmic ray Boosted Dark Matter at PROSPECT – Experimental Analysis**
   *APS April Meeting 2021, Virtual, Apr. 17-20, 2021*

1. **PROSPECT-II Detector Upgrade and Sterile Neutrino Oscillation Sensitivity**
   *APS Prairie Section Fall Meeting, Virtual, Nov. 11-13, 2020*

## PROFESSIONAL DEVELOPMENT

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| **14th International Neutrino Summer School 2023** | Aug. 7-18, 2023 |
| *Fermilab National Laboratory* | *Batavia, IL* |
| **Computational and Data Science for High Energy Physics 2023** | Jul. 17-21, 2023 |
| *Princeton University* | *Princeton, NJ* |
| **National Nuclear Physics Summer School 2022** | Jul. 11-22, 2022 |
| *Massachusetts Institute of Technology* | *Boston, MA* |
| **13th International Neutrino Summer School 2021** | Aug. 2-13, 2021 |
| *Conseil Européen pour la Recherche Nucléaire* | *Virtual* |
| **PyTorch Scholarship Challenge from Facebook** | Nov. 9, 2018 - Jan. 9, 2019 |
| *Udacity* | *Virtual* |

- Developed a deep learning model using PyTorch to classify 108 flower species.
- Achieved an accuracy of 83% on the validation set by fine-tuning the ResNet18 model.

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| **2nd Big Data Africa School 2018** | Sep. 10–17, 2018 |
| *SARAO* | *Cape Town, SA* |

- Developed an image classifier to identify retinopathy in medical images using machine learning algorithms.
- Used image processing techniques for feature extraction and data augmentation.

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| **JEDI Workshop in Big Data Science** | May. 25-29, 2018 |
| *SKA* | *Nosy Be, MG* |

- Performed an image-based data mining to improve radiotherapy for cancer treatment.

## Technical Skills

- **Computer Languages:** C, C++, Python, Bash
- **Frameworks:** ROOT, Scikit-learn, Pytorch
- **Tools:** Vim, LaTeX, Github, CMake, Valgrind, Perf
- **Operating Systems:** Linux, Micrsoft Windows

## Languages

- **English:** Full Professional Proficiency
- **French:** Full Professional Proficiency
- **Malagasy:** Native