Jeong Min Kong

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Information

- Birth Date: December 7th, 1998 (Age: **21**)
- Place of Birth: **Republic of Korea**
- Nationality: **Canada**

Education

- **University of Toronto** - BASc Electrical Engineering & Artificial Intelligence 2016 - 2022
- **Regiopolis-Notre Dame Catholic High School** - OSSD 2012 - 2016

Research

- **Researcher**, SNOLAB & Dept. of Physics, Carleton University 2020/1 -
  Supervisor: **Professor David Sinclair**
- **Research Assistant**, Dept. of Electrical Engineering, University of Manitoba 2019/9 - 2020/1
  Supervisor: **Professor Ekram Hossain**
- **Researcher**, Dept. of Physics, The University of Tokyo & RIKEN 2018/11 - 2019/2
  Supervisor: **Professor Kathrin Wimmer** (Moved to IEM CSIC, Spain)
- **Researcher**, Dept. of Electrical Engineering, University of Toronto & TELUS 2018/05 - 2018/9
  Supervisor: **Professor Raviraj Adve**
- **Research Assistant**, Canadian Institute for Theoretical Astrophysics 2017/6 - 2017/8
  Supervisor: **Professor Ue-Li Pen**

Current/Past Work

- **UAV & Intelligent Reflecting Surface (IRS) Assisted Large Scale Wireless Networks Python Simulation Software Program for 6G Research**
  Professor Ekram Hossain | University of Manitoba 2019/9 - 2020/1
- **Publication in Preparation**
  Professor Kathrin Wimmer | The University of Tokyo 2018/12 -
  Identified, under Professor Wimmer, that beta decay occur in the isomer that was being investigated in the experiment at ISOLDE Facility at CERN through data analysis using ROOT. This result will be important in future nuclei experiments involving this isomer as well as in the field of nuclear fission. The final report is currently under review by collaborators. Will be one of the lead authors.
- **Low-Energy (Optical) Photon Time Tracking GEANT4 Simulation Software Program for Gamma Spectroscopy Experiments Using GAGG Scintillator**
  Professor Kathrin Wimmer | The University of Tokyo and RIKEN 2018/11 - 2019/2
  In gamma spectroscopy experiments, which is a popular method used for understanding many mysteries underlying nuclear structures, scintillator efficiency and arrangement are extremely important factors to consider as only a short amount of time is available to conduct experiments due to the restricted use of large particle colliders. From the efficiency view, GAGG has been confirmed to be an excellent scintillation material candidate because it has very high density compared to the formerly used materials such as NaI and CsI. However, due to the lack of simulation programs available, it was previously very difficult to determine which GAGG scintillator design especially yield the best time resolution. Contributed in modelling the best time resolution GAGG scintillator design for future exotic nuclei experiments at RIBF Facility at RIKEN by developing an algorithm that is capable of accurately measuring the times of over 1 million photocathode-detected low-energy photons with the consideration of complex combinations of physics phenomenons, successfully implementing it using GEANT4, and visualizing the results for time resolution (FWHM) measurements using ROOT. Document available upon request.
- **Investigating the Correlation Between Gamma Probability Density Function and Data Rate Probability Density Function at Microwave Frequencies**
  Professor Raviraj Adve | University of Toronto 2018/7 - 2018/9

Researchers have recently made an observation that cellular data rates at microwave frequencies can be very well modelled with Gamma Probability Density Function under diverse conditions. Further contributed in better understanding this phenomenon by conducting simulations of various different scenarios using the Python 4G/5G wireless coverage simulation program and presenting new mathematical relationships between the shape and the scale parameters of the Gamma Probability Density Function and the simulation parameters (conditions) using MATLAB. Document available upon request.

- **4G/5G (mmWave) Wireless Coverage Python Simulation Software Program**
  Professor Raviraj Adve | University of Toronto and TELUS 2018/5 - 2018/9
  5G is an emerging wireless technology that aims to make communication extremely fast, and one way to accomplish this is by utilizing the mmWave frequencies to allow greater bandwidth. Researchers are studying many problems surrounding the mmWave concept, one being signals not reaching the receiver due to its natural property of having high attenuation. The solution to this problem is unfortunately very expensive, as many cellular networks are needed to work cooperatively at close distances. Contributed in helping researchers develop algorithms that will efficiently place the 5G mmWave cellular networks in various environments by building a wireless coverage design/analysis simulation software program with a Graphical User Interface (GUI) using Python. The program was additionally used for "Studying the Correlation Between Gamma PDF and Data Rate PDF" research (as the program also supports microwave frequencies) and is currently being used by a Senior RAN Engineer at TELUS. Document and undergraduate engineering research conference presentation (UnERD) poster available upon request.
- **Implementation of Various Functions to Visualize MHD Simulation on the GPU**
  Professor Ue-Li Pen | Canadian Institute of Theoretical Astrophysics 2017/6 - 2017/8
  To run the MHD simulation code on the AMD GPU for a faster computation of the MHD equations, additional scripts for analyzing the simulation results on the GPU also had to be written. The 1st script, written in C, saved each of the density, velocity and magnetic fields of the magneto fluids at different times as binary files. The 2nd script, written in Python, processed each of these binary files and produced 2-dimensional images that show the strength and the direction of the fields, which are important tools for studying how these fields behave with respect to time given different initial conditions. Because AMD GPU was not yet prepared to use at CITA during the time of employment, these scripts were tested using a CPU and the results were frequently discussed with the graduate student advisor. Besides this task, the average times to compute each type of field were recorded and updated on the CITA group website so that future research student can compare the simulation performances between GPU and CPU when the GPU becomes available.

Skill

- **Multilinguial** English, Korean, Japanese (Elementary), French (Elementary)
- **Laboratory** Developing simulation program, Performing data analysis, Mathematical modelling
- **Computing** Python, C, C++, MATLAB, GEANT4, ROOT, PartSim, Assembly (Elementary), HTML (Elementary), CSS (Elementary), LaTeX, MS Office, Google Suite
- **Mathematics** Multivariable & Vector Calculus, Linear Algebra, Proof-Based Probability Theory, Proof-Based Stochastic Processes, Complex Analysis, ODE
- **Social** Great communication skills and ability to understand others' feelings
- **Personality** Having deep concentration & extreme obsession when working on something I find highly exciting.

Job

- **Summer Orientation Teacher**, Algonquin & Lakeshore Catholic District School Board 2016 - 2017
  Introduced basic concepts in grade 9 mathematics and literacy to over 120 incoming secondary school students during the final week of August.
- **Dishwasher & Cleaner**, Cactus Club Cafe 2018 - 2018
  Dishwashed through lunch and early dinner hours, cleaned the floor and the stairs, and processed garbage collection. The income was used to additionally financially support the internship in Japan.