Cory Ball

389 Collins Run
McMinnville, TN

Phone: (423) 276-0693
Email: `ballcb@ornl.gov`

EDUCATION

Ph.D. Mathematics: Florida Atlantic University, May 2020. (3.8 GPA)
- **Dissertation**: "The Change Point Problem for Two Classes of Stochastic Processes"
- Division of Student Affairs and Enrollment Management Academic Excellence Award
- Dissertation Year Scholarship

M.S. Mathematics: Florida Atlantic University, December 2017.

M.S. Mathematical Sciences: East Tennessee State University, May 2015.
- **Thesis**: "The Apprentices' Tower of Hanoi"
- James H. Quillen Scholarship

B.S. Physics: East Tennessee State University, May 2013.

PROFESSIONAL EXPERIENCE

Postdoctoral Research Associate – Oak Ridge National Laboratory (September 2020 – Present).
- Developed SPESO Algorithm for optimization of physical systems. SPESO has been applied in the Moly-99 production project and currently in discussion for use in chemical vapor deposition (CVD) project.
- Co-Wrote reports, papers, and presentations in these areas: nuclear safeguards, system optimization, advanced reactor construction and safeguards schedules, nuclear sabotage codes.
- Worked on instrumentation and control implementation for nuclear thermal propulsion and various nuclear security projects.

Graduate Teaching Assistant Mathematics – Florida Atlantic University (August 2015–May 2020).
- Taught courses such as Calculus, College Algebra, and Trigonometry with class sizes from 15-120 students.
- Tutored all undergraduate math courses as a CRLA Level 3 certified tutor for the Math Learning Center.

Data Analyst – Florida Atlantic University Division of Student Affairs, Assessment & Academic Initiatives (May 2018– May 2019).
- Worked with a team to assess university programs by student involvement, academic outcomes, and career outcomes.
- Provided data analysis, statistical modeling, and data visualization.

- Presented findings to the division during the assessment showcase.

Upward Bound Physics Instructor – East Tennessee State University (May 2015– August 2015).
  - Taught physics to advanced high school students.

Graduate Teaching Assistant Mathematics – East Tennessee State University (August 2013– May 2015).
  - Taught pre-calculus with class sizes around 30 students.
  - Tutored students primarily in statistics, calculus, and physics.

SELECTED COMPUTING AND SOFTWARE SKILLS

- R – 7 years experience
- Python – 8 years experience
- Matlab – 6 years experience
- High-Performance/Super Computer/Cluster – 4 years experience
- Parallel Computing – 4 years experience
- LaTeX– 9 years experience
- Fortran – 9 years experience
- Monte-Carlo N-Particle Transport Code (MCNP) – 2 years experience

RESEARCH SINCE JOINING ORNL

ORNL RESEARCH PRODUCTS
- Kovacic, D., Gibbs, P., Hu, J., Hartanto, D., Wieselquist, W., Ball, C., and McElroy, B. "Pebble Bed Reactor Domestic Safeguards FY 22 Summary Report–Uncertainties in Fuel Burnup and Fissile Material Loss and Production for Pebble Bed Reactor Nuclear Material Accounting" (2022). ORNL/SPR-2022/2635

- Navarro, J., Nash, J., Bryan, C., Muth, T., Hyer, H., Dryepondt, S., Garrison, L., Massey, C., Wallen, Z., Goth, N., Smith, M., Nelson, N., Ball, C., and Conant, A. "Oak Ridge National Laboratory Molybdenum-99 Program" (2022)

- Navarro, J., Nelson, N., Smith, M., Ball, C., Wilkerson, B., Conant, A., Karriem, Z., and Nash, J. "Oak Ridge National Laboratory Design and Shielding Support for Accelerator Driven Sub-Critical Assembly use for Mo-99 Production" (2022)

- Ball, C., Sabatino, S., Hauck, G., and Harrison, T.J. "Gap Analysis of Advanced Reactor Construction and Safeguards Implementation" (2021). *ORNL/TM-2021/2208*

- Sabatino, S., Hauck, G., Ball, C., and Harrison, T.J. "Characterization of Safeguards Implementation Schedules for Advanced Reactors" (2021). *ORNL/TM-2021/2202*

- Hauck, G., Sabatino, S., Ball, C., and Harrison, T.J. "Characterization of Potential Construction Schedules for Advanced Reactors" (2021). *ORNL/TM-2021/2142*

- Belles, R., Nelson, S., Phathanapirom, B., Ball, C., and LANL. "Sabotage Mitigation: 9 Software Tools for International Use" (2021). *INS Report*

- Belles, R., Nelson, S., Phathanapirom, B., and Ball, C. "Codes Supporting Sabotage Analysis" (2021). *ORNL White Paper*

- Belles, R., Nelson, S., Phathanapirom, B., and Ball, C. "Accessibility of Codes Supporting Sabotage Analysis" (2021). *ORNL White Paper*

- "Introduction of the Stochastic Prediction-Based Exploration Surrogate Optimization (SPESO) Algorithm and Application to NioWave UTA-2 Nuclear System" (Forthcoming)

- Python Code - UTA3-Stage123Generator - In Support of NioWave Core Design/Optimization - The code generates MCNP input files with randomized parameters and grids with an option to have LEU (or NU) rods placed radially around a random point. The code also generates folders that are compatible with the existing driver.py code and places the MCNP files in those folders. Finally, the code places each case of randomized parameters in an excel spreadsheet.

- Python Code - Sample Size Calculator for Small Populations - In support of INS Performance Evaluation - Input the desired power, confidence, null proportion, highest acceptable proportion, and population. Outputs sample size, number of component failures to reject, and plots showing power and confidence.

EXTERNAL RESEARCH PRODUCTS

- Chhetri, S., Lastimoso, D.J., and Ball, C. (2022). "Extended Lomax Distribution with an Application to Cancer Patient Data." In: Arai, K. (eds) Advances in Information and Communication. FICC 2022. Lecture Notes in Networks and Systems, vol 438. (Book Chapter) Springer, Cham, `http://doi.org/10.1007/978-3-030-98012-2_22`

- Chhetri, S., Mdziniso, N., and Ball, C. "Extended Lindley Distribution with Applications." Revista Colombiana de Estadística, vol. 45, no. 1, Jan. 2022, pp. 65-83, `https://doi.org/10.15446/rce.v45n1.93548`

- Ball, C., Rimal, B., and Chhetri, S.B. (2021). "A New Generalized Cauchy Distribution with an Application to Annual One Day Maximum Rainfall Data." Statistics, Optimization and Information Computing, 9, 123-136. `https://doi.org/10.19139/soic-2310-5070-1000`

- Chhetri, S., Long, H., and Ball, C. "Parameter Estimation for Geometric Lèvy Processes with Constant Volatility" (2020). *AMS Fall Southeastern Sectional Meeting: Special Session on Probability and Statistical Models with Applications.* Chattanooga.

- Ball, C. and Long, H. "An Introduction to Stable Random Variables with an Application." (2020). *AMS Fall Southeastern Sectional Meeting: Special Session on Probability and Statistical Models*

with Applications. Chattanooga.

- Chhetri, S., Long, H., Ball, C., "Parameter Estimation for Geometric Lèvy Processes with Constant Volatility" (Awaiting Publication).

RESEARCH PRIOR TO JOINING ORNL

- "The Change Point Problem for Two Classes of Stochastic Processes" (2020). *Florida Atlantic University*. ProQuest Dissertations Publishing, 2020. 27958764. `http://purl.flvc.org/fau/fd/FA00013462` (Advisor: Hongwei Long)

- Ball, C. and Long, H. "The Volatility Change-Point Problem for Diffusion Processes" (2020). *Joint Mathematics Meeting*. Denver.

- Ball C. and Beeler, R. "The Apprentices' Tower of Hanoi." *Journal of Mathematical Sciences, 3*: 1–6, 2016.

- "The Apprentices' Tower of Hanoi." (2015). *Electronic Theses and Dissertations.*: Paper 2512. `https://dc.etsu.edu/etd/2512` (Advisor: Robert A. Beeler)

Professional references available upon request. Last updated: November 11, 2022