

Rebecca L. Preston

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Objective Looking to deploy rigorous mathematical methods and data-driven insights as a PhD candidate in nuclear astrophysics into a equity capital markets role supporting trading descisions. Successful track record in developing and executing proprietary trading algorithms and quantitative modeling.

Relevant Projects

- 8/2025-current Project Nyx**
End-of-day options trading pipeline (signal ingestion, feature engineering, trade selection, IBKR execution). Block-bootstrap MC backtester (10k sims), regime-aware features, 5% position sizing; iterated to improve Sharpe, Sortino, and drawdown.
- 1/2026-current Traders@SMU RKHS**
Multi-kernel RKHS model (kernel ridge regression) over order flow, volatility, and macro regime features; bootstrap MC backtesting with PCA to suppress redundant microstructure signals. Next iteration extends to live cross-asset data.
- 4/2026-current Relativistic RKHS**
Lorentz-invariant kernel for RKHS trading models, capturing scale-dependent nonlinear interactions in financial time series.
- 1/2026-current Argus: Multi-Strategy Meta-Allocation**
7-model systematic framework (trend, mean-reversion, dealer-flow, cross-asset carry, long-vol, equity factors, inflation-regime) under TSMOM-grade validation: walk-forward, stationary block bootstrap, look-ahead audits, pre-registered acceptance bars. Paper-deployed 3 models (GEX, TSMOM, Post-Panic Reversion) on IBKR; combined backtest Sharpe ~ 1.3 , $\sim 13\%$ annualized over 10y. Meta-allocation layer (vol budgeting, correlation budgeting, Bayesian Sharpe weighting) confirmed 1/N as deployment-optimal on current pool.

Current Position

- 8/2023-current PhD Candidate**, Southern Methodist University
- 8/2025-current Adjunct Professor**, Southern Methodist University
- 8/2025-current Quantitative Consultant**, Success Accelerators — design and implementation of quant strategies for proprietary trading

Education

- 8/2023-current PhD, Astrophysics**, Southern Methodist University — Advisor: Dr. Fred Olness
GPA: 3.583
- 9/2021-7/2023 MS, Physics**, Texas A&M University, GPA: 3.57 — Advisor: Dr. William G. Newton
Thesis: “Inference of whole neutron star EOS from combined astrophysical and nuclear observables”
- 8/2019-5/2021 BS, Physics (Astrophysics concentration)**, Texas A&M University–Commerce,
Magna Cum Laude, GPA: 3.75 — Advisor: Dr. Kent Montgomery

Organizations

2026-current **Traders@SMU - Quantitative Strategies Sector Head**
Developing kernel-method-based quantitative trading models;
designed and built the team's complete backtesting infrastructure.

Research

2025-current **Graduate Projects**
"From proton-neutron short range correlations to neutron star cooling"
Collaborators: William Newton, Fred Olness, Lami Suleiman

2023-2025 "SURGE collaboration: machine learning for nuclear cross section calculations"
Collaborators: Fred Olness

2021-2023 "Constraining nuclear symmetry energy using multimessenger resonant shattering flares"
Collaborators: Duncan Neill, David Tsang
"Comparison of methods for the inferred neutron skin thickness and
dipole polarizability of ^{208}Pb and ^{48}Ca "
Collaborators: Reed Essick, Philippe Landry, Achim Schwenk, and Ingo Tews
Master's Thesis: "Inference of whole neutron star EOS from combined astrophysical
and nuclear observables"

Publications

2021 "From neutron skins and neutron matter to the neutron star crust",
William G. Newton, **Rebecca Preston**, Lauren Balliet and Michael Ross
Physics Letters B 834, 137481
arXiv:2111.07969

2022 "Constraining Nuclear Symmetry Energy with Multi-messenger Resonant Shattering Flares",
Duncan Neill, **Rebecca Preston**, William G. Newton, and David Tsang
PRL 130, 112701
arXiv:2208.00994

In Prep "Comparison of methods for the inferred neutron skin thickness and
dipole polarizability of ^{208}Pb and ^{48}Ca ",
William G. Newton, **Rebecca Preston**, Reed Essick, Philippe Landry,
Achim Schwenk, and Ingo Tews

In Prep "Inference of whole neutron star EOS from combined astrophysical and nuclear observable",
William G. Newton, **Rebecca Preston**

In Prep "*A Causal Kernel for Relativistic RKHS in Options Markets*",
Rebecca Preston

Professional Development

June 2025 **CTEQ Summer School on QCD and Electroweak Phenomenology**
MSU East Lansing, MI

June 2024 **HEFTY (High-Energy FRontier Theory) Summer School**
Santa Fe, NM

May 2022 **Frontiers in Nuclear Astrophysics Conference and
Junior Researchers' Workshop**
University of Notre Dame, South Bend, IN

July 2022 **National Nuclear Physics Summer School**
Massachusetts Institute for Technology, Cambridge, MA

Sept 2022 **Ecole Joliot-Curie School for Nuclear Physics Summer School**
St. Pierre d'Oleron, France

Academic Honors

2021	Sigma Pi Sigma, honorary national physics society
2021	Magna Cum Laude
2020	President's List
2019, 2021	Dean's List

Awards and Fellowships

2025	NASA/Texas Space Grant Fellowship 2025-2026 - \$5,000.00
2023	NASA/Texas Space Grant Fellowship 2023-2024 - \$5,000.00
2022	1st Place - TAMUC Annual Research Symposium: Oral Presentation - \$250.00
2022	NASA/Texas Space Grant Fellowship 2022-2023 - \$5,000.00
2022	TAMUC Phys & Astr Department: Outstanding Graduate Student - \$200.00
2021	TAMUC Phys & Astr Department: Outstanding Undergraduate Researcher - \$200.00
2020-2021	National Science Foundation: Phys and Astronomy Scholarship for Success - \$6958.00
2019-2020	National Science Foundation: Phys and Astronomy Scholarship for Success - \$9681.00
2020	1st Place - Texas Section of the American Physics Society: Outstanding Undergraduate Presentation

References

Dr. William G. Newton

Associate Professor

Physics and Astronomy Department

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Dr. Kurtis Williams

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