

Robert Jenkinson Alvarez

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EDUCATION

London School of Economics and Political Science (LSE)

MSc Financial Mathematics (Distinction)

Sep 2023 – Jul 2024

- Black-Scholes; Interest Rate/Credit Risk-Hull-White/Vasicek/HJM; Stochastic Processes-Ito; Fixed Income; Portfolio Management.
- Alghathon (Top 2): Built LSTM on BTC/ETH returns with unconventional sentiment data: 1.2 OOS Sharpe, 54% directional accuracy.
- Analysed CRSP, TRACE/FISD and OptionMetrics across equities, credit and derivatives; yield-curve calibration and option hedging.
- Finite-difference PDE solvers, variance-reduced Monte Carlo and Euler SDE simulation, analysing stability and convergence.

University of Bath

BSc Mathematics (First-Class Honours)

Sep 2020 – Jul 2023

- Markov Processes; Martingales; Stochastic Systems; Discrete Probability; Machine Learning; Measure Theory; Statistics, Advanced Real/ Complex Analysis; Algebra; ODEs/Control Theory; PDEs/Vector Calculus; Numerical Analysis (97%).

QUANTITATIVE RESEARCH & TRADING EXPERIENCE

Quantitative Researcher

Sep 2024 – Present

Cross-Asset Hamiltonian Alpha Engine

- Discovered incremental cross-asset volatility signal beyond model-free implied variance, forecasting 20-day relative realised variance with 0.232 locked-test rank IC, date clustered $t=4.40$ and positive coefficients in 13/13 asset/month omission tests.
- Transformed option markets into arbitrage-consistent density, calendar and momentum states, achieving maximal primal/dual feasibility errors of $8.9 \times 10^{-7} / 2.1 \times 10^{-13}$, 100% projection convergence and 100% sigma-estimator completion.
- Designed a stochastic Port-Hamiltonian JEPA capturing non-linear surface dynamics beyond damped mechanics, attaining 0.365 out-of-sample relative-state innovation R^2 and 0.251 aggregate innovation R^2 against the train-fitted baseline at 40 observations.

Chebyshev Global Options Surface Engine

- Architected a global martingale-density/calendar-flow engine with a surface enforcing density positivity, unit mass/mean, strike convexity and calendar monotonicity with 99.77-100% inside-spread coverage and 0 static-arbitrage violations on 720x61 grids.
- Outperformed independent SANOS on 100% of 272 material-stability comparisons, reducing gamma-curvature q95 by 87.5%, gamma finite-difference sensitivity by 81.1%, local-variance strike roughness by 82.7% and calendar-curvature RMS by 46.7%.
- Compiled the certified global surface into analytic Chebyshev price/Greek caches, accelerating price-plus-Greeks evaluation by 11.1-14.4x, decreasing model size by 58-83% and cutting local-variance invalid-domain mass by 98.8-99.4% versus SANOS.

Machine Learning Researcher, NeurIPS 2026

Oct 2025 – Present

- Developed HamJEPA [1], a phase-space JEPA with symplectic leapfrog/non-isotropic priors, deriving an optimal prior and isotropy bound, beating LeJEPA/SIGReg linear-probe/kNN-20 by 10.6/6.5 (80 ep.) on CIFAR-100 and 7.52/4.82 (45 ep.) on ImageNet-100.
- Proved state-dimension and finite-bit lower bounds for cumulative learning, quantifying information beyond predictions [2].

Optiver

Derivatives Quant Trading & Market Making Trainee

Oct 2023 – Nov 2023

- Developed Black-Scholes options market-making algorithms, adapting bid-ask spreads to liquidity and order-book depth, reducing daily PnL variance by 30% and 95% VaR by 25% via delta-hedging and gamma rebalancing (IOC orders).
- Improved order placement latency by 40% with a priority queue architecture, using real-time Greeks caching for high-frequency updates and pruning low-liquidity strike/expiry pairs in a 3-person team on Optibook's live simulated exchange.

SELECTED PUBLICATIONS AND MANUSCRIPTS

- [1] Beyond Isotropy in JEPAS: Hamiltonian Embeddings and Symplectic Prediction. NeurIPS 2026: main-track accept – Poster.
- [2] Prediction is not a Sufficient Memory State. ICLR 2027 – Under Review.
- [3] Variational rigidity for alternating symplectic billiards. Submitted to Annals of Mathematics, 2026.
Resolved an open billiard problem, proving integrability forces an inner-product ellipse without reversibility or finite symmetry.
- [4] Rational-slope rigidity with identity holonomy through finite-amplitude resonant cells. Submitted to ETDS, 2026.
Established one-dimensional rigidity under identity holonomy via finite-amplitude classification of resonant variational cells.
- [5] Minimizing foliations: counterexamples and common-volume rigidity. Submitted to Annals of Mathematics, 2026.
Answered the higher-dimensional question negatively and derived an exact rigidity criterion under common invariant volume.
- [6] Arbitrage-free option price surfaces via Chebyshev tensor bases and a Hamiltonian fog post-fit. arXiv:2512.01967, 2025.
Built arbitrage-free surfaces via CVXPY/OSQP convex QP, achieving >98% inside-spread, <1% no-arb violations with 3D fog noise.

SKILLS & INTERESTS

- Technical Skills: Python (NumPy, Pandas, PyTorch, TensorFlow, SciPy, QuantLib, OSQP), MATLAB, R, SQL, LaTeX.
- Communication: Tutored metric spaces & stochastic processes to 5 university students, improving pass rates by 10%.
- Languages / Interests: Native Spanish & English (CPE C2). Piano (ABRSM Grade 8), Giveaway chess (2220 Elo, top 100 worldwide).