

Curriculum Vitae

Bee Rosa Davis

Researcher and Software Engineer

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Brief Biography

Bee Rosa Davis is a researcher and software engineer working on experimental graph algorithms, database systems, and geometric approaches to machine learning. Her current work studies how graph representation and stored statistics affect shortest-path computation. Her broader interests include interpretable models, semantic code analysis, and reproducible evaluation of research software.

Education

Brown University - MS, Digital Forensics

Spelman College - BA, Logic

Professional Appointments

Jan. 2026 - present	Davis Geometric - Founder & Principal Researcher Independent research and software development in graph algorithms, data systems, and geometric models of computation.
Jan. 2024 - Dec. 2025	IBM X-Force Red - Principal Adversarial Intelligence Engineer • Led architecture of VIVID, an adversarial analytics platform for command-and-control analysis, attack-chain reconstruction, and anomaly triage. • Created Shadow Clone Jutsu for vulnerability discovery through semantic code analysis, and PhantomBridge for policy-governed threat-emulation training. • Integrated language models and LangGraph into workflows for threat decoding, signature matching, and hypothesis generation from command output.
2023 - 2025	NASA, Johnson Space Center - Principal Software Engineer Via MRI Technologies / Navteca • Designed gRPC telemetry pipelines with adaptive embedding-format switching and semantic translation across data streams. • Built precision-adaptation and deterministic-rollback mechanisms, with memory-error safeguards for edge-computing workflows. • Developed software-bill-of-materials runtime verification for telescope data infrastructure and patch-based vulnerability analysis for flight software.

Jan. 2022 - Aug. 2023	Humana - Director of Security Engineering • Led security engineering for healthcare data systems, including encrypted data pipelines on Azure Kubernetes Service, Azure Data Factory, Databricks, and SQL Database. • Incorporated privacy, interpretability, and fairness requirements into analytics and machine-learning workflows.
2020 - 2022	Eaze - Head of Information Security • Established security monitoring and detection standards, incident-response runbooks, and evidence-collection practices.
2019 - 2020	Action - Head of InfoSec & Chief Privacy Officer • Built key-management-backed pipelines and data catalogs for regulated analytics, with documentation for sensitive health-data systems.
2018 - 2019	NASA, Headquarters ITCD - Principal Engineer Via Navteca • Modernized AWS and Kubernetes infrastructure with approved system images, container controls, and policy-as-code baselines. • Piloted secure/measured boot and TPM attestation; implemented GPU admission controls and network policies.
July 2012 - Jan. 2016	Axiom88 - Head of Machine Learning & Security Engineering • Developed anomaly-detection and geospatial machine-learning systems for government applications, integrating operational data with existing intelligence workflows.
Aug. 2009 - July 2012	Pandora Radio - Principal Engineer, Machine Learning & Ad Automation • Developed machine-learning systems for audience segmentation, contextual prediction, and advertising-yield optimization. • Built streaming engagement analytics and user-behavior models.

Current Research

Sequential shortest-path algorithms

- Developed a Rust experimental harness to study bucket-width selection, duplicate work, and local lookahead in sequential single-source shortest-path computation.
- Compared bucket-based solvers with binary-heap Dijkstra across synthetic graph families and DIMACS road networks, using correctness checks, operation counts, and controlled timing experiments.
- Released a working paper and reproducibility artifact with implementation code, raw results, and an interactive explanation of the experiments.
- Current extensions examine whether stored graph statistics and reusable light/heavy edge partitions reduce repeated query work, accounting for preparation costs.

Paper and artifact: <https://github.com/nurdymuny/sssp-gigi>

GIGI: graph storage and algorithm preparation

- Developed a Rust database engine organized around keyed records, associated fields, and indexes, with persistence and statistical query operations.
- Investigating the use of statistics maintained by the store, including mean edge weight, to supply solver parameters without repeatedly scanning the graph.
- Implemented an experimental path for storing and recovering per-vertex edge-partition information, with checks against directly computed partitions and shortest-path distances.

Source code: <https://github.com/nurdymuny/gigi>

Research Software and Live Applications

Selected software developed through Davis Geometric, with public interfaces and project demonstrations.

GIGI - Database engine and statistical queries

Rust database engine using a fiber-bundle representation: keys identify records and associated fields hold their values. Supports indexes, persistent snapshots, a query language, and statistical operations. Maintains numeric summaries during ingestion for reuse by downstream algorithms. Current shortest-path experiments use the mean edge weight and stored per-vertex edge partitions to reduce repeated preparation and scanning.

<https://davisgeometric.com/gigi> | <https://github.com/nurdymuny/gigi>

DHOOM - Structured-data serialization

Human-readable serialization format for compact structured records. Uses shared field headers, arithmetic sequences, default values, and delta encoding to reduce repeated information while supporting JSON round trips. Provides an encoding and decoding specification, implementation libraries, and a browser playground comparing JSON, TOON, and DHOOM representations. Applications include data exchange and structured context for language models.

<https://dhoom.dev/>

MARCELLA - Source-grounded intelligence

Research system separating a GIGI-backed source library, a support gate, and a language model for phrasing responses. Retrieves inspectable passages, attaches supporting sources, and declines questions unsupported by the library. Source material can be updated without retraining the entire system. Related research investigates geometric transport for composing retrieved sections and parallel transport for sequence modeling.

<https://www.davisgeometric.com/marcella>

HELICITY - Market structure and order-flow analysis

Financial analytics platform examining market structure through geometric and topological measures. Represents financial flows as graphs and studies circulation and spectral connectivity across macroeconomic series, futures bars, and order books. The LAMINAR application analyzes order-flow structure in real time to distinguish directional flow from churning activity.

<https://helicity.io>

PRISM - Payment reconciliation

Reconciliation application spanning SWIFT, ISO 20022, ACH, card, and real-time payment records. Encodes amount, date, counterparties, transaction type, and reference text into a common representation to compare records despite naming differences, fees, and schema variation. The public demonstration generates transaction data and exposes matching decisions; the architecture includes signed decision records and deterministic replay for examining the evidence behind individual matches.

<https://useprism.sh>

MIRADOR - Pharmacokinetic modeling

Computational pharmacology research application studying how tissue compartments, physiological barriers, and organism characteristics affect modeled drug exposure and efficacy. Uses published pharmacokinetic inputs to compare drug-organism-compartment combinations. Interactive examples cover bone MRSA, tuberculosis, meningitis, and HIV reservoirs, exposing comparative predictions for further validation against experimental or clinical data.

<https://usemirador.sh>

PARALLAX - Laboratory research platform

Platform bringing together HERALD, GEODESIC, and TESSERA for viral surveillance, cancer evolution, and bacterial genomics. Provides laboratory data uploads, interactive research reports, and PDF export through a shared browser interface. Currently used by five laboratories worldwide.

<https://parallax.sh/>

HERALD - Viral surveillance

Research software focused on antigenic drift and variant tracking from viral sequence data. The PARALLAX interface accepts sequence uploads and presents reports organized around variant comparisons, mutations, drift indicators, and surveillance priorities. Develops geometric representations for studying how viral populations change over time.

<https://parallax.sh/>

GEODESIC - Cancer evolution

Cancer-genomics research software investigating clonal structure, evolutionary trajectories, and resistance emergence. The PARALLAX interface accepts variant-call uploads and organizes reports around genomic alterations, variant allele fractions, and clonal architecture. Explores geometric representations of tumor evolution to support research into progression and treatment response.

<https://parallax.sh/>

TESSERA - Bacterial genomics and antimicrobial resistance

Bacterial-surveillance research software focused on antimicrobial resistance, plasmids, and outbreak clustering. The PARALLAX interface supports sequence uploads and structured reports covering resistance genes and relationships among isolates. Studies geometric representations for comparing bacterial populations and investigating the spread of resistance.

<https://parallax.sh/>

CHIIRO - Plasma stability diagnostics

Plasma-physics research application exploring magnetohydrodynamic stability through spectral diagnostics and geometric descriptions of confinement. Investigates how magnetic-field topology and curvature relate to stability indicators. The public interface presents the diagnostic framework and computational demonstrations linking field geometry to stability analysis.

<https://chihiro.sh>

ICARUS - Guidance, navigation, and control

Guidance, navigation, and control research platform representing autonomous-system state with fiber bundles. Expresses state estimation, trajectory planning, fault detection, and envelope-awareness tasks through queries against GIGI. Includes work on reachable-state prediction and a monitoring component designed to assess operating envelopes without issuing actuation commands.

<https://davisgeometric.com/icarus>

KRAKEN - Maritime sensor fusion

Maritime research demonstrator combining information across sensor modalities for threat assessment. Explores geometric signature matching, translation between sensor representations, and tail-risk-aware fusion. The public blind-test demonstrator emphasizes inspection of detection behavior and replay of the decision record, using linked audit artifacts to trace how evidence contributes to a result.

<https://davisgeometric.com/kraken>

Technical Background

Languages and tools: Python, Rust, C++, SQL, Bash; PyTorch, NumPy, SciPy, JAX; Kubernetes, gRPC, AWS, Azure, CUDA.

Methods: Algorithm benchmarking, correctness validation, ablation studies, semantic code analysis, differential geometry, and spectral methods.

Publications

Books

Geometric Intelligence - seven-book series

Technical exposition, engineering case studies, and personal narrative connecting geometric ideas with data systems, scientific modeling, and control. Volumes listed in series order.

Readership: 100 copies sold across the series through Amazon and offline sales combined, as of September 2026.

1. B. R. Davis, *Hidden Variable: Unlocking Patterns in a World Obsessed with Structure*, (Geometric Intelligence, Vol. 1), independently published, 2025.

Engineering memoir examining pattern recognition and information preservation across representations, with examples from telemetry, payment systems, and institutional decision-making.

<https://a.co/d/ia1s3x3>

2. B. R. Davis, *The Geometry of Sameness: Riemannian Equivalence of Translation and Distance for Semantic Detection*, (Geometric Intelligence, Vol. 2), independently published, 2025.

Examines translator graphs, Riemannian distance, and representation error bounds, with case studies in identity verification, payment reconciliation, telemetry drift, and content moderation.

<https://a.co/d/e7rGkcF>

3. B. R. Davis, *The Geometry of Medicine: A Geometric Framework for Understanding Disease*, (Geometric Intelligence, Vol. 3), independently published, 2025.

Explores geometric models of viral drift, cancer detection, and antimicrobial resistance through the HERALD, GEODESIC, and TESSERA research systems; emphasizes uncertainty, traceability, and abstention.

<https://a.co/d/eIVqMku>

4. B. R. Davis, *The Geometry of Fuel*, (Geometric Intelligence, Vol. 4), independently published, 2026.

Combines personal narrative with proposed connections among inference, configuration-space geometry, theoretical physics, and energy, including speculative directions for modeling and further investigation.

<https://a.co/d/0a7HjrLQ>

5. B. R. Davis, *The Geometry of War*, (Geometric Intelligence, Vol. 5), independently published, 2026.

Examines geopolitical risk through proposed geometric models of economic interdependence and political trust. Historical case studies explore divergence between continuing material flows and weakening cooperation.

<https://a.co/d/0a6l4Rpv>

6. B. R. Davis, *SUPERFLUID: The Geometry of Velocity*, (Geometric Intelligence, Vol. 6), independently published, 2026.

Studies critical velocity, vortex formation, and onset phenomena through geometric models and computational examples, including comparisons across atomic species and obstacle conditions.

<https://a.co/d/01ELdDm8>

7. B. R. Davis, *The Geometry of Flight: A Geometric Reading of Guidance, Navigation, and Control*, (Geometric Intelligence, Vol. 7), independently published, 2026.

Developed alongside ICARUS; covers Kalman filtering, Lyapunov methods, adaptive control, GNSS/INS fusion, and SLAM. Six Python labs connect bundle storage, simulation, sensor fusion, and guidance.

<https://a.co/d/01Cgy4LT>

Working Papers and Preprints

Algorithms, data systems, and scientific applications

1. B. R. Davis, *Bucket Width, Duplicate Work, and Local Lookahead in Sequential Shortest Paths*, Working paper and reproducibility artifact, 2026.

Studies bucket width, duplicate-work suppression, and local lookahead in sequential shortest paths. Compares mean-edge-weight selection with searched widths and other defaults across synthetic families and DIMACS road networks. The reproducibility artifact includes Rust implementations, raw timings, operation counts, and correctness checks, characterizing when inexpensive parameter choices are competitive and where their advantage ends.

<https://github.com/nurdymuny/sssp-gigi>

2. B. Davis, *LAMINAR: Measuring an Order-flow Coherence Label across Twelve Futures Instruments*, Working paper, SSRN, September 9, 2026.

Evaluates a session-relative order-flow classifier across twelve futures instruments, 36.5 million trades, and 194 trading-day sessions. Uses 70 control executions to distinguish label incidence, perturbation sensitivity, and dependence on surrounding context. Surrogate inputs can produce comparable or higher incidence, motivating careful interpretation of the coherence label. The study concerns measurement and classifier controls rather than predictive returns or execution performance.

<https://ssrn.com/abstract=7439319> | <https://doi.org/10.2139/ssrn.7439319>

3. B. R. Davis, *Geometric Encryption: Property-Preserving Database Encryption via Gauge Invariance on Fiber Bundles*, Preprint, Zenodo, 2026.

Models property-preserving encryption as transformations of database value spaces and characterizes compatible invariant and equivariant queries. Describes exact client recovery for twelve analytical aggregate operators on Affine-encrypted columns, mode-specific leakage profiles, and parser-enforced invariant queries. The GIGI implementation provides reproducibility examples and algebraic checks; per-mode security proofs and full empirical evaluation are reserved for companion work.

<https://doi.org/10.5281/zenodo.20438796>

4. B. R. Davis, *The Database Is the Controller: Fiber-Bundle GNC as Query Execution*, Preprint, Zenodo, 2026.

Presents the ICARUS architecture, storing vehicle state and reachable-state bounds as fiber-bundle records and expressing estimation, planning, tracking, and fault detection through geometric query primitives. Describes ingestion-time quaternion normalization checks, a curvature-derived confidence score, and a floored controller-gain schedule. Examines query expressibility and stability under the stated control-model assumptions.

<https://doi.org/10.5281/zenodo.19702067>

5. B. R. Davis, *The Spectral Geometry of Plasma Confinement: A Davis Field Equations Framework for Fusion Stability, Transport Bottlenecks, and Cross-Domain Universality*, Preprint, Zenodo, 2026.

Numerical study of ideal-MHD and resistive stability using spectral and energy-principle methods. A twenty-profile scan reports a wall-free external-kink critical normalized-beta/internal-inductance ratio of 0.163 ± 0.004 (2.4% coefficient of variation) in natural units. The observed profile consistency is a numerical result, not a topological derivation. Connects the experiments to CHIHRO diagnostics while identifying standard closure assumptions and open cross-validation tasks.

<https://doi.org/10.5281/zenodo.21110010>

Mathematical models and earlier systems research

6. B. R. Davis, *On the Infeasibility of Sequential Control in Pyramidal Construction at Old Kingdom Precision*, Preprint, Zenodo, 2026.

Analyzes translation, yaw, and tilt-error accumulation when each construction course inherits its reference frame from the preceding course. Contrasts this sequential model with redundant, fixed-datum network adjustment. Develops a structure-as-datum hypothesis and testable precision-gradient predictions; the model constrains candidate control protocols rather than establishing which historical method was used.

<https://doi.org/10.5281/zenodo.20123423>

7. B. R. Davis, *Zero Does Not Exist: A Geometric Foundation for the Natural Numbers*, Preprint, Zenodo, 2026.

Constructs a graph-based domain that excludes the empty graph while retaining a singleton. Presents a shifted embedding of the Peano naturals into canonical path graphs, with addition preserved by concatenation and the singleton serving as identity. Examines how non-path connected graphs add structural information beyond the embedded arithmetic.

<https://doi.org/10.5281/zenodo.19477365>

8. B. R. Davis, *The Lift Unification: Why Six Pillars of Probability Fail for the Same Geometric Reason*, Preprint, Zenodo, 2026.

Uses the standard probability lift ratio to organize examples involving conditional probability, dependence, Bayes' rule, and conditional expectation. Reframes familiar intuition errors through event coupling and base-rate asymmetry, including diagnostic-testing and dice examples. Proposes a geometric interpretation of these effects within the ordinary probability calculations.

<https://doi.org/10.5281/zenodo.19344768>

9. B. R. Davis, *Adaptive Embedding Format Switching and Semantic Translation in High-Volume Telemetry Systems*, Working paper, Zenodo, 2025.

Introduces Adaptive Multi-Vector Correlation, selecting dense, sparse, or quantized telemetry representations using signal characteristics and task feedback. Examines representation drift, translation between embedding spaces, and rollback for traceability. Reports an evaluation on NASA's MODIS archive, studying storage efficiency while retaining information needed for anomaly detection.

<https://doi.org/10.5281/zenodo.17211403>

10. B. R. Davis, *BRIDGE: Deterministic Replay for Hybrid AI-Assisted Operational Procedures via VFS Harmonization*, Working paper, Zenodo, 2025.

Converts operational-security transcripts into replayable procedures by grounding file-observing commands in virtual-filesystem state and recording mutations in an append-only log. Combines correction filtering, prerequisite checks, and graph-based suggestions with bounded language-model assistance. Examines observational equivalence for specified filesystem operations and reports an evaluation on 147 transcripts.

<https://doi.org/10.5281/zenodo.17313876>

11. B. R. Davis, *The Field Equations of Semantic Coherence: A Geometric Theory of Meaning, Curvature, and Reasoning in Transformer Architectures*, Working paper, Zenodo, 2025.

Proposes geometric relationships among transformer representations, attention, context limitations, curvature, parallel transport, and holonomy. Organizes definitions and proposed mechanisms for semantic evolution and reasoning failure. The cited release presents the framework and dependency structure, reserving proofs and application-specific implementations for subsequent work.

<https://doi.org/10.5281/zenodo.17771796>

Software systems, security, and infrastructure

12. B. Davis, *PRISM v4.1: Risk-Aware Multi-Rail Payment Reconciliation with Bounded Semantic Translation and Spectral Consensus - Adapting NASA Safety-Critical Systems to Financial Infrastructure*, Working paper, Zenodo, 2025.

Describes multi-rail payment reconciliation using adaptive representations, bounded semantic translation, consensus, and deterministic replay, with specifications for decision provenance and model-risk review.

<https://doi.org/10.5281/zenodo.17489610>

13. B. Davis, *Swarm Symphony: Multi-Agent Orchestration with Consensus Visualization*, Working paper, Zenodo, 2025.

Separates parallel agent proposals from serialized execution to support replayable security workflows. Describes consensus, policy gates, mutation logging, and visualization of coordination.

<https://doi.org/10.5281/zenodo.17429650>

14. B. R. Davis, *Explainable Multi-CVE Family Discovery via CWE/CAPEC Graph Semantics*, Working paper, Zenodo, 2025.

Groups vulnerabilities using CWE/CAPEC relationships, sparse representations, and graph diffusion. Produces traceable family explanations and compares structural grouping with text-based clustering.

<https://doi.org/10.5281/zenodo.17211494>

15. B. R. Davis, *GPU Behavior Genome: Stable, Change-Sensitive Embeddings for Fleet-Level GPU Telemetry in NASA HPC*, Working paper, Zenodo, 2025.

Studies self-supervised GPU telemetry embeddings designed to remain stable across routine workload changes while responding to configuration, firmware, and cooling changes, with operator-facing attribution.

<https://doi.org/10.5281/zenodo.17211504>

16. B. R. Davis, *Gemini Drift: Automated Patch-Twin Discovery for NASA Flight Software via Semantic Graph Analysis*, Working paper, Zenodo, 2025.
 Uses semantic code graphs to identify unpatched variants of corrected vulnerabilities in flight software. Combines patch similarity, candidate ranking, and checks of patch-intended invariants.
<https://doi.org/10.5281/zenodo.17211531>
17. B. R. Davis, *SBOM $\leftrightarrow$ Runtime Concordance Vector (SRCV): Semantic Proof of Build Integrity for NASA JWST Science Platforms*, Working paper, Zenodo, 2025.
 Aligns signed software bills of materials with observed runtime components using embeddings, assignment methods, and policy rules. Produces coverage scores and evidence for investigating mismatches.
<https://doi.org/10.5281/zenodo.17211556>
18. B. R. Davis, *Dual-Torus Architecture in SHA-256: Carry-Field Tomography Reveals Asymmetric Subsystem Design*, Preprint, Zenodo, 2025.
 Analyzes modular-addition carry events and correlations across SHA-256 subsystems. Proposes a geometric account of mixing and subsystem coupling, with exploratory implications for cryptanalysis.
<https://doi.org/10.5281/zenodo.18028911>

Language models, representation, and semantic detection

19. B. R. Davis, *Sheaf Composition: The Geometry of Creativity*, Preprint, Zenodo, 2026.
 Studies constrained composition of compatible text sections in Marcella. Evaluates path order, holonomy, topic retention, and contradiction controls, with a Rust database operator checked against a Python reference.
<https://doi.org/10.5281/zenodo.20185331>
20. B. R. Davis, *Pure-Fiber Language Modeling: Sequence Prediction by Geometric Query on a Real Fiber Bundle*, Preprint, Zenodo, 2026.
 Investigates language modeling through indexed corpus statistics, explicit linguistic coordinates, and geometric retrieval. Compares classical smoothing methods and fiber-based residuals using held-out evaluations and shuffled controls.
<https://doi.org/10.5281/zenodo.20151450>
21. B. R. Davis, *Geometric Token Transport: Riemannian Parallel Transport as Sequential State Accumulation in Neural Sequence Processing*, Preprint, Zenodo, 2026.
 Develops a neural sequence model based on learned transport and accumulated state. Studies parallel-prefix execution, geometric gating, and language-model benchmarks as alternatives to attention-based sequence processing.
<https://doi.org/10.5281/zenodo.18883346>
22. B. R. Davis, *Spectral Geometry of Transformer Cognition: Heat Kernel Analysis Reveals Functional Organization in Language Models*, Preprint, Zenodo, 2025.
 Uses attention graphs, Laplacian spectra, and heat kernels to investigate transformer layers, task-dependent computation, and retrieval behavior across language models.
<https://doi.org/10.5281/zenodo.17783723>

23. B. R. Davis, *The Geometry of Generative Reasoning: Gauge-Theoretic Transformers as Realizations of Semantic Sameness*, Preprint, Zenodo, 2025.

Proposes geometric controls for transformer reasoning, including residual adapters, subspace projections, and curvature-informed attention-head pruning. Separates diagnostic calibration from subsequent inference.

<https://doi.org/10.5281/zenodo.17718659>

24. B. R. Davis, *The Geometry of Sameness: An ε -Equivalence of Translation and Distance*, Preprint, Zenodo, 2025.

Studies conditions connecting translator graphs and manifold-based semantic detection, with categorical constructions and explicit error-budget transfer under bounded local distortion assumptions.

<https://doi.org/10.5281/zenodo.17642422>

Statistical methods and scientific applications

25. B. R. Davis, *Curvature Meta-Analysis: A Geometric Refinement of Heterogeneity*, Preprint, Zenodo, 2026.

Studies nonlinear variation in effect sizes across moderators using local Hessian estimates, bootstrap reliability checks, synthetic controls, and reanalyses of three published meta-analysis datasets.

<https://doi.org/10.5281/zenodo.20938452>

26. B. R. Davis, *PHAETHON - A Curvature-of-Section Formulation of Multi-Machine Stability*, Preprint, Zenodo, 2026.

Relates a curvature operator to classical small-signal power-system stability and studies pole-slip energy barriers. Includes IEEE benchmark checks, a reproducibility kit, and pre-registered event-level tests.

<https://doi.org/10.5281/zenodo.20273563>

27. B. R. Davis, *The Geometry of Delivery: A Uniqueness Theorem for Section Coherence over Stratified Barrier Bundles*, Preprint, Zenodo, 2026.

Develops an axiomatic model of transport across tissue barriers and a proposed coherence functional. Compares model implications with published pharmacokinetic studies under explicit compartment and obstruction assumptions.

<https://doi.org/10.5281/zenodo.19321978>

28. B. R. Davis, *MIRADOR: Manifold of Immune Receptors And Drift-Optimized Responses : Geometry-First Co-Embedding for Vaccine and Antibody Design*, Preprint, Zenodo, 2026.

Proposes joint geometric representations of antigens and receptors for vaccine and antibody-panel design, with coverage bounds conditional on geometric, binding-model, sampling, and neutralization-linkage error budgets.

<https://doi.org/10.5281/zenodo.19142195>

29. B. R. Davis, *HERALD: High-resolution Early Recognition of Antigenic Landscape Divergence*, Preprint, Zenodo, 2025.

Develops a geometric viral-surveillance framework linking sequence embeddings with antigenic drift. Includes retrospective sequence analyses, distortion audits, calibrated signals, and explicit error budgets.

<https://doi.org/10.5281/zenodo.17831313>

30. B. R. Davis, *Predicting Interstate Conflict 72 Days in Advance: A Topological Approach to Weaponized Interdependence*, Preprint, Zenodo, 2025.

Proposes an interstate-conflict indicator based on economic integration and diplomatic alignment. Reports a historical evaluation; its lead-time claims concern the manuscript's retrospective analysis.

<https://doi.org/10.5281/zenodo.17905678>

Graph structures, geometry, and conceptual models

31. B. R. Davis, *The Bra Strap Principle: Flat Base Propagation in Fiber Bundles over S^1* , Preprint, Zenodo, 2026.

Examines how trivial holonomy and path-independent transport determine a global parallel section over a circular base, using ribbon geometry as an illustrative design model and computational test case.

<https://doi.org/10.5281/zenodo.20273573>

32. B. R. Davis, *The Subgraph Lattice Theorem and Geometric Partition Counting*, Preprint, Zenodo, 2026.

Studies partitions of graph vertices into connected induced blocks, including monotonicity under edge addition and counts for trees, cycles, and complete graphs.

<https://doi.org/10.5281/zenodo.19503065>

33. B. R. Davis, *Why the Universe Looks Random (And Isn't): A Topological Phase Transition at the Edge of Observability*, Preprint, Zenodo, 2026.

Explores observability of compact spatial topology through flat connections, monodromy, and proposed horizon criteria. Develops a theoretical interpretation of cosmic-microwave-background statistics.

<https://doi.org/10.5281/zenodo.19038092>

34. B. R. Davis, *The Cognitive Geometry Correspondence: Human Perception as Riemannian Computation*, Preprint, Zenodo, 2026.

Proposes correspondences between perception, memory, attention, and Riemannian geometry. Uses Marcella as a computational illustration; the work presents a modeling hypothesis rather than an established neuroscientific account.

<https://doi.org/10.5281/zenodo.18883387>

35. B. R. Davis, *The Double Cover Principle: Every Circle Carries Two Circumferences*, Preprint, Zenodo, 2026.

Examines circle and projective-line representations, double-cover relationships, state overlap, and normalized chord distance, with proposed applications to geometric phase and physical observables.

<https://doi.org/10.5281/zenodo.18895462>