Noah Parsons
STEM Research Student | Computational Physics & Machine Learning

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Profile Summary

Tenth-grade dual-enrollment student leading university-level research in computational physics, machine learning, and theoretical framework development.

Innovating a novel domain-specific language (DSL) for unified physical system modeling, integrating algebraic topology, category theory, and neural-symbolic AI, with planned open-source release.

Proven ability to drive complex projects from conception to deployment, including advanced simulations and real-world problem-solving tools (e.g., 3D photogrammetry studio, rocket trajectory simulator).

Actively collaborating with university faculty on research aiming for publication; pursuing technical assistant roles with leading researchers.

Education

Newcastle High School & Eastern Wyoming College | 2024 - 2028 (Expected)

Unweighted GPA: 4.00

Dual Enrollment: Pursuing Associate's of Science degree (completion by 2028), completing college-level coursework in Physics, Chemistry, Advanced Biology, College Algebra, and Statistics.

Self-Directed Advanced Learning: MIT OpenCourseWare (Linear Algebra, Advanced Mathematics), EdX Certifications (Multiple university-level STEM courses).

STEM Lyceums Participant: 2024 - Present - Member of prestigious virtual STEM mentorship program, engaging in advanced interdisciplinary discussions and career pathway exploration.

Research & Advanced Technical Projects

Independent Research Project: Unified Symbolic-Topological Framework for Physical Systems | 2025 - Present

Developing a rigorous, interdisciplinary framework that unifies symbolic mathematics, algebraic topology, type theory, and machine learning to represent, predict, and control physical systems.

Designing a novel domain-specific language (DSL) and compiler toolchain modeling physical laws using advanced constructs:

Sheaves and Cosheaf Cohomology for gluing local observables.

Category Theory and Categorical IR for abstracting laws and systems.

Neural-Symbolic Transformers for pattern and physical law discovery.

Game-Theoretic Multi-Agent Control for dynamical evolution.

Incorporating Symbolic PDE Solvers, Type & Unit Inference, Quantum-Classical/Thermodynamic Constraints, and Topological AI.

Building a LaTeX-style DSL with type-checking compiler and theorem prover integration, with plans for an interactive demo and open-source release.

Research Collaboration with University Faculty | 2025 - Present

Collaborating with Dr. Khalifah of Stony Brook University on advanced research, targeting peer-reviewed publication.

Actively establishing partnerships with faculty at South Dakota School of Mines & Technology (SDSMT) for technical assistant and project collaboration opportunities in computational astroparticle physics (Dr. Bai, Dr. Plum).

High-Impact Applied Physics & Engineering Projects | 2025

3D Photo Modeling Studio: Engineered and deployed a web-based photogrammetry studio to enable accessible 3D scanning from photos, addressing a peer's need. (Link: https://photo-modeling-studioip.vercel.app/)

Sugar Rocket Trajectory Simulation: Developed a Streamlit-based interactive simulation for sugar rocket trajectory modeling, incorporating advanced physics principles (thrust, drag, mass change) to aid peer understanding. (Link: https://sugar-rockets-simulation-8qrnjjzm58w4u8dacnedtz.streamlit.app/)

Renewable Energy Power Plant Simulation: Designed a comprehensive 3D rendering and 47-page technical analysis of a renewable energy facility, integrating ML models for energy optimization. Conducted outreach to fossil and renewable energy plants for data, informing optimal resource integration.

Advanced Physics Simulation (Blender/Python): Created a 3D Blender simulation of Sphero collision dynamics, designing and comparatively analyzing a force minimization device to demonstrate impact reduction.

Neutrino & Particle Physics Masterclasses | 2025

IceCube International Masterclass (SDSMT): Analyzed real-world neutrino data from the South Pole, implementing Python-based data science techniques to identify cosmic ray signatures and compare with Monte Carlo simulations.

QuarkNet International Neutrino Masterclass (SURF): Studied the Deep Underground Neutrino Experiment (DUNE), analyzing neutrino oscillation data with Python in Google Colab to statistically prove neutrino oscillation evidence.

Competitive Programs & Honors

RSI Program Manager Consultation: Scheduled meeting (Fall 2025) with RSI Program Manager based on direct referral.

University of Wyoming STEM Academy: June 15-22, 2025

Young Talents Lab: Fall 2025

Technical Skills

Programming Languages: Python (Advanced - NumPy, Pandas, scikit-learn, TensorFlow/PyTorch, Streamlit, web frameworks), Java (Intermediate), HTML/CSS (Intermediate).

Specialized Software/Tools: Google Colab, Blender, Git, LaTeX, Monte Carlo simulation frameworks, Symbolic Mathematics (SymPy), Theorem Proving Systems.

Mathematical Expertise: Linear Algebra (MIT OCW), Calculus, Statistics, Topology, Category Theory, Type Theory, Differential Equations, Algebraic Topology, Sheaf Theory.

Research Methodologies: Independent theoretical framework development, experimental design, scientific documentation, collaborative research, domain-specific language (DSL) development, compiler design, machine learning model building & training.

Key Competencies

Research & Innovation: Leading novel theoretical and applied research, cross-disciplinary problem-solving, developing publishable work.

Technical Proficiency: Advanced programming, complex system design, data analysis, and scientific simulation.

Collaboration & Communication: Professional correspondence, scientific presentation, and effective teamwork.