William Chuang

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Summary of Qualifications

- **Strategic Thinker (INTJ)**: Focused on long-term, high-impact solutions in AI-driven cryptanalysis, OSINT, and cybersecurity.
- **Advanced Math & Physics:** Deep expertise in hyperbolic geometry, Kleinian groups, Galois theory, crucial for secure algorithm design.
- **Robust R&D:** 10+ years at respected institutions (Arizona, SFSU, Penn State, NTU), applying theoretical methods to practical challenges.
- **Security & Cryptography:** Applied curvature, limit sets, and Galois groups in post-quantum encryption and secure data protocols.
- **OSINT & Cybersecurity Research:** Self-studying Open-Source Intelligence (OSINT), pentesting, network forensics, and adversarial ML applications in threat detection.
- **Machine Learning & Data Security:** Applying ML models to system log analysis, TCP/IP traffic inspection, firmware integrity verification, and network anomaly detection.
- **Computational Proficiency:** Python (NumPy, scikit-learn, PyTorch), R, C/C++, Java, Lisp, Mathematica, Linux/Bash scripting, and reverse-engineering low-level firmware; built large-scale cryptography tools.

Education

University of Arizona (Expected Spring 2025)
M.S. in Mathematics, advanced Ph.D.-level coursework

San Francisco State University (Spring 2022)
M.A. in Mathematics; Thesis on Schottky groups (Advisor: Dr. C.-K. Lai)

University of San Francisco (Fall 2018)
B.S. in Mathematics, Minor in Computer Science, GPA: 3.88/4.00, Honors

Core Competencies

Mathematical Cryptography & Security:
Hyperbolic geometry, Kleinian groups, post-quantum cryptography, topological vulnerabilities.

Data Analysis & Machine Learning:
Transformer architectures (multi-head attention), autoencoders, geometric/topological ML approaches.

Algorithm & HPC Development:
Python/C++ for large-scale data, GPU-accelerated ML, system-level optimization.

Research & Technical Writing:
Multiple publications/presentations; formal proof tools (Lean 4, LLMs).

AI-Augmented Intelligence Analysis & OSINT Automation:
Developing transformer-based (local LLM) AI agents trained on intelligence cycle methodologies (e.g., Heuer's structured analysis, HUMINT techniques) for real-time data fusion, deception detection, and adversarial influence modeling.

Human Factor Security & OSINT:
Defending against psychological manipulation, decoding body language, behavioral profiling, lie detection via baseline analysis, NLP for communication security, countering mind control tactics, and influence operations in intelligence settings.

Cognitive & Influence Security:
Adversarial intelligence analysis, AI-enhanced OSINT gathering, NLP-driven deception detection, psychological profiling via transformer models, and social engineering countermeasures.

Relevant Research Experience

University of Arizona (2022–Present)
- *Prof. S. Sethuraman:* Real analysis; self-studied stochastic processes for cryptanalysis.
- *Prof. S. Cherkis:* Explored Nahm equations, geometric field theories, and used Lean 4+LLMs for secure AI.
- *Prof. N. Hao:* RTG Project on transformer attention scaling.
- *Prof. C. Haessig:* Investigated corresponding polynomials of Galois gorups by writing Python code, self-studying this for cryptographic classification.
- *Prof. D. Glickenstein:* Mentored a project reconstructing Mirzakhani's study on hyperbolic geometry and closed geodesics, with self-study on its application for encryption using transformer architectures and autoencoders.

San Francisco State University (2019–2022)
- Computed Hausdorff dimension of Schottky groups; applied fractal geometry for data obfuscation.
- Applied the prime geodesic theorem to secure high-dimensional data.

Pennsylvania State University (2017–2018)
- Investigated Hardy's proof of uniform distribution (pseudo-random generation).
- Studied topological invariants for encryption algorithms.

NTU—LeCosPA (Pre-Baccalaureate, 2011–2013)
• Researched TQFT, AdS/CFT, and vacuum energy; early work in quantum information.

Additional Research Projects

Self-Study: Semisimple Rings and Radicals in Coding Theory and Cryptography
Based on Prof. Klaus M Lux's lecture (Spring 2025), this project explores the role of semisimple rings and the Jacobson radical in coding theory and cryptography. Topics include linear codes over rings (e.g., $\mathbb{Z}_4$), group algebras, ring-based cryptosystems (NTRU, Ring-LWE), and ten concrete examples illustrating how nontrivial radicals influence cryptographic security.
Self-Study: AI-Driven Network & Firmware Security Analysis
Applying machine learning to detect anomalies in system logs, TCP/IP traffic, and firmware integrity. Researching adversarial ML techniques for cyber threat detection, focusing on vulnerabilities in processors (e.g., AMT), chipsets, and network traffic patterns. Investigating anomaly detection across all OSI layers and forensic-level system monitoring.
Self-Study: RF Signal Analysis for SIGINT & Cybersecurity
Applying spectrum analysis, SDR, and machine learning to detect and classify RF signals for cybersecurity and intelligence applications. Studying RF propagation, modulation techniques, and counter-SIGINT strategies while preparing for FCC amateur radio licensing.
Self-Study: AI-Driven Cognitive Security & OSINT Defense
Designing AI-powered analyst teams using transformers (local LLMs) for autonomous intelligence gathering, behavioral profiling, and deception detection. Researching automated influence analysis and adversarial social engineering defense using Heuer's methods (Analysis of Competing Hypotheses, Structured Analytical Techniques).
Self-Study: AI-Driven Narrative Simulation & Influence Modeling
Researching AI-driven frameworks for strategic narrative generation, adversarial influence simulations, and predictive modeling of geopolitical discourse. Developing transformer-based AI for policy impact analysis, disinformation detection, and automated strategic communications. Exploring AI-enhanced wargaming environments to test leadership messaging strategies, adversarial competition, and cognitive warfare principles. Studying structured analytic techniques (SATs), psychological operations (PsyOps), and counter-deception models to advance information dominance in government, defense, and corporate intelligence applications.

AI-Driven Intelligence Solutions (Launching July 2025)

Founder & Independent Researcher
- Full operational launch scheduled for July 2025 to provide personalized/customized AI-driven intelligence solutions for OSINT, cybersecurity, and strategic influence modeling.
- Researching transformer-based AI for cyber threat intelligence, geopolitical risk modeling, adversarial influence simulations, and disinformation detection.
- Developing AI-powered analytical frameworks for real-time data fusion, deception detection, and automated intelligence synthesis in national security, defense, and corporate applications.
- Preparing AI-driven consulting services focused on narrative analysis, structured analytic techniques (SATs), and influence operations.
- Actively designing proprietary LLM-based AI agents trained on intelligence cycle methodologies to enhance decision-making in cybersecurity and geopolitical strategy.

Teaching & Leadership

University of Arizona (2022–Present): GTA for College Algebra/Calculus.

San Francisco State University (2019–2022): GTA for Calculus, focusing on proof-based exploration.

Awards & Certifications

- Nominated for MSRI Summer School, Oxford (Metric Geometry, 2021)
- Information Security Awareness & Safety Training, Univ. of Arizona (2023)
- MASS Scholarship, Penn State (Full Tuition, 2017)
- ACM SIGMOD Service Award (2016)
- Big Data Training, MIT CSAIL (2015)

Technical Skills

Programming & Tools: Python, C/C++, Java, Lisp, R, Mathematica, Shell, Lean 4, Git/GitHub, LaTeX.

Cybersecurity & OSINT:
AI-assisted network forensics, AI-driven anomaly detection in TCP/IP traffic, firmware-level intrusion detection, reverse-engineering network threats, cryptanalysis, penetration testing via transformer models.

System & Network Security: TCPDump/Wireshark analysis, intrusion detection, monitoring firmware/memory vulnerabilities, reverse-engineering Intel AMT and similar architectures for anomaly detection.

Mathematical & Computational Methods: Real/complex analysis, measure theory, topology, functional analysis, stochastic processes, encryption/decryption, HPC, advanced cryptography.

Radio Frequency (RF) & SIGINT: Spectrum analysis, Software-Defined Radio (SDR), RF signal detection, FCC amateur radio exam preparation. **AI-Enhanced Intelligence & OSINT**:
AI-driven intelligence automation (Heuer-based LLM agents), adversarial social engineering defense, NLP-driven deception detection, multi-agent data fusion for SIGINT/HUMINT integration.

Additional Information

Faith: Catholic (Confirmed 28 years, e-Knight of Columbus, awaiting CUF exemplification)

Languages: English (Fluent), Mandarin/Taiwanese (Native), Learning Latin, French, Spanish, Italian, Hebrew

Memberships: Pi Mu Epsilon Honor Society (University of San Francisco)

References: Available upon request