# William Chuang

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## Summary of Qualifications

- **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.
- **Computational Skills:** Python (NumPy, scikit-learn, PyTorch), R, C/C++, Java, Lisp, Mathematica; built large-scale cryptography tools.
- **Adaptive Learning:** Quickly masters new fields (real/stochastic analysis, Lean 4, LLM-based proof automation).

## 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).

## 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 cryptography.

## 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., Z4), group algebras, ring-based cryptosystems (NTRU, Ring-LWE), and ten concrete examples illustrating how nontrivial radicals influence cryptographic security.

## Teaching & Leadership

**University of Arizona (2022–Present)**: GTA for College Algebra/Calculus, integrating cryptography concepts into lessons.

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

## Awards & Certifications

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

## Technical Skills

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

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

## Additional Info

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

**Languages**: English (Fluent), Conversational Japanese/German/Taiwanese; Learning French/Spanish/Italian

**Memberships**: Pi Mu Epsilon (USF)

**References**: Available upon request