COOPER K. WATSON, Ph.D.

4017 Avenue H ⋄ Austin, TX 78751

(512)-658-9236 ⋄ Cooper_Watson@protonmail.com ⋄ U.S. Citizen ⋄ Eligible for Q-Clearance

EDUCATION

Postdoc in Optical and Fusion Physics — Supervisor: Dr. Marlan O. Scully
Texas A&M University (TAMU) — *May 2025 – May 2027*
Institute for Quantum Science & Engineering (IQSE)

Doctorate in Theoretical Physics — Major GPA: 3.52
Baylor University Graduate School — *Ph.D. Completed August 2024*

M. A. in Physics — Cumulative GPA: 3.40
Baylor University — *Masters Completed May 2021*

B. S. in Mechanical Engineering — Engineering GPA: 3.47
Secondary Degree in Physics — Physics GPA: 3.22
Minor in Mathematics — Cumulative GPA: 3.22
Baylor University — *Undergraduate Completed May 2018*

TECHNICAL SKILLS

Computer Languages	MATLAB(+Guide), Python, Bash, conversant in C++
Software & Tools	SOLIDWORKS, COMSOL, LaTeX, Excel, Mathematica(+xAct), MathCad, FLASH4.8, Photoshop, PSpice/OrCad, Oscilliscopes, Altium, 3D Printing

PUBLICATIONS

- **Watson, C. K.**; Shaukat M. I.; Vanakifarahani, A.; Eden, J. G.; and Scully, M. O. "Brillouin Frequency Shift in Dilute Gases: An Analytical Model from Kinetic to Hydrodynamic Regimes" *In Progress*
- **Watson, C. K.**; Shaukat M. I.; Vanakifarahani, A.; Eden, J. G.; and Scully, M. O. "Analytical Modeling of the Peak Stimulated Brillouin Gain in Dilute Gases" *In Progress*
- Shaukat M. I.; **Watson, C. K.**; Svidzinsky, A.; Eden, J. G.; and Scully, M. O. "Stimulated Brillouin Scattering Gain for Binary Mixture of Gases" *In Progress*
- Shaukat M. I.; **Watson, C. K.**; Svidzinsky, A.; Eden, J. G.; and Scully, M. O. "Kinetic theory of stimulated Brillouin scattering with velocity-dependent collisional relaxation" *Physical Review A*, **2026**, *113* (6), 063523. doi:10.1103/xflf-7fkd
- **Watson, C. K.**; Shaukat M. I.; Svidzinsky, A.; Kim, M.; and Scully, M. O. "Unified Microscopic Foundations of the Quantum Boltzmann Equation" *Fluctuation and Noise Letters*, **2026**, *25*(2), 2640002. doi:10.1142/S021947752640002X
- **Watson, C. K.**; Julius W. D.; Brown, P.; Salisbury, D.; and Cleaver, G. B. "An Intrinsic Coordinate Reference Frame Procedure I: Tensorial Canonical Weyl Scalars" *Universe*, **2025**, *11*(12), 389. doi:10.3390/universe11120389
- Cremaschini, C.; **Watson, C. K.**; Radhakrishnan, R.; Cleaver, G. B. "The Validity of the Ehrenfest Theorem in Quantum Gravity Theory" *Symmetry*, **2026**, *18*(1), 182. doi:10.3390/sym18010182

- Shaukat, M. I.; **Watson, C. K.**; Svidzinsky, A.; and Scully, M. O. "Stimulated Brillouin Scattering Gain for Binary Mixture of Gases". (*In Progress*)

- **Watson, C. K.**; Jullius W.; Gorban M.; McNutt, D. D.; Davis, E. W.; and Cleaver, G. "An Invariant Characterization of the Levi-Civita Spacetimes". *Symmetry*, **2021**, *13*(8), 1469. doi:10.3390/sym13081469

- Mattingly, B.; Kar, A.; Gorban, M.; Julius W.; **Watson, C. K.**; Ali, M. D. Baas A.; Elmore, C.; Lee, J. S.; Shakerin, B.; Davis, E. W.; and Cleaver, G. "Curvature Invariants for the Alcubierre and Natário Warp Drives". *Universe*, **2021**, *7*(2), 21. doi:10.3390/universe7020021

- Mattingly, B.; Kar, A.; Gorban, M.; Julius W.; **Watson, C. K.**; Ali, M. D. Baas A.; Elmore, C.; Lee, J. S.; Shakerin, B.; Davis, E. W.; and Cleaver, G. "Curvature Invariants for the Accelerating Natário Warp Drive". *Particles*, **2020**, *3*(3), 642-659. doi:10.3390/particles3030042

- Mattingly, B.; Kar, A.; Ali, M.; Baas, A.; Elmore, C.; **Watson, C.**; Shakerin, B.; Davis, E. W.; and Cleaver, G. "Curvature Invariants for Lorentzian Traversable Wormholes". *Universe*, **2020**, *6*(1), 11. doi:10.3390/universe6010011

PRESENTATIONS

- Presented research over Stimulated Brillouin Scattering at the TAMU-Casper Summer School on Quantum Physics, Laser Fusion and Biophysics (2026)

- Presented research poster over Optical Damage from Lasers at U.S.-I.F.E. in Washington D.C. (March)

- Presented research over Kinetic Modeling of Excimer Gas Lasers at TAMU-IQSE (March & June 2026)

- Presented research poster over the Quantum Boltzmann Equation at PQE 2025 in Snowbird, UT.

- Presented research over Active Diffeomorphisms of differential geometry and Canonical Hamiltonian dynamics at the Princeton-TAMU Symposium at Princeton University

- Presented research over the unification of electromagnetism and gravity at the TAMU-Casper Summer School on Quantum Physics, Laser Fusion and Biophysics (2025)

- Presented our group's novel research using scalar invariants to depict the curvature of spacetimes in Denver, Colorado, at the 2018 April APS national conference

- Presented the research from my first-authorship publication over the two methods of invariantly characterizing and classifying the Levi-Civita Spacetimes in New York City at the 2022 April APS national conference. Presented again in Austin at the 10th Gulf Coast Gravity Meeting at the University of Texas

- Presented the research from my second first-authorship publication over the novel description of 4D spacetimes by invariant phase space scalars in Sacramento, CA at the 2024 April APS national conference

EXPERIENCE

Institute for Quantum Science and Engineering (IQSE) May 2025 – Present

- Researching Stimulated Brillouin Scattering theory
- Used COMSOL to study optimal frequency for Inverse Bremsstrahlung absorption for ARPA-E
- Researched Inverse Bremsstrahlung absorption for ARPA-E joint research program
- Created CAD Model of the Argon Laser experiment for High Power Gas Laser experimentation

- Helped organized a Symposium in Honor of Virgil Sanders: A Life with Ring Laser Gyroscopes at TAMU
- Organized and Hosted the Princeton-TAMU Symposium on Quantum Engineering and Technology at Princeton University
- Researched Active Diffeomorphisms to describe Vacuum Squeezing in General Relativity/Quantum Field Theory
- Currently designing and Engineering an Argon-Xenon Excimer laser for applications of Inertial Confinement Fusion

Center for Astrophysics, Space Physics, and Engineering Research May 2017 – May 2025
- Spearheaded General Relativity and Quantum Cosmology research projects with the Early Universe Cosmology and Strings Group (EUCOS)
- Conducted research in a variety of gravitational physics, cosmology and high energy astrophysics under faculty member Dr. Gerald Cleaver
- Collaborated on implementing our C++ algorithm to investigate the Swampland Conjecture of String Theory

Baylor Research and Innovation Collaborative (BRIC) May 2016 – Aug. 2016
- Quantum Optics Lab under faculty mentor, Dr. Zhenrong Zhang
- Designed a custom part using Solid Works for the STM (Scanning Tunneling Microscope)
- Developed a Systematic/Analytical GUI (Graphic User Interface) in MatLab

Engineering Senior Design (Baylor University) Jan. 2018 – May 2018
- Managed as lead Engineer integrating the Mechanical and Electrical engineering groups (team of six)
- Designed and fabricated a field-deployable antenna to measure Electric and Magnetic fields
- Employed processes of 3D modeling, drilling, EM-shielding, and thermoplastics

Engineering Junior Design (Baylor University) Jan. 2016 – May 2016
- Oversaw a team of six engineers as lead Mechanical Engineer
- Modeled and fabricated a small-scale crane in Solid Works to transport balls 5x the initial length
- Employed processes of 3D modeling, drilling, milling, and turning

TEACHING EXPERIENCE

Temporary Lecturer, Baylor University Fall 2022 – Spring 2024
- Instructed both Algebra and Calculus-based Physics II (Introductory Electricity and Magnetism)
- Strengthened my teaching ability where my first semester (20 students) course evaluations were 16% higher compared to the sample group ($N \approx 4,200$) on clearly explaining the subject matter
- The following semester (49 students) I progressed with a 25% better than average evaluation than the sample group ($N \approx 4,700$)
- Fall 2023 (41 students) I was 12% above average ($N \approx 4,800$)
- Spring 2024 (46 students) I was 16% above average ($N \approx 4,600$)
- Encouraged and inspired the enjoyment of learning and discussing physics

Teaching Assistant, Tutoring Baylor University Fall 2018 – Summ. 2022
- Taught both Classical Mechanics and Electricity and Magnetism labs
- Tutored undergraduate students over introductory and advanced material in both physics and general engineering (both electrical and mechanical subjects)
- Trained and mentored incoming graduate students
- Mediated and resolved interpersonal conflicts between graduate students
- Shaped the revision of the Physics Lab Manual Procedures

LEADERSHIP

The Inertial Fusion Science and Technology (RISE) Hub Feb. 2026 – Present

- Nominated for RISE Student Leadership Council for Thrust 5 (Workforce Development)
- Co-Founder and Interim Chair for RISE student council of outreach, research, and education (CORE)
- Organized and Hosted RISE Hub Monthly Seminar Series

Outstanding Student Instructor Award Nomination Jan. 2021 – May 2021

- Nominated for the highest rating for a Lab instructor for the Physics Department's spring semester

Society of Physics Students Aug. 2016 – Aug. 2017

- President of the Baylor SPS chapter (Spring and Summer 2017)
- Vice-President (Fall 2016)
- Our SPS chapter was involved with charitable services such as Habitat for Humanity, Relay for Life, as well as hosting physics demos for local public schools
- Baylor SPS Chapter was named a Distinguished Chapter for 2016-2017 by the National SPS Office