

# Furkan Altincicek | Résumé

Edmonton, Alberta, Canada

☎ (+1) 780 243 3677 • ✉ faltincicek@gmail.com

🌐 Personal Webpage

## Work Experience

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### Graduate Researcher

*University of Alberta*

**July 2019 - Present**

*Edmonton, AB, Canada*

- Operated and maintained ultra-high vacuum, low-temperature ( 4.5 K) scanning tunneling microscopy (UHV LT-STM).
- Managed lab's cryogenics (liquid nitrogen and helium) consumption and maintained helium recovery plant.
- Worked on silicon surface passivation with hydrogen monolayer and studied molecules on this surface.
- Lead a project about making atomic wires on the silicon surface with LT-STM and conducted molecular orbital analysis through scanning tunneling spectroscopy (STS).
- Studied variable size atomic switches on the hydrogenated silicon surface with applications to memory and random number generation.
- Characterized surface quality of nanolithographed samples prepared in the clean room with photolithography and e-beam lithography with STM.
- Took part in upgrading the LT-STM system to non-contact QPlus AFM.
- Developed a numerical simulation of the atomic wires I made and coded it in Python.
- Analyzed atomic wires data with Fourier transform to study their electronic bands and effective masses.
- Taught first year physics labs for a total of ~200 students.

### Graduate Researcher

*University of North Dakota*

**August 2017 - May 2019**

*Grand Forks, ND, USA*

- Operated and maintained UHV XPS system and AFM.
- Assembled a home-built chemical vapor deposition (CVD) system with spare rough and turbo pump, argon gas cylinder, and tube furnace for quartz tubes.
- Synthesized quasi-two-dimensional chromium sulfides with the CVD system I built.
- Characterized two dimensional molecules I deposited on mica with X-ray photoelectron spectroscopy (XPS), X-ray powder diffraction (XRD), and atomic force microscopy (AFM).
- Collaborated with groups from the Petroleum Engineering and Chemistry departments in two separate projects where I analyzed their samples with XPS, which yielded two papers.
- Taught first year physics labs for a total of ~400 students.

**Undergraduate Researcher***Bilkent University***September 2014 - June 2017***Ankara, Turkey*

- Studied the Gross-Pitaevski-Poisson system to model compact astrophysical objects as Bose-Einstein condensates.
- Studied a solvable model of Maxwell's Demon computationally.

**Summer Intern***METU***2015 Summer***Ankara, Turkey*

- Analyzed neutron stars and pulsars with computational methods.

**Education**

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**Doctor of Philosophy***University of Alberta***2019 - present***Edmonton, AB, Canada*

Supervisor: Prof. Robert Wolkow

Expected graduation date: May 2025

Dissertation Title: Atomic Silicon Dimer Wires on the Hydrogenated Surface and Their Macro-to-Atom Connection

**Master of Science***University of North Dakota***2017 – 2019***Grand Forks, ND, USA*

Supervisor: Prof. Nuri Oncel

Thesis Title: Synthesis and Characterization of Quasi-Two-Dimensional Chromium Sulfides

GPA: 3.85/4.00

**Bachelor of Science***Bilkent University with Full Scholarship***2012 - 2017***Ankara, Turkey*

Supervisor: Prof. Bilal Tanatar

Senior Project Title: Adaptation of Two Dimensional Bose-Einstein Condensates to Compact Astrophysical Objects

Graduated with Honors, Class Rank: 2

GPA: 3.04/4

**Laboratory Skills**

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|---------------------------------------|--|
| - Scanning Tunneling Microscopy (STM) | - Atomic Force Microscopy (AFM)          |
| - Ultra-High Vacuum (UHV) Systems     | - X-ray Photoelectron Spectroscopy (XPS) |
| - Field Ion Microscopy (FIM)          | - Liquid Helium Recollection Systems     |
| - Chemical Vapour Deposition (CVD)    | - Physical Vapour Deposition (PVD)       |
| - Residual Gas Analyzer (RGA)         | - Vacuum Leak Test Systems               |
| - Omicron LT-STM System               | - Nanonis STM Controller                 |

**Computer Skills**

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**Programming:** Python, Matlab, LabView, HTML,  $\LaTeX$

**Simulation:** Amsterdam Modelling Suite (AMS), Quantum Espresso, Vesta

**Processing:** Gwyddion, WSxM, Origin

## Publications

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**6: Altincicek, F. M.\***, Kumar, A.\*, Leon, C., Pitters, J., Wolkow, R. Nano Lithographed Etch Mark Sample Preparation for STM Studies. In preparation 2025.

**5: Altincicek, F. M.**, Leon, C., Chutora, T., Wolkow, R. Buckling and Controlled Switching of Variable Size Silicon Dimer Wires. In preparation 2025.

**4: Altincicek, F. M.**; Livadaru, L.; Leon, C. C.; Chutora, T.; Yuan, M.; Achal, R.; Croshaw, J.; Pitters J.; Wolkow, R. Electronic Structures of Atomic Silicon Dimer Wires as a Function of Length. Recently accepted on a peer-reviewed journal 2025.

DOI: [10.1088/1361-6528/adafae](https://doi.org/10.1088/1361-6528/adafae)

**3:** Liu, X.; Han, J.; Hou, X.; **Altincicek, F.**; Oncel, N.; Pierce, D.; Wu, X.; Zhao, J. X. One-Pot Synthesis of Graphene Quantum Dots Using Humic Acid and Its Application for Copper (II) Ion Detection. Journal of Materials Science 2020, 56, 4991–5005.

DOI: [10.1007/s10853-020-05583-6](https://doi.org/10.1007/s10853-020-05583-6)

**2:** Lee, H.; Oncel, N.; Liu, B.; Kukay, A.; **Altincicek, F.**; Varma, R. S.; Shokouhimehr, M.; Ostadhassan, M. Structural Evolution of Organic Matter in Deep Shales by Spectroscopy ( $^1\text{H}$  and  $^{13}\text{C}$  Nuclear Magnetic Resonance, X-Ray Photoelectron Spectroscopy, and Fourier Transform Infrared) Analysis. Energy & Fuels 2020, 34, 2807–2815.

DOI: [10.1021/acs.energyfuels.9b03851](https://doi.org/10.1021/acs.energyfuels.9b03851)

**1: Altincicek, F. M.** Synthesis And Characterization Of Quasi-Two-Dimensional Chromium Sulfides. University of North Dakota, Theses and Dissertations 2019, 2446.

[Available on UND Commons](#)

## Awards and Honors

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**2022:** Best Scanning Probe Micrograph of The 65th International Conference on Electron, Ion and Photon Beam Technology and Nanofabrication (EIPBN)

**2017:** Best Senior Project Award by Department of Physics, Bilkent University, Turkey

**2015:** NUBA International Nuclear Physics Summer School Achievement Certificate, Akdeniz University, Turkey

**2015:** Feza Gürsey Institute Einstein's General Relativity Summer School Achievement Certificate, Bogazici University, Turkey

## Selected Presentations

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**2024:** "Silicon Dimers on the Hydrogenated Surface" Contributed Talk at Condensed Matter Physics Seminar Series, University of Alberta, Canada

**2023:** "Nano Hotdog" Image Presentation at Images of Research Competition, University of Alberta, Canada

**2022:** "Atomically Defined Wires on P-Type Silicon" Contributed Talk at the Annual Canadian Association of Physicists (CAP), McMaster University, Canada

**2022:** "Atomically Defined Wires on P-Type Silicon" Contributed Talk at the 65th International Conference on Electron, Ion and Photon Beam Technology and Nanofabrication (EIPBN), New Orleans, USA

**2022:** "Atomically Defined Wires on P-Type Silicon" Contributed Talk at the Annual American Physical Society (APS) March Meeting, Chicago, USA

**2021:** "Silicon Dangling Bond Pairs as Quantum Random Number Generators" Talk at National Institute of Standards and Technology (NIST) iSPM3, Online

**2021:** "Silicon Dangling Bond Pairs as Quantum Random Number Generators" Poster Presentation at the Annual Canadian Association of Physicists (CAP), Online

**2019:** "Synthesis and Characterization of quasi 2D-Chromium Sulfide" Talk at the Annual American Physical Society (APS) March Meeting, Boston, USA

**2019:** "Synthesis and Characterization of quasi 2D-Chromium Sulfide" Talk at the Physics Department Colloquium, University of North Dakota, USA

**2019:** "Working in Two Dimensions" 3 Minute Thesis Competition Presentation, University of North Dakota, USA