# Burak Aslan

**CONTACT** aslan@boun.edu.tr

**EDUCATION**

**Ph.D. in Physics, Columbia University**, USA 2012 – 2017
"Probing Transition Metal Dichalcogenides via Strain-Tuned and Polarization-Resolved Optical Spectroscopy" Advisor: Prof. Tony F. Heinz

**B.S. in EE & Physics, Bogazici University**, TURKEY 2007 – 2012

**Ankara Science High School**, TURKEY 2004 – 2007

**WORK EXPERIENCE**

**Assistant Professor, Department of Physics, Bogazici University** 2020 September –

- *Opto-Electronics and Physics of Atomically Thin Semiconductors*

**Senior Optical Systems Engineer, Terabix, CA, USA** 2019 Jan – 2020 June
Supervisor: Andrew Daiber

- *Test Engineering: Designed Optical Systems & Automated Validation Tests for Laser via Board & Instrument Control*
- *Fiber-optic Communications: Acquired & Interpreted Optical Data of Laser Prototype*
- *Start-Up Involvement: Interviewer, IT Infrastructure*

**Post-doctoral Researcher, Stanford University** 2017 June – 2019 Jan
Materials Science & Engineering, Advisor: Prof. Mark Brongersma

- *Dynamic Optical Response of 2D Materials:* Built an Automated Free-Space Optical Spectroscopy Setup to Measure Dynamic & Reversible Optical Properties from 2D Materials via Strain Engineering.
- *Many-body Physics:* Studied Excitons in Suspended 2D Materials

**Graduate (Visiting) & Post-doctoral Researcher, Stanford University** 2015 May – 2017 May
Applied Physics, Advisor: Prof. Tony F. Heinz

- *Strain-Tuned Optics:* Engineered & Studied the Optoelectronic Properties of 2D Materials via Mechanical Strain. Performed Image Processing for Strain Calculations.
- *Atomically Thin Transistors:* Measured Optical Absorption of Ultrathin $MoS_2$ at Elevated Temperatures for Raman Thermometry. Performed Thin Film Optical Calculations.

**Graduate Researcher, Columbia University** 2013 – 2015
Physics, Advisor: Prof. Tony F. Heinz

- *Thinnest Light Emitter:* Measured Visible Light Emission Spectrum of Electrically Biased Graphene
- *Optical Anisotropy:* Studied Ultrathin $ReS_2$ Studied via Absorption, PL & Raman.
- *Band Structure in Atomically Thin Limit:* Investigated Ultrathin $MoTe_2$ via Absorption, PL & Raman.
- *Semiconductor Physics of Excitons:* Probed Ultrathin Transition Metal Dichalcogenides.

**Undergrad. Research Assistant, Bogazici University** 2011 – 2012
EE & Physics, Advisor: Prof. Ozhan Ozatay

- *Phase Change Memory:* Performed 3D Finite Element Modeling of Phase Change & Percolation in Phase Change Memory Unit Cells

**TEACHING EXPERIENCE**

**Lecturer, Bogazici University**

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|---|---|
| *Thermodynamics, Waves, Optics & Modern Physics (Phys 130)* | Fall 2021, Spring 2022 |
| *Introductory Mechanics (Phys 101)* | Fall 2020 |
| *Introductory Mechanics & Thermodynamics (Phys 121)* | Spring 2021 |

**Lab Instructor, Columbia University**

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| *General Physics II, Experiments for Pre-medical Students (Phys 1292)* | Spring 2013 |
| *General Physics I, Experiments for Pre-medical Students (Phys 1291)* | Fall 2013, Spring 2014 |

**Teaching Assistant, Columbia University**

*Help Hour, Undergraduate Physics* 2012 – 2014

*Laboratory Help Hour, General Physics Experiments* 2012 – 2014

**Teaching Assistant, Bogazici University**

*Thermal Properties of Matter (Phys 221)* Fall 2011

*Instructor*: Prof. Ersan Demiralp

*Thermodynamics, Waves, Optics & Modern Physics (Phys 130)* Summer 2011

*Instructors*: Prof. Ersan Demiralp, Prof. Yani Skarlatos

## TALKS AT PROFESSIONAL MEETINGS

### Primary Author Talks

- "Engineering Energy Transfer from 0D to 2D" 16th Nanoscience & Nanotechnology Conference, METU, Ankara, Turkey, 2022
- "Strain Tuning of Energy Transfer from 0D to 2D" International 2D Nanomaterials Conference, Virtual Conference, Turkey, 2022
- "Suspended Excitons in Monolayer $WSe_2$" APS March Meeting, Virtual Conference, USA, 2021
- "Probing the Optical Properties of 2D Materials via Strain" Frontiers in Optics & Laser Science , Virtual Conference, 2020
- "Strain Tuning of the Excitons of Monolayer $WSe_2$" APS March Meeting, Los Angeles, CA, USA, 2018
- "Probing the Anisotropic Light-Matter Interaction in Ultrathin $ReS_2$"
- "Probing the Band Structure of Ultrathin $MoTe_2$ via Strain" APS March Meeting, New Orleans, LA, USA, 2017
- "Optical Properties and Band Gap of Single- and Few-Layer $MoTe_2$ Crystals" APS March Meeting, San Antonio, TX, USA, 2015
- "3-D Simulation Model of Phase Change and Percolation in Phase Change Memory" APS March Meeting, Boston, MA, USA, 2012

### Invited Talks

- ""Engineering Energy Transfer from 0D to 2D"" Condensed Matter Physics Meeting, İstanbul, Turkey, 2022

"Excitons in strained and suspended monolayer $WSe_2$" Condensed Matter Physics Meeting, İzmir, Turkey, 2022

- "Strain tuned optical spectroscopy of 2D materials" Condensed Matter Physics Meeting, Virtual Conference, Turkey, 2020

**Co-Authored Talks**

- "Strained bilayer $WSe_2$ with reduced exciton-phonon coupling" APS March Meeting, Virtual Conference, 2021
- "Excited excitonic states in second harmonic spectra of 2D materials with ab-initio many-body methods" APS March Meeting, Boston, MA, USA, 2019
- "Effect of Strain and hBN Encapsulation on the Optical Transitions of Ultrathin Transition Metal Dichalcogenides" APS March Meeting, Los Angeles, CA, USA, 2018
- "Electrically-driven GHz range ultrafast graphene light emitter" Proc. SPIE 10102, Ultrafast Phenomena and Nanophotonics XXI, 101021T, 2017
- "Charge and Spin-Valley Transfer in Transition Metal Dichalcogenides Heterostructure" APS March Meeting, New Orleans, LA, USA, 2017
- "Excitons in Atomically Thin Transition-Metal Dichalcogenides" CLEO, San Jose, CA, USA, 2014
- "Exciton Rydberg Series in Mono- and Few-layer $WS_2$" APS March Meeting, Denver, CO, USA, 2014
- "3-D Numerical Study of Switching Dynamics in Nanoscale Phase Change Memory Devices" APS March Meeting, Boston, MA, USA, 2012

**HONORS & AWARDS**

- International Fellowship for Outstanding Researchers by TUBITAK 2020
- Travel Award (Grad. Student) by American Physical Society, Division of Cond. Matt. Phys. 2017
- Dean's Fellowsip from Columbia University 2012
- Fullbright Opportunity Fund Award 2012
- Graduated with $2^{nd}$ Rank in Electrical and Electronics Engineering Department 2012
- High Honors Certificates from Faculty of Engineering and Faculty of Arts & Sciences 2012
- Dean's High Honor List for 6 consecutive semesters 2012
- NETAŞ Telecommunication Inc. Scholarship Award 2011
- Prime Ministry Scholarship for 4 years 2008
- $60^{th}$ rank out of $\sim$1.6 million students, Nationwide College Entrance Exam 2007
- Bronze Medal and $4^{th}$ rank in the $14^{th}$ National Physics Olympiads by TUBITAK 2006

**EXPERIMENTAL TECHNIQUES & SKILLS**

**Optical:** Free-Space Optical Alignment, Second Harmonic Generation, Raman, Time-resolved Photoluminescence, Absorption, Transmission & Reflection Spectroscopy, Strain-dependent Spectroscopy on Flexible Materials.
**Cryogenic:** Closed Cycle Optical Cryostats. **Fabrication:** Photolithography.
**Imaging:** AFM, Spectrometer, Silicon & InGaAs CCD Spectroscopy for Visible & Infrared Light.
**Data:** Python, MATLAB, OriginPro, C. **Modeling:** COMSOL Multiphysics.
**Instrument Control:** Python, Arduino, LabView. **CAD:** SolidWorks, AutoCAD.
**Image Processing:** Python, ImageJ. **Word Processing:** Python, LaTeX

**LANGUAGES**

Turkish (Native), English (Fluent)

**COMMUNITY INVOLVEMENT**

**Academic Service**
Reviewer for Nature Communications (Nature Research), Chemistry of Materials (American Chemical Society), Nanoscale Research Letters (Springer)

**Social Roles**
Stanford Turkish Student Association 2016 – 2017
Information Technology Officer, Event Organizer

**PUBLICATIONS**

- S. H. Kim, E. Barre, **O. B. Aslan**, Y. D. Kim, D. Seo, K. Kang, E-H. Yang, J. C. Hone, T. F. Heinz "Charge and Spin-Valley Transfer in a Transition Metal Dichalcogenide Heterostructure" **Unpublished.**
- **O. B. Aslan**, Y. Yu, L. Cao, M. Brongersma "Excitons in Strained and Suspended Monolayer $WSe_2$" **2D Mater.** 2022, 9, 015002
- F. Xiong, E. Yalon, C. McClellan, J. Zhang, **O. B. Aslan**, A. Sood, J. Sun, C. M. Andolina, W. A. Al-Saidi, K. E. Goodson, T. F. Heinz, Y. Cui, E. Pop "Tuning Electrical and Interfacial Thermal Properties of Bilayer $MoS_2$ via Electrochemical Intercalation" **Nanotechnology** 2021, 32, 265202
- **O. B. Aslan**, M. Deng, M. Brongersma, T. F. Heinz "Strained bilayer $WSe_2$ with reduced exciton-phonon coupling" **Phys. Rev. B** 2020, 101, 115305
- K. K. H. Smithe, A. V. Krayev, C. S. Bailey, H. R. Lee, E. Yalon, **O. B. Aslan**, M. Munoz Rojo, S. Krylyuk, P. Taheri, A. V. Davydov, T. F. Heinz, E. Pop "Nanoscale Heterogeneities in Monolayer $MoSe_2$ Revealed by Correlated Scanning Probe Microscopy and Tip-Enhanced Raman Spectroscopy" **ACS Appl. Nano Mater.** 2018, 1, 572-9.
- Y. D. Kim, Y. Gao, R. J. Shiue, L. Wang, **O. B. Aslan**, M. H. Bae, H. Kim, D. Seo, H. J. Choi, S. H. Kim, A. Nemilentsau, T. Low, C. Tan, D. K. Efetov, T. Taniguchi, K. Watanabe, K. L. Shepard, T. F. Heinz, D. Englund, J. Hone "Ultrafast Graphene Light Emitters" **Nano Lett.** 2018, 18, 934–40.
- **O. B. Aslan**, M. Deng, T. F. Heinz "Strain Tuning of Excitons in Monolayer $WSe_2$" **Phys. Rev. B** 2018, 98, 115308.
- **O. B. Aslan**, I. M. Datye, M. J. Mleczko, K. Sze Cheung, S. Krylyuk, A. Bruma, I. Kalish, A. V. Davydov, E. Pop, T. F. Heinz "Probing the Optical Properties and Strain-Tuning of Ultrathin $Mo_{1-x}W_xTe_2$" **Nano Lett.** 2018, 18, 2485-91.
- E. Yalon, **O. B. Aslan**, K. K. H. Smithe, C. J. McClellan, S. V. Suryavanshi, F. Xiong, A. Sood, C. M. Neumann, X. Xu, K. E. Goodson, T. F. Heinz, E. Pop "Temperature-Dependent Thermal Boundary Conductance of Monolayer $MoS_2$ by Raman Thermometry" **ACS Appl. Mater. Interfaces** 2017, 9, 43013-20.
- E. M. Mannebach, C. Nyby, F. Ernst, Y. Zhou, J. Tolsma, Y. Li, M. J. Sher, I. C. Tung, H. Zhou, Q. Zhang, K. L. Seyler, G. Clark, Y. Lin, D. Zhu, J. M. Glownia, M. E. Kozina, S. Song, S. Nelson, A. Mehta, Y. Yu, A. Pant, **O. B. Aslan**, A. Raja, Y. Guo, A. DiChiara, W. Mao, L. Cao, S. Tongay, J. Sun, D. J. Singh, T. F. Heinz, X. Xu, A. H. MacDonald, E. Reed, H. Wen, A. M. Lindenberg "Dynamic Optical Tuning of Interlayer Interactions in the Transition Metal Dichalcogenides" **Nano Lett.** 2017, 17, 7761-6.
- **O. B. Aslan**, D. A. Chenet, A. M. van der Zande, J. C. Hone, T. F. Heinz "Linearly Polarized Excitons in Single- and Few-Layer $ReS_2$ Crystals" **ACS Photonics** 2016, 3, 96-101.
- I. Cinar, **O. B. Aslan**, A. Gokce, O. Dincer, V. Karakas, B. Stipe, J. A. Katine, G. Aktas, O. Ozatay "Three dimensional finite element modeling and characterization of intermediate states in single active layer phase change memory devices" **J. Appl. Phys.** 2015, 117, 214302.
- D. A. Chenet, **O. B. Aslan**, P. Y. Huang, C. Fan, A. M. van der Zande, T. F. Heinz, J. C. Hone "In-Plane Anisotropy in Mono- and Few-Layer $ReS_2$ Probed by Raman Spectroscopy and Scanning Transmission Electron Microscopy" **Nano Lett.** 2015, 15, 5667-72.
- C. Ruppert, **O. B. Aslan**, T. F. Heinz "Optical Properties and Band Gap of Single- and Few-layer $MoTe_2$ Crystals" **Nano Lett.** 2014, 14, 6231-6.
- A. Chernikov, T. C. Berkelbach, H. M. Hill, A. Rigosi, Y. Li, **O. B. Aslan**, D. R. Reichman, M. S. Hybertsen, T. F. Heinz "Exciton Binding Energy and Nonhydrogenic Rydberg Series in Monolayer $WS_2$" **Phys. Rev. Lett.** 2014, 113, 076802.

[*CV compiled on 2022-11-11* ]