

Bahar Modir

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Professional Experience

- 2018-present **Assistant Professor, Physics & Astronomy**, Texas A&M University-Commerce, Commerce, Texas.
- 2017-present **Adjunct Professor, Physics & Astronomy**, Texas A&M University-Commerce, Commerce, Texas.

Education

- 2017 **Doctor of Philosophy (Physics)**, Kansas State University, Manhattan, Kansas.
Problem solving in physics: Undergraduates' framing, procedures, and decision making Advisor: Dr. Eleanor C Sayre
- 2011 **Master in Atomic and Molecular (Physics)**, University of Tehran, Tehran, Iran.
Methane conversion to hydrogen and hydrocarbons by pulsed plasma at a uniform electric field Advisor: Dr. Atamalek Ghorbanzadeh
- 2006 **Bachelor of Sciences (Physics)**, Arak University, Arak, Iran.

Phd thesis

As part of the Mathematization project, I use different theories and methods to model students' problem solving practices in upper division physics courses of quantum mechanics and electromagnetism I. My focus is on the manifold and context dependent aspects of student problem solving in physics. I use the theory family of "Knowledge in Pieces" and provide evidence to expand this theoretical foundation. I have used observational data to explore students' moment-by-moment discourse and their problem solving processes and not just the final answer.

Master thesis

My field of study was physics of atoms and molecules. My thesis was about Investigation of gas conversion by a pulsed plasma, aided by a corona pre-ionization at room temperature. I designed a plasma reactor, and a uniform electrode profile (Ernest). I investigated the effects of voltage, frequency, input flow, and pulse energy on the conversion process. The percentage of hydrogen and hydrocarbons in the output products were measured by a gas chromatograph.

Honors and Awards

- 2017 **Arts and Sciences Research Travel Scholarship Award**, Kansas State University, to attend American Association of Physics Teachers Summer Meetings and Physics Education Research Conference, Cincinnati, OH.
- 2017 **Graduate Student and Post-doc Travel Award by University of St. Thomas**, University of St. Thomas, to attend at TRUSE Conference.

- 2016 **Physics Outstanding Graduate Student Award**, *Kansas State University*, I was nominated by Professor Brett DePaola for my work in an online course - Physics 102 - Physics for Policymakers.
- 2016 **Travel award by University of Oklahoma, Mathematics Department**, *Oklahoma State University*, to attend at RUME with a View Conference.
- 2016 **Arts and Sciences Research Travel Scholarship Award**, *Kansas State University*, to attend American Association of Physics Teachers Summer Meetings, and Physics Education Research Conference, Sacramento, CA.
- 2010 **Exempted from Ph.D. program entrance exam as an "Exceptionally Talented" student**, *University of Tehran*.
- 2010 **Ranked 1st among M.Sc. students of Atomic and Molecular (Physics coursework)**, *University of Tehran*.

Research

Interests

- Physics and STEM education research.
- Online instruction and course development
- Coordination between physics and mathematics understanding.
- Qualitative and quantitative research methods.
- Experimental plasma physics (natural gas conversion to valuable products).

Grants

- 2020-2022 **Texas Regional PhysTEC Network**, *PhysTEC Regional Network*, Award amount: \$15,000.
PI: W. G. Newton; (TAMUC), Co-PI: R. M. Lock; B. Modir; M. Fields (TAMUC)
- 2021-2024 **REU Site: Summer Research Program for Community College Students in Physics and Astronomy at Texas A&M University-Commerce**, *NSF REU*, Award #2050277, Award amount: \$236,704.00.
PI: H. Park (TAMUC), Co-PI: B. Modir (TAMUC)

Presentations & Publications

Journal Papers

1. Modir, B., Thompson, J.D., and Sayre, E.C. "Framing difficulties in quantum mechanics" *Physical Review Physics Education Research* [link](#), 2019
2. Modir, B., Thompson, J.D., and Sayre, E.C. "Students' epistemological framing in quantum mechanics problem solving" *Physical Review Physics Education Research* [link](#), 2017
3. Modir, B., and Sayre, E.C. (manuscript in preparation) "How Do Students "Look Ahead" When Solving Problems In Electromagnetic Fields?" *Physical Review Physics Education Research*
4. Modir, B., and Sayre, E.C. (manuscript in preparation) "Unpacking separation of variables in partial differential equations in quantum mechanics." *Physical Review Physics Education Research*

Peer-reviewed Conference Proceedings

1. Nadeau, M., Modir, B., Lock, R., and Newton W. G. (2020) "Participation in an online community of high school physics teachers ", *Physics Education Research Conference Proceedings 2020* [link](#)
2. Thompson, J.D., Modir, B. and Sayre, E.C. (2016) "Algorithmic, Conceptual, and Physical Thinking:

A Framework for Understanding Student Difficulties in Quantum Mechanics” *Proceedings of the 2016 International Conference of the Learning Sciences*

3. Modir, B, Irving, P.W., Wolf, S.F, and Sayre, E.C. (2015) “Learning about the Energy of a Hurricane System through an Estimation Epistemic Game”, *Physics Education Research Conference Proceedings 2014* [link](#)
4. Ghorbanzadeh, M., Lotfalipour, R., Modir, B., Mahdian, A. (2011) “Effects of pre-ionization on molecular breakdown dynamic in natural gas electrical discharge”, *Proceedings of the 2011 Iranian Physics Conference*
5. Ghorbanzadeh, M., Lotfalipour, R., Modir, B. (2010) “Direct methane conversion to hydrogen and higher valuable hydrocarbons by the pulsed plasma”, *Proceedings of the 2010 Iranian Physics Conference*

Invited Talks

1. “An online community of practice of physics educators: formation, participation and engagement” B. Modir. *American Physical Society*, Virtual, 2021 April Meeting
2. “Participation in online classroom communities” B. Modir, M. Magno, R. Lock and W. G. Newton. *American Association of Physics Teachers National Meeting*, Virtual, 2020 July

Contributed Talks by BM

1. “Formation of an online Community of Practice and its Application” B. Modir, R. Lock and W. G. Newton. *Partnership for Integration of Computation into Undergraduate Physics*, Virtual, 2020 June
2. “Impact of online discussion in forming a community of practice for educators” B. Modir, R. Lock and W. G. Newton. *American Association of Physics Teachers National Meeting*, Provo UT, 2019 July
3. “Best practices in designing and teaching online graduate courses” B. Modir, R. Lock and W. G. Newton. *American Association of Physics Teachers National Meeting*, Washington DC, 2018 July
4. “How students mathematize in upper-division physics theory courses?” B. Modir (presenter), and N Weliweriya. *Physics Education Research Conference-Parallel Session*, Cincinnati OH, 2017 July
5. “Looking ahead” as an extended readout strategy in Electromagnetism I course” B. Modir, and E.C. Sayre. *American Association of Physics Teachers National Meeting*, Cincinnati OH, 2017 July
6. “How Do Students “Look ahead” When Solving Problems In Electromagnetic Fields?”. B. Modir, and E.C. Sayre, *K-State GRAD Forum*, Kansas State University, 2017 March
7. “Framing Difficulties in Quantum Mechanics” B. Modir, J.D.Thompson, and E.C. Sayre. *American Association of Physics Teachers National Meeting*, Sacramento CA, 2016 July
8. “A Framework for Analyzing Students’ Difficulties in Quantum Mechanics”. B. Modir, and E.C. Sayre, *K-State GRAD Forum*, Kansas State University, 2016 March
9. “Effect of Visual Cues and Display Design on Solving Conceptual Tasks” B. Modir, X. Wu, J. Hutson, L.C. Loschky, and N.S. Rebello. *American Association of Physics Teachers National Meeting*, College Park MD, 2015 July
10. “Methane conversion to hydrogen and more valuable hydrocarbons by repetitive pulsed plasma” M. Ghorbanzadeh, R. Lotfalipour, B. Modir, *Proceedings of the Iranian Physics Conference*, 2010 September
11. “Direct methane conversion to hydrogen and higher valuable hydrocarbons by the pulsed plasma” M. Ghorbanzadeh, R. Lotfalipour, B. Modir, *Proceedings of the Iranian Physics Conference*, 2010 September

Contributed Posters by BM

1. “A new online course on computational waves for high school physics teachers” B. Modir, R. Lock and W. G. Newton. *Physics Teacher Education Conference*, Virtual, 2021 March
2. “Applying Social Network Analysis to an online community of practice for high school teachers” B.

Modir, M. Nadeau, R. Lock and W. G. Newton. *Physics Teacher Education Conference*, Denver CO, 2020 March

3. "Impact of online discussion in forming a community of practice for educators" B. Modir, R. Lock and W. G. Newton, *Physics Education Research Conference*, Provo UT, 2019 July
4. "Impact of online discussion in forming a community of practice of educators" B. Modir, R. Lock and W. G. Newton, *Physics Teacher Education Conference*, Boston MA, 2019 March
5. "Unpacking separation of variables in partial differential equations in quantum mechanics" B. Modir, and E.C. Sayre, *Physics Education Research Conference*, Cincinnati OH, 2017 July
6. "'Looking ahead" as an extended readout strategy in Electromagnetism I course" B. Modir, and E.C. Sayre. *Transforming Research in Undergraduate STEM Education*, St. Paul, MN, 2017 July
7. "'Bringing out" as a procedural resource when solving partial differential equations" B. Modir, and E.C. Sayre, *Research and the State Forum*, Kansas State University, 2016 November
8. "'Pulling out" as a procedural resource when solving partial differential equations" B. Modir, and E.C. Sayre, *Physics Education Research Conference*, Sacramento CA, 2016 July
9. "How does Applying the Gestalt Grouping Principle on the Display Design Influence Students' Reasoning? " B. Modir, A. Agra, J. Hutson, L.C. Loschky, and N.S. Rebello., *Physics Education Research Conference*, College Park MD, 2015 July
10. "Learning About The Energy Of A Hurricane System Through An Estimation Epistemic Game". B. Modir and E.C. Sayre, *Physics Education Research Conference*, Minneapolis MN, 2014 July
11. Ghorbanzadeh, M., Lotfalipour, R., Modir, B., Mahdian, A. "Methane Conversion by Pulsed Plasma: The Effect of Pre-ionization", *The World Congress on Engineering and Technology*, Shanghai China, 2011 October

Teaching Experience

- Summer 2020 "Computational Waves for Educators", online course development from scratch" (graduate), *Texas A&M University-Commerce*, Department of Physics & Astronomy.
- Spring 2020 "Teaching and Learning Physics" (undergraduate), *Texas A&M University-Commerce*, Department of Physics & Astronomy.
- Fall and Spring 2018- Current "University Physics I & II" (undergraduate), *Texas A&M University-Commerce*, Department of Physics & Astronomy.
- Fall 2019 "Quantum Mechanics for Educators" (online graduate), *Texas A&M University-Commerce*, Department of Physics & Astronomy.
- Summer 2018-2019 "Classical Mechanics for Educators" (online graduate), *Texas A&M University-Commerce*, Department of Physics & Astronomy.
- Spring 2018 Adjunct Faculty in the course "Electricity and Magnetism for Educators" (online graduate), *Texas A&M University-Commerce*, Department of Physics & Astronomy.
- Fall 2017 Adjunct Faculty in the course "Physics Mathematical Methods for Educators" (online graduate), *Texas A&M University-Commerce*, Department of Physics & Astronomy.
- Fall 2017 Adjunct Faculty in the course "Thermodynamics for Educators" (online graduate), *Texas A&M University-Commerce*, Department of Physics & Astronomy.
- Spring 2016 Graduate Teaching Assistant in the Lab "General Physics 1" (undergraduate), *Kansas State University*, Department of Physics.
- Fall 2015 Graduate Teaching Assistant in the course "Physics for Policymakers" (online undergraduate), *Kansas State University*, Department of Physics.

- Fall 2015 Graduate Teaching Assistant in the course “Physics for Policymakers” (undergraduate), *Kansas State University*, Department of Physics.
- Fall 2015 Graduate Teaching Assistant in three Labs “General Physics 2” (undergraduate), *Kansas State University*, Department of Physics.
- Spring- Graduate Teaching Assistant in the course “Physics for Policymakers”, online course
Summer development from the face-to-face version of the course” (undergraduate), *Kansas State University*, Department of Physics.
- Fall 2014 Graduate Teaching Assistant in the course “Physics for Policymakers” (undergraduate), *Kansas State University*, Department of Physics.
- Summer Graduate Teaching Assistant in the Lab “General Physics 1” (undergraduate), *Kansas State University*, Department of Physics.
- Spring 2014 Graduate Teaching Assistant in the Lab “General Physics 2” (undergraduate), *Kansas State University*, Department of Physics.
- Fall 2013 Graduate Teaching Assistant in the course “Concepts of Physics” (undergraduate), *Kansas State University*, Department of Physics.
- Fall 2011 Graduate Teaching Assistant in the course “Classical Mechanics I” (undergraduate), *University of Tehran*, Department of Chemistry.
- Fall 2011 Graduate Teaching Assistant in the course “Classical Mechanics I” (undergraduate), *University of Tehran*, Department of Biotechnology.

Community partnerships

- SPS Faculty Dallas ISD STEM EXPO, SPS outreach Virtual presentation, 2021
advisor
- SPS Faculty Dallas ISD STEM EXPO, SPS outreach presentation in Dallas, TX, 2020
advisor
- Workshop Cast Workshop, Cast conference in Dallas, TX, 2019
Co-leader
- Workshop Physics Day, Texas A&M University-Commerce, 2018-2021
Co-leader
- Workshop Research camp for three high school students, Texas A&M University-Commerce, 2019
Co-leader
- Workshop Noyce Workshop, Texas A&M University-Commerce, 2019-2021
Co-leader
- Workshop GROW program for middle school girls, Kansas State University, 2016-2017
leader

Reviewing

- *Physical Review Physics Education Research and Proceedings of the Physics Education Research Conference*

Affiliations

- *American Association of Physics Teachers*
- *Golden Key International Honour Society*