

WAYNE STATE UNIVERSITY

Professional Record  
Faculty

NAME: Nausheen R. Shah

OFFICE ADDRESS: Rm 362, Physics Building  
Department of Physics & Astronomy  
Wayne State University  
Detroit, MI 48201

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DEPARTMENT/COLLEGE: Physics and Astronomy / Liberal Arts and Science

PRESENT RANK & DATE OF RANK: Associate Professor, 09/30/2022

WSU APPOINTMENT HISTORY:

Year Appointed/Rank: Fall 2022, Associate Professor  
Fall 2015, Assistant Professor  
Fall 2016, Modified Duties  
Academic year 2020 - 21, Halt of tenure clock  
Academic year 2016 - 17, Halt of tenure clock

Year Awarded Tenure: 2022

Year Promoted to Associate Professor: 2022

Year Promoted to Full Professor:

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CITIZEN OF: USA

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EDUCATION:

Baccalaureate:

B.Sc. Highest Distinction with Joint Honors in Physics & Mathematics,  
George Mason University, Fairfax VA, 2001

Graduate:

Ph.D. (Physics): The University of Chicago, Chicago IL, 2009

Postgraduate (postdoctoral):

Fermi National Accelerator Laboratory, Batavia IL, 2009 - 12  
University of Michigan, Ann Arbor MI, 2012 - 15

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**FACULTY APPOINTMENTS AT OTHER INSTITUTIONS (Years and Rank):**

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**PROFESSIONAL SOCIETY MEMBERSHIP(S):**American Physical Society

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**HONORS/AWARDS:**

- Wayne State University
    - Junior Faculty Award, Academy of Scholars, WSU, 2022.
    - Profiles in Warrior Strong, Board of Governors Recognition, WSU, 2021.
    - Richard J. Barber Faculty Award, Dept. of Physics, 2019.
  - Aspen Center for Physics
    - Sloan Foundation Award, 2022.
    - Paula Johnson Family Gift Award, 2021.
    - Paula Johnson Family Gift Award, 2018.
  - University of Chicago
    - Bloomenthal Research Fellow, Dept. of Physics, 2008 - 9.
    - GAANN (Graduate Assistance in Areas of National Need) Teaching Fellow, Dept. of Education, 2007 - 8.
  - George Mason University
    - Dean's Scholar, 1998 - 2001.
    - Outstanding Physics Senior Award, 2001.
    - Outstanding Physics Junior Award, 2000.
    - Member Sigma Pi Sigma, 2000.
    - Member National Society of Collegiate Scholars, 1999.
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**BIOGRAPHICAL CITATIONS (National/Regional or Professional Directories):**

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**I. TEACHING**

- A. Years at Wayne State: 2015 - present
- B. Years at Other Colleges/Universities (please list)
- C. Courses Taught at Wayne State in Last Three Years

- 1. Undergraduate

- Physics 1020 lecture: F22

- Physics 1020 lecture: F20

- 2. Graduate

- Physics 6400: W23

- Physics 6400: W22

- Physics 7060: F21

- Physics 8810: W21

- Physics 7060: W20

- 3. Graduate Professional School

- D. Essays/Theses/Dissertations Directed

- 1. Students by Name, Level, Title of Project, Year

- a) Undergraduate Students

- Janice Gibbons, Med-Direct Scholar WSU, Graduated 2020.

- “The Search for Dark Matter: Self-Annihilation via Pseudoscalar Mediation”, Poster presentation, ReBUILD & Wayne Med-Direct, University of Detroit Mercy, July 18, 2018.

- “Higgs Portal Dark Matter in the Absence of Direct Detection”, Poster presentation, ReBUILD & Wayne Med-Direct, University of Detroit Mercy, July 16, 2019.

- “Higgs Portal Dark Matter in the Absence of Direct Detection,” Poster presentation, NCUR 2020, Montana State University, March 26, 2020 (Cancelled due to COVID-19).

- Nicolas Tedesco, Honors Thesis WSU, Graduated 2020.

- “Experiences in Researching Two Higgs Doublet Models + Singlets”, Honors Thesis, Dept. of Physics and Astronomy, Dec 2020.

- Diana Forbes, Junior Purdue University, “Higgs Portal to Dark Matter”, REU, 2018.

- b) Graduate Students

- Sebastian Baum, PhD student, Stockholm  
Graduated F19, postdoc Stanford.

- “Dark Matter, Ancient Rocks, a Band of Higgs Bosons, and a Big Collider: or, Models of New Physics and Some Ways to Probe Them.”

- Annamarie Formicola,  
Masters, Aug 2020.

“Educating the Experts: Pedagogy for Physics Graduate Teaching Assistants”

2020 Garrett T. Heberlein Excellence in Teaching Award.

2020-21 Emil and John & Mary Kaczor Endowed Graduate Teaching Assistant Award.

- Suneth Jayawardana, Fifth year PhD student

Passed qualifying exam and prospectus Aug 2020.

“Deconstructing Flavor”, Poster presentation, WSU 10th Annual Graduate Postdoctoral Research Symposium, Mar 3, 2020.

“Deconstructing Flavor”, Talk, MASAL Conference, Lawrence Tech U., Mar 13, 2020 (Cancelled due to COVID-19).

## 2. Ph.D. Thesis Committees

- Sam Carey, 2021 - Present

- Songwei Li, 2021 - Present

- Ethan Partington, 2020 - Present

- Cody Grant, 2017 - 2022

- Renae Conlin 2019 - 2021

## E. Course or Curriculum Development

a) W19: Phys 8810, Advanced Particle Physics (lecture 2.5 hrs/week). This graduate course has been offered in previous years with a heavy experimental focus. I have redesigned the course to be theory focused. Additionally, instead of traditional homework assignments, a short weekly homework quiz tests student learning. An individual student final project is introduced instead of the final exam. This project consist of a short paper, about 5 pages, and a 15 minutes presentation at the end of the semester. This approach provides the students much needed presentation experience, and teaches them collaborative skills essential for success in research.

b) F19 - F20: I supervised Annamarie Formicola for her Masters’s thesis in Physics Education Research. Her main project has been the development of a graduate training course (PHY 6992), in collaboration with Dr. Jon Troyer. This is a 1-credit course, which covers GTA professional development and pedagogical theory. This course is designed to support GTA responsibility to provide our undergraduates with a high-quality education. In addition, the GTAs will hone transferable skills that enhance their professional development whatever their intended career path. Annamarie has had responsibility for assisting with content development and administration, in-Class Observations of GTAs, creating a Teaching Portfolio Template, designing entrance/exit surveys, and providing feedback to GTAs during micro-teaching exercises and lab simulations.

## F. Course Materials (Unpublished)

## II. RESEARCH

### A. Research in Progress, Not Funded

#### 1. Not Funded

Title: "The Higgs & Dark Matter Lamp Posts for Physics at the Weak Scale"  
PI: N. R. Shah  
Source: National Science Foundation CAREER  
Period: 08/01/2018–07/31/2023  
Amount: \$699,249 (100% for Shah)  
Outcome: Not Funded. I was rated Excellent and it is not clear why I was not awarded.

#### 2. Not Funded

Title: "The Higgs and Dark Matter Lamp Posts for Physics at the Weak Scale"  
PI: N. R. Shah  
Source: Department of Energy Early Career Research Program  
Period: 05/15/2017–07/14/2022  
Amount: \$1,046,873 (100% for Shah)  
Outcome: Not Funded.

#### 3. Not Funded

Title: "The Higgs and Dark Matter Lamp Posts for Physics at the Weak Scale"  
PI: N. R. Shah  
Source: National Science Foundation  
Period: 09/01/2016–8/31/2019  
Amount: \$577,639 (100% for Shah)  
Outcome: Not Funded. The panel recommendation was for proposal to be funded and it was placed in the "Must Fund" category.

## B. Funded Research in Last Five Years

Title: "Particle Physics Research Program (Task-B: HEP Theory)"  
PI: G. Paz, A. Petrov & N. R. Shah  
Source: Department of Energy  
Period: 07/01/2022–03/31/2026  
Amount: \$ 550,000 (27% for Shah)  
Outcome: Funded

Title: "The Naturally Unnatural Standard Model: Symmetry Remnants at the Weak Scale"  
PI: N. R. Shah  
Source: Department of Energy  
Period: 10/01/2020–03/31/2022  
Amount: \$ 82,000 (100% for Shah)  
Outcome: Funded

Title: "Particle Physics Research Program (Task-B: HEP Theory)"  
PI: G. Paz, A. Petrov & N. R. Shah  
Source: Department of Energy  
Period: 04/01/2018–03/31/2022  
Amount: \$ 614,000 (27% for Shah)  
Outcome: Funded

## C. Fellowships/Grants/Special Awards in Last Five Years

Title: "RAPID: PUR◊GEM"  
PI: N. R. Shah  
Source: National Science Foundation  
Period: 06/01/2021–05/31/2022  
Amount: \$ 50,000 (100% for Shah)  
Outcome: Funded.

Title: "A Rainbow of Dark Sectors (Winter Aspen Conference 2021)"  
PI: C. Prescod-Weinstein (U. New Hampshire), N. R. Shah & T. Yu (U. of Oregon)  
Source: Heising-Simons Foundation  
Period: 10/01/2020–11/30/2021  
Amount: \$ 92,000 (33% for Shah)  
Outcome: Funded. The funding is being handled by U. of New Hampshire.

Title: "Society of Underrepresented Physics Educators and Researchers (SUPER)"  
PI: N. R. Shah  
Source: American Physical Society Women In Physics Grant  
Period: 01/01/2020–12/31/2021  
Amount: \$ 1,000 (100% for Shah)  
Outcome: Funded. The original term of the grant was till 12/31/2020. We have been granted an extension till 12/31/2021 due to the current pandemic.

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### III. PUBLICATION

#### A. Scholarly Books Published

1. Authored
2. Co-Authored

#### B. Chapters Published

1. Authored
2. Co-Authored

#### C. Editorships of Books/Proceedings

#### D. Journal Articles Published

**Note:** In theoretical high energy physics the order of the authors is traditionally listed **alphabetically**. The Snowmass reports, while not technically published in a refereed journal, have been thoroughly reviewed by the community and present the summarized views of the community on the future of the field (to be ultimately used to make the physics case to Congress for future funding).

- 1) Refereed Journals

1. **“The Future of US Particle Physics–The Snowmass 2021 Energy Frontier Report,”**  
M. Narain, et al.,  
arXiv:2211.11084 [hep-ex].
2. **“ Report of the Topical Group on Physics Beyond the Standard Model at Energy Frontier for Snowmass 2021,”**  
T. Bose, et al.,  
arXiv:2209.13128 [hep-ph].
3. **“The Tiny ( $g-2$ ) Muon Wobble from Small- $\mu$  Supersymmetry,”**  
S. Baum, M. Carena, N. R. Shah and C. E. M. Wagner,  
arXiv:2104.03302 [hep-ph].  
JHEP **01**, 025 (2022).
4. **“Higgs Alignment and Novel CP-Violating Observables in 2HDM,”**  
I. Low, N. R. Shah and X. P. Wang,  
arXiv:2012.00773 [hep-ph].  
Phys. Rev. D **105**, no.3, 035009 (2022).
5. **“Nucleation is More than Critical – A Case Study of the Electroweak Phase Transition in the NMSSM,”**  
S. Baum, M. Carena, N. R. Shah, C. E. M. Wagner and Y. Wang,  
arXiv:2009.10743 [hep-ph].  
JHEP **03**, 055 (2021).
6. **“Return of the WIMP: Missing energy signals and the Galactic Center excess,”**  
M. Carena, J. Osborne, N. R. Shah and C. E. M. Wagner,  
arXiv:1905.03768 [hep-ph].  
Phys. Rev. D **100**, no. 5, 055002 (2019)
7. **“ $\nu$  solution to the strong CP problem,”**  
M. Carena, D. Liu, J. Liu, N. R. Shah, C. E. M. Wagner and X. P. Wang,  
[arXiv:1904.05360 [hep-ph].  
Phys. Rev. D **100**, no. 9, 094018 (2019)
8. **“The NMSSM is within Reach of the LHC: Mass Correlations & Decay Signatures,”**  
S. Baum, N. R. Shah and K. Freese,  
arXiv:1901.02332 [hep-ph].  
JHEP **1904**, 011 (2019)



9. **“Supersymmetry and LHC Missing Energy Signals,”**  
M. Carena, J. Osborne, N. R. Shah and C. E. M. Wagner,  
arXiv:1809.11082 [hep-ph].  
Phys. Rev. D **98**, no. 11, 115010 (2018)
10. **“Two Higgs Doublets and a Complex Singlet: Disentangling the Decay Topologies and Associated Phenomenology,”**  
S. Baum and N. R. Shah,  
arXiv:1808.02667 [hep-ph].  
JHEP **1812**, 044 (2018)
11. **“Higgs Portals for Thermal Dark Matter - EFT Perspectives & the NMSSM -,”**  
S. Baum, M. Carena, N. R. Shah and C. E. M. Wagner,  
arXiv:1712.09873 [hep-ph].  
JHEP **1804**, 069 (2018)
12. **“Stop Co-Annihilation in the Minimal Supersymmetric Standard Model Revisited,”**  
A. Pierce, N. R. Shah and S. Vogl,  
arXiv:1706.01911 [hep-ph].  
Phys. Rev. D **97**, no. 2, 023008 (2018)
13. **“NMSSM Higgs boson search strategies at the LHC and the mono-Higgs signature in particular,”**  
S. Baum, K. Freese, N. R. Shah and B. Shakya,  
[arXiv:1703.07800 [hep-ph]].  
Phys. Rev. D **95**, no. 11, 115036 (2017)
14. **“Double peak searches for scalar and pseudoscalar resonances at the LHC,”**  
M. Carena, P. Huang, A. Ismail, I. Low, N. R. Shah and C. E. M. Wagner,  
arXiv:1606.06733 [hep-ph]  
Phys. Rev. D **94**, no. 11, 115001 (2016)
15. **“Closing the Wedge: Search Strategies for Extended Higgs Sectors with Heavy Flavor Final States,”**  
S. Gori, I. W. Kim, N. R. Shah and K. M. Zurek,  
arXiv:1602.02782 [hep-ph]  
Phys. Rev. D **93**, no. 7, 075038 (2016)
16. **“MSSM A-funnel and the Galactic Center Excess: Prospects for the LHC and Direct Detection Experiments,”**

K. Freese, A. Lopez, N. R. Shah and B. Shakya,  
arXiv:1509.05076 [hep-ph]  
JHEP **1604**, 059 (2016)

17. **“On the Alignment Limit of the NMSSM Higgs Sector”**  
M. Carena, H. E. Haber, I. Low, N. R. Shah and C. E. M. Wagner.  
arXiv:1510.09137 [hep-ph]  
Phys. Rev. D **93**, no. 3, 035013 (2016).
18. **“Anatomy of Coannihilation with a Scalar Top Partner”**  
A. Ibarra, A. Pierce, N. R. Shah and S. Vogl.  
arXiv:1501.03164 [hep-ph]  
Phys. Rev. D **91**, no. 9, 095018 (2015).
19. **“Complementarity between Nonstandard Higgs Boson Searches and Precision Higgs Boson Measurements in the MSSM”**  
M. Carena, H. E. Haber, I. Low, N. R. Shah and C. E. M. Wagner.  
arXiv:1410.4969 [hep-ph]  
Phys. Rev. D **91**, no. 3, 035003 (2015).
20. **“NMSSM Interpretation of the Galactic Center Excess”**  
C. Cheung, M. Papucci, D. Sanford, N. R. Shah and K. M. Zurek.  
arXiv:1406.6372 [hep-ph]  
Phys. Rev. D **90**, no. 7, 075011 (2014).
21. **“Impersonating the Standard Model Higgs Boson: Alignment without Decoupling”**  
M. Carena, I. Low, N. R. Shah and C. E. M. Wagner.  
arXiv:1310.2248 [hep-ph]  
JHEP **1404**, 015 (2014).
22. **“Light Stops, Light Staus and the 125 GeV Higgs”**  
M. Carena, S. Gori, N. R. Shah, C. E. M. Wagner and L. T. Wang.  
arXiv:1303.4414 [hep-ph]  
JHEP **1308**, 087 (2013).
23. **“Vacuum Stability and Higgs Diphoton Decays in the MSSM”**  
M. Carena, S. Gori, I. Low, N. R. Shah and C. E. M. Wagner.  
arXiv:1211.6136 [hep-ph]  
JHEP **1302**, 114 (2013).
24. **“Indirect Probes of the MSSM after the Higgs Discovery”**  
W. Altmannshofer, M. Carena, N. R. Shah and F. Yu.

- arXiv:1211.1976 [hep-ph]  
JHEP **1301**, 160 (2013).
25. **“The pMSSM Interpretation of LHC Results Using Renormalization Group Invariants”**  
M. Carena, J. Lykken, S. Sekmen, N. R. Shah and C. E. M. Wagner.  
arXiv:1205.5903 [hep-ph]  
Phys. Rev. D **86**, 075025 (2012)
26. **“Light Stau Phenomenology and the Higgs  $\gamma\gamma$  Rate”**  
M. Carena, S. Gori, N. R. Shah, C. E. M. Wagner and L. T. Wang.  
arXiv:1205.5842 [hep-ph]  
JHEP **1207**, 175 (2012)
27. **“A 125 GeV SM-like Higgs in the MSSM and the  $\gamma\gamma$  rate”**  
M. Carena, S. Gori, N. R. Shah and C. E. M. Wagner.  
arXiv:1112.3336 [hep-ph]  
JHEP **1203**, 014 (2012)
28. **“Light Dark Matter and the Electroweak Phase Transition in the NMSSM”**  
M. Carena, N. R. Shah and C. E. M. Wagner.  
arXiv:1110.4378 [hep-ph]  
Phys. Rev. D **85**, 036003 (2012)
29. **“SUSY-Breaking Parameters from RG Invariants at the LHC”**  
M. Carena, P. Draper, N. R. Shah and C. E. M. Wagner.  
arXiv:1011.4958 [hep-ph]  
Phys. Rev. D **83**, 035014 (2011)
30. **“Determining the Structure of Supersymmetry-Breaking with Renormalization Group Invariants”**  
M. Carena, P. Draper, N. R. Shah and C. E. M. Wagner.  
arXiv:1006.4363 [hep-ph]  
Phys. Rev. D **82**, 075005 (2010)
31. **“A Heavy Higgs and a Light Sneutrino NLSP in the MSSM with Enhanced SU(2) D-terms”**  
A. D. Medina, N. R. Shah and C. E. M. Wagner.  
arXiv:0904.1625 [hep-ph]  
Phys. Rev. D **80**, 015001 (2009)
32. **“Gauge-Higgs Unification, Neutrino Masses and Dark Matter in**

**Warped Extra Dimensions”**

M. Carena, A. D. Medina, N. R. Shah and C. E. M. Wagner.

arXiv:0901.0609 [hep-ph]

Phys. Rev. D **79**, 096010 (2009)

33. **“Collider phenomenology of gauge-Higgs unification scenarios in warped extra dimensions”**

M. Carena, A. D. Medina, B. Panes, N. R. Shah and C. E. M. Wagner.

arXiv:0712.0095 [hep-ph]

Phys. Rev. D **77**, 076003 (2008)

34. **“Gauge-Higgs Unification and Radiative Electroweak Symmetry Breaking in Warped Extra Dimensions”**

A. D. Medina, N. R. Shah and C. E. M. Wagner.

arXiv:0706.1281 [hep-ph]

Phys. Rev. D **76**, 095010 (2007)

35. **“Gravitons and dark matter in universal extra dimensions”**

N. R. Shah and C. E. M. Wagner.

hep-ph/0608140

Phys. Rev. D **74**, 104008 (2006)

36. **“Dimer Decimation and Intricately Nested Localized-Ballistic Phases of Kicked Harper”**

T. Prosen, I. I. Satija and N. R. Shah.

nlin/0102011 [nlin.CD]

Phys. Rev. Lett. **87**, 066601 (2001)

37. **“Collision and symmetry-breaking in the transition to strange nonchaotic attractors”**

A. Prasad, R. Ramaswamy, I. I. Satija and N. R. Shah.

chao-dyn/9909039

Phys. Rev. Lett. **83**, 4530 (1999)

2) Invited Review Articles

38. White Paper: **“Early-Universe Model Building,”**

P. Asadi, et al.,

arXiv:2203.06680 [hep-ph].

Contribution to 2022 Snowmass Summer Study.

39. White Paper: **“Higgs Boson Pair Production at Colliders: Status and Perspectives,”**

B. Di Micco, et al.,  
arXiv:1910.00012 [hep-ph].  
Rev. Phys. **5**, 100045 (2020)

3) Non-refereed Journals

40. **“The Deconstruction of Flavor in the Privately Democratic Higgs Sector,”**  
B. Bhattacharya, S. Jayawardana and N. R. Shah,  
(Draft in Preparation)
41. **“Benchmark Suggestions for Resonant Double Higgs Production at the LHC for Extended Higgs Sectors,”**  
S. Baum and N. R. Shah,  
arXiv:1904.10810 [hep-ph].  
Invited benchmarks produced for analysis by LHC collaborations.
42. **“Neutralino Dark Matter with Light Staus,”**  
A. Pierce, N. R. Shah and K. Freese.  
arXiv:1309.7351 [hep-ph]

E. Papers Published in Conference Proceedings

1) Refereed Papers

43. **“The Higgs and WIMP DM Lamp Posts for New Weak Scale Physics: EFT Perspectives and the NMSSM,”**  
N. R. Shah,  
arXiv:1812.10882 [hep-ph].  
Nucl. Part. Phys. Proc. **303-305**, 92 (2018)
44. **“Braneworld Graviton Interactions in Early Universe Phase Transitions,”**  
R. U. H. Ansari, C. Delaunay, R. Gwyn, A. Knauf, A. Sellerholm, N. R. Shah  
and F. R. Urban.  
hep-ph/0612321.  
Contribution to: Les Houches Summer School - Session 86: Particle Physics  
and Cosmology: The Fabric of Spacetime.

2) Nonrefereed Papers

F. Translations of Other Authors Published

1. Books
2. Articles or Creative Works

- G. Abstracts Published in Academic Journals
- H. Book Reviews Published
1. Academic Journals
  2. Magazines/Newspapers
- I. Creative Shows/Exhibits
1. Refereed or Judged: National Competition
  2. Refereed or Judged: Local/Regional Competition
  3. Not Refereed
- J. Creative Performances
1. Outside Metropolitan Area
  2. Metropolitan Area
  3. Campus
- K. Instructional Materials Formally Published
1. Textbooks
  2. Study Guides/Laboratory Workbooks
  3. Other Published Materials
    - Provisional Patent filed by WSU for **“PUR-GEM,” Nov 2020.**
    - Patent filed by WSU for **“PUR-GEM,” Nov 2021.**
    - Associated white papers

**“Personal Ultraviolet Respiratory Germ Eliminating Machine (PUR  
 ◇ GEM) for COVID-19,”**  
 N. R. Shah, *et al.*, arXiv:2011.09601 [physics.med-ph].

**“Personal Ultraviolet Respiratory Germ Eliminating Machine (PUR  
 ◇ GEM) for COVID-19: Prototype Development,”**  
 N. R. Shah, arXiv:2011.09604 [physics.med-ph].
- L. Papers Presented
- 1) Invited and/or Refereed Internationally or Nationally
    1. Plenary, ECLS of APS Fall 2022 Meeting, Lawrence Tech U., MI, Oct 22, 2022,  
 “The Naturally Unnatural Standard Model of Particle Physics.”
    2. Contribution to Plenary, 19th Workshop of the LHC Higgs Working Group, CERN (Virtual), Nov 28, 2022,  
 “Summary of LHC WG3 NMSSM Subgroup Activities.”
    3. Plenary, CERN – CKC Physics Beyond the SM, Jeju Island Korea, June 7, 2022,  
 “The SM- Like Higgs Alignment & the *W* Mass.”

4. Plenary, ATLAS/CMS Run 3 SUSY Workshop, CERN (Virtual), Nov 15, 2021,  
“SUSY in Electroweak & Higgs Sectors.”
5. Plenary, 20th Lomonosov Conference, Moscow Russia (Virtual), Aug 23, 2021,  
“WIMPS & Missing Energy Signals & the Galactic Center Excess.”
6. Plenary, (g-2) Days '21, (Virtual), June 2, 2021,  
“Small  $\mu$  SUSY & the Tiny (g-2) Muon Wobble.”
7. Invited talk, ILC IDT Working Group, (Virtual), May 27, 2021,  
“The ILC(?), SUSY, & the Tiny (g-2) Muon Wobble.”
8. Invited talk, ATLAS SUSY Working Group, CERN, Geneva (Virtual), May 6, 2021,  
“The LHC, SUSY & the Tiny (g-2) Muon Wobble.”
9. Invited talk, Snowmass Community Planning Meeting 2020, (Virtual), Oct 6, 2020,  
“Schrödinger’s WIMP: Dead or Alive? (Motivations and Benchmarks).”
10. Invited talk, LHC HXSWG Meeting, CERN, Geneva, Oct 17, 2019,  
“2HDM + S and the NMSSM: Benchmark Suggestions for HH Production.”
11. Plenary, In Search of New Physics using SMEFT, ANL, Oct 3, 2019,  
“Higgs Portals for Thermal Dark Matter: EFT/Simplified Model Perspectives & the NMSSM.”
12. Plenary, 6th DM@LHC 2019, U. of Washington, Seattle WA, Aug 14, 2019,  
“DM Theory in Higgs & SUSY (The Return of WIMPY DM).”
13. Plenary, Indirect Searches for New Physics Across the Scales, MITP, Mainz, Germany, July 02, 2019,  
“A  $\nu$  Solution to the Strong CP-Problem (Thoughts on Hierarchies across the scales ...)”
14. Plenary, LHC Higgs XS HH Meeting, CERN, Geneva, June 25, 2019,  
“2HDM + a complex S: Benchmark Suggestions.”
15. Plenary, Opportunities at Future High Energy Colliders, IFT-UAM, Madrid, Spain, June 21, 2019,  
“A  $\nu$  Solution to the Strong CP-Problem (No Opportunities at Future Colliders so far...)”
16. Invited talk, LHCP2019, Puebla Mexico, May 22, 2019,  
“The Return of WIMPY Dark Matter.”
17. Invited talk, SUSY2019, Texas A&M University, Corpus Christi TX, May 20, 2019,  
“THE Higgs and more Higgs, 2HDM + a complex S: Making Sense out of Chaos.”
18. Plenary, Double Higgs Productions at Colliders, FermiLab, Batavia IL, Sep 7, 2018,

- “THE Higgs and *more* Higgs, 2HDMS + a complex S: Making Sense out of Chaos.”
19. Plenary, 7th Workshop on Theory, Phenomenology and Experiments in Flavour Physics and the future of BSM physics, Capri Italy, June 10, 2018, “The Higgs and WIMP DM Lamp Posts for New Weak Scale Physics: EFT Perspectives and the NMSSM.”
  20. Plenary, Towards Dark Matter Discovery, KICP, U. of Chicago, Apr 13, 2018, “Higgs Portals for Thermal Dark Matter: EFT Perspectives and the NMSSM.”
  21. Plenary, US ATLAS Collaboration Meeting, ANL, July 28, 2017, “The Higgs (and Dark Matter) Lamp Posts for New Physics at the Weak Scale ”.
  22. Plenary, US CMS Collaboration Meeting, WSU, May 18, 2017, “The Higgs (and Dark Matter) Lamp Posts for New Physics at the Weak Scale ”.
  23. Baryon Lepton Violation 2017, Case Western Reserve University, Cleveland OH, May 15, 2017, “SM-like h125: Additional Scalars and their Expected Experimental Signatures ”.
  24. Plenary, New Physics Interpretations at the LHC, ANL, Apr 6, 2017, “SM-like h125: Additional Scalars and their Expected Experimental Signatures.”
  25. Plenary, LHC Higgs XS WG3 NMSSM Benchmark Meeting, CERN, Geneva, Feb 28, 2017, “Higgs Pheno Implications of the Aligned NMSSM”.
  26. Invited speaker SPS Undergraduate Research Conference, Wayne State University, Detroit, MI Nov 4, 2016, “The Future of Particle Physics: The Higgs, Dark Matter and the LHC”.
  27. Plenary, PIKIO Meeting, Ohio State University, Columbus OH, Sep 24, 2016, “Stop Co-annihilation”.
  28. Plenary, Particle Physics on the Verge of Another Discovery, Aspen Winter Conference 2016, Aspen CO, Jan 10-16, 2016, “We have the Higgs, Now What? SUSY Implications”.
  29. Plenary, ABHM First Annual International Workshop, University of Heidelberg, Heidelberg Germany, Dec 14-15, 2015, “The Galactic Center Excess: NMSSM Interpretation”.
  30. Plenary, Higgs Coupling 2015, Durham University, Durham UK, Oct 12-15, 2015, “We have the Higgs! Now What?”
  31. DPF 2015, Univ. of Michigan, Ann Arbor MI, Aug 7, 2015, “h125 & Natural Alignment in the Z3 NMSSM”.



32. Plenary, The 4th MCTP Spring Symposium, Univ. of Michigan, Ann Arbor MI, April 22, 2015,  
“h125 and Natural Alignment in the Z3 NMSSM”.
  33. Plenary, LHC Higgs XS WG3 Kick-off Meeting, CERN, Geneva, Oct 7, 2014,  
“Complementarity between Direct Searches & Precision Higgs Measurements in the MSSM.”
  34. SUSY at the Near Energy Frontier, Fermilab, Batavia IL, Nov 11-13 2013.  
“Light  $\tilde{\tau}_1$ , Dark Matter and EWkinos in the MSSM.”
  35. Plenary, LHC Results Forum, May 16 2013,  
“125 GeV Higgs in the Diphoton Channel and its Theoretical Implications.”
  36. Plenary, The first three years of the LHC, MITP Univ. of Mainz, Mainz Germany, March 18-22, 2013,  
“Light Stops, Light Staus & 125 GeV Higgs in the MSSM.”
  37. Plenary, Higgs Identification, KITP UCSB, Santa Barbara CA, Dec 17-21, 2012,  
“Higgs Discovery and an Enhanced  $\gamma\gamma$  Rate in the MSSM.”
  38. Aspen Center for Physics, Summer 2012 Workshop, Aspen CO, Aug 26-Sept 9 2012,  
“A 125 GeV Higgs, Light  $\tilde{\tau}$  and the  $\gamma\gamma$  rate in the MSSM.”
  39. Physics at LHC-2012, U British Columbia, Vancouver Canada, June 4-9 2012,  
“A 125 GeV Higgs, Light  $\tilde{\tau}$  and the  $\gamma\gamma$  rate in the MSSM.”
  40. Second MCTP Spring Symposium on Higgs Boson Physics, Univ. of Michigan, Ann Arbor MI, April 16-20, 2012,  
“The 125 GeV Higgs and the  $\gamma\gamma$  rate in the MSSM.”
  41. BLV2011, Gatlinburg, TN, Sep 22-4 2011,  
Poster on “Light Dark Matter and the Electroweak Phase Transition in the NMSSM.”
- 2) Invited and/or Refereed Locally/Regionally
- 3) Contributed
1. SUSY11, Fermilab, Batavia, IL, Aug 28-Sep 2 2011,  
“Light Dark Matter and the Electroweak Phase Transition in the NMSSM.”
  2. TH-LPCC Summer Institute on LHC Physics, CERN, Geneva, Switzerland, Aug 23-8 2011,  
“Light Dark Matter and the Electroweak Phase Transition in the NMSSM.”
  3. 2011 Phenomenology Symposium (PHENO), UW Madison, May 2011,  
“SUSY Breaking Parameters from Renormalization Group Invariants at the LHC.”

4. SUSY10, Bonn, Germany, Aug 23-28 2010,  
“Dissecting the SUSY Breaking Mechanism Using Renormalization Group Invariants.”
5. PLANCK 2010 Parallel Session, CERN, Geneva, Switzerland, June 2 2010,  
“Discriminating SUSY breaking scenarios using RG Invariants in the MSSM.”
6. PHENO 2010 Parallel Session, Madison WI, May 11 2010,  
“Renormalization Group Invariants in the MSSM.”
7. Low Energy Precision Electroweak Physics in the LHC Era, INT, Seattle WA, Sept 2008,  
“Gauge Higgs Unification Phenomenology in Warped Dimensions.”
8. Beyond the Standard Model: from the Tevatron to the LHC, Fermilab, Batavia IL, Sept 2008,  
“Gauge Higgs Unification Phenomenology in Warped Dimensions.”
9. Cosmo 08 Parallel Session, Madison WI, Aug 2008,  
“Gravitons & Dark Matter in Universal Extra Dimensions.”
10. TASI 2008, Boulder CO, June 2008,  
“Gauge Higgs Unification Phenomenology in Warped Dimensions.”
11. PHENO 2008 Parallel Session, Madison WI, April 2008,  
“Gauge Higgs Unification Phenomenology in Warped Dimensions.”
12. PHENO 2007 Parallel Session, Madison WI, May 2007,  
“Gauge Higgs Unification Phenomenology in Warped Dimensions.”
13. The Hunt for Dark Matter: A Symposium on Collider, Direct & Indirect Searches, Fermilab, Batavia IL May 2007,  
“Gravitons & Dark Matter in Universal Extra Dimensions.”
14. PASI Beyond the Standard Model in Cosmology, Astroparticle & Particle Physics, Puerto Vallarta Mexico, Oct 2006,  
Poster on “Gravitons & Dark Matter in Universal Extra Dimensions.”

#### M. Invited Seminars or Lectures Presented in Last Five Years

1. Colloquium, University of Toledo, Toledo OH, Feb 24, 2022,  
“The Naturally Unnatural Standard Model of Particle Physics,”
2. Lecture, HEP International School on Physics and Allied Disciplines, Islamabad Pakistan (Virtual), March 17, 2022,  
“Dark Matter: What? How? Where? Part 1.”
3. Lecture, HEP International School on Physics and Allied Disciplines, Islamabad Pakistan (Virtual), March 18, 2022,  
“Dark Matter: What? How? Where? Part II.”
4. Lecture, BCVSPIN (Virtual), Jan 11, 2022,  
“Beyond the Standard Model & Higgs - 2.”
5. Lecture, BCVSPIN (Virtual), Jan 10, 2022,  
“Beyond the Standard Model & Higgs - 1.”

6. Colloquium, Oakland University, Rochester MI, Dec 2, 2021,  
“The Naturally Unnatural Standard Model of Particle Physics.”
7. Colloquium, Wayne State University, Detroit MI, Oct 14, 2021,  
“The Naturally Unnatural Standard Model of Particle Physics.”
8. Lecture, 49th Stanford Linear Accelerator Center (SLAC) Summer Institute,  
Menlo Park CA (Virtual), Aug 18, 2021,  
“Beyond the Standard Model (BSM): Higgs II”
9. Lecture, 49th Stanford Linear Accelerator Center (SLAC) Summer Institute,  
Menlo Park CA (Virtual), Aug 17, 2021,  
“Beyond the Standard Model (BSM): Higgs I”
10. Colloquium, Aspen Center for Physics, Aspen CO, Aug 5, 2021,  
“The Naturally Unnatural Standard Model of Particle Physics”
11. Colloquium, U. of Illinois at Chicago, Chicago IL, Nov 6, 2019,  
“1, 2, 3, 4,... We Found the Higgs – *But Are There MORE?*”
12. Particle Physics Seminar, U. of Notre Dame, Notre Dame IN, Feb 06, 2019,  
“Higgs and Dark Matter: Absence of Evidence != Evidence of Absence?”
13. HEP Theory Seminar, U. of Wisconsin-Madison, Madison MI, Dec 7, 2018,  
“Higgs and Dark Matter: Absence of Evidence != Evidence of Absence?”
14. SPS Seminar, Lawrence Tech. U., Southfield MI, Nov 20, 2018,  
“The Higgs and Dark Matter: Are We There Yet?”
15. Graduate Student Seminar, Wayne State University, Nov 19, 2018,  
“The Future of Particle Physics: The Higgs, Dark Matter and the LHC.”
16. LCTP HEP Theory Seminar, U. of Mich. Ann Arbor MI, Oct 12, 2018,  
“Higgs and Dark Matter: Absence of Evidence != Evidence of Absence?”
17. REU Lecture, Wayne State University, May 4, 2018,  
“Introduction to Particle Physics.”
18. Graduate Student Seminar, Wayne State University, Dec 11, 2017,  
“The Future of Particle Physics: The Higgs, Dark Matter and the LHC.”
19. Colloquium, U. of Michigan-Dearborn, Dec 1, 2017,  
“The Future of Particle Physics: The Higgs, Dark Matter and the LHC.”
20. Particle Theory Seminar, SLAC, May 26, 2017,  
“Implications of the 125 GeV Higgs: Additional Scalars and their Expected  
Experimental Signatures ”.
21. Particle Theory Seminar, LBNL, Berkeley, CA, Nov 16, 2016,  
“Stop Co-Annihilation and the Higgs”.
22. Invited speaker SPS Undergraduate Research Conference, Wayne State Uni-  
versity, Detroit, MI Nov 4, 2016,  
“The Future of Particle Physics: The Higgs, Dark Matter and the LHC”.
23. Graduate Student Seminar, Wayne State University, Oct 24, 2016,  
“The Future of Particle Physics: The Higgs, Dark Matter and the LHC.”
24. Colloquium, Wayne State University, Detroit MI, Aug 17, 2015,  
“The Future of Particle Physics: The Higgs, Dark Matter & the LHC”.

25. LPC Topic of the week Seminar, Fermilab, Batavia IL, June 3, 2015, "Phenomenological Implications of the Naturally Aligned NMSSM".
26. Colloquium, Carleton University, Ottawa CA, March 23, 2015, "Higgs and Dark Matter: Complementary probes of New Physics at the Weak Scale."
27. HET Seminar, Brown University, Providence RI, Feb 18, 2015, "The 125 GeV Higgs and Dark Matter: Complementary Probes of New Physics at the Weak Scale."
28. ANL HEP Division Seminar, Argonne National Lab, Argonne, Nov 19, 2014, "Alignment & the Complementarity between Direct Searches & Precision Higgs Measurements in the MSSM."
29. HEP Seminar, MSU, East Lansing MI, Nov 21, 2013, "Impersonating the Standard Model Higgs Boson: Alignment without Decoupling"
30. Nuclear-Astronomy-Particle Seminar, Wayne State University, Detroit MI, April 12, 2013, "Light Stops, Light Staus & 125 GeV Higgs in the MSSM."

#### N. Other Scholarly Work

##### 1) Conferences attended without paper presentation

1. Aspen Center for Physics, Summer 2022 Workshop, Aspen CO, Aug 21 - Sep 11, 2022.
2. Snowmass Community Summer Study, Seattle WA, July 16 - 26, 2022.
3. Aspen Center for Physics, Summer 2021 Workshop, Aspen CO, July 25 - Aug 8, 2021.
4. Aspen Center for Physics, Summer 2019 Workshop, Aspen CO, Aug 11 - 31, 2019.
5. Aspen Center for Physics, Summer 2018 Workshop, Aspen CO, July 29 - Aug 12, 2018.
6. Probing Baryogenesis via LHC and Gravitational Wave Signatures, MITP Workshop, Mainz Germany, June 18- 29, 2018.
7. The Future of BSM Physics, MITP Workshop, Capri Italy, June 10-15, 2018.
8. LHCP 2018, Bologna Italy, June 4-9, 2018.
9. Aspen Center for Physics, Summer 2017 Workshop, Aspen CO, Aug 21-Sep 3, 2017.
10. DPF 2017, FNAL, Batavia IL, July 31-Aug 4, 2017.
11. Beyond the Standard Model, MCTP, U. of Michigan, Ann Arbor MI, Oct 10-12, 2016.
12. International Conference on High Energy Physics, Chicago IL, Aug 3-10, 2016.

13. Aspen Center for Physics, Higgs Working Group, Aspen CO, July 19-Aug 2, 2015.
14. 2015 Phenomenology Symposium (PHENO), U of Pittsburgh, May 4-6, 2015.
15. Aspen Center for Physics, Summer 2014 Workshop, Aspen CO, Aug 17-30, 2014.
16. Particlegeneration, KITP UCSB, Santa Barbara CA, May 27-June 13, 2014.
17. Aspen Center for Physics, Summer 2013 Workshop, Aspen CO, Aug 18-Sept 14 2013.
18. Snowmass on the Pacific, KITP UCSB, Santa Barbara CA, May 29-31, 2013.
19. Exploring TeV Scale New Physics with LHC Data, KITP UCSB, Santa Barbara CA, April 29-June 7, 2013.
20. Snowmass Energy Frontier Workshop, Brookhaven, Upton NY, April 3-6, 2013.
21. Aspen Center for Physics, Summer 2012 Workshop, Aspen CO, Aug 26-Sept 9 2012.
22. The Next Stretch of the Higgs Magnificent Mile, Northwestern, Chicago IL, May 14-16, 2012.
23. Chicago 2012 workshop on LHC physics, U of Chicago, Chicago IL, May 2-4, 2012.
24. Intensity Frontier Workshop, Rockville, MD, Nov 30-Dec 2 2011.
25. Muon Collider 2011, Telluride, CO, June 27-July 1 2011.
26. PreSUSY10, Bonn, Germany, Aug 19-21 2010.
27. Aspen Center for Physics, Summer 2010 Workshop, Aspen CO, June 6 - 27 2010.
28. Muon Collider Physics Workshop, Machine - Detector - Physics, Nov. 10-12, 2009.
29. Chris Quigg Symposium: Minute Particulars and Hidden Symmetries, Fermilab, Dec. 14-15, 2009.
30. Argonne National Laboratory-University of Chicago Joint Theory Institute Workshop on Strong Dynamics & Dynamical Chiral Symmetry Breaking, June 2007.
31. Les Houches Summer School on Particle Physics & Cosmology: The Fabric of Spacetime, Les Houches, France, Aug 2006.
32. Argonne National Laboratory-University of Chicago Collider Workshop, May 2006.
33. Great Lakes Strings Conference, UM, Ann Arbor, April 2006.
34. Argonne Theory Institute on Higgs, SUSY & Extra Dimensions, May 2005.
35. Argonne Workshop on QCD in extreme environments, June 2004.

36. Argonne Theory Institute on Higgs, SUSY & Extra Dimensions, May 2004.

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#### IV. SERVICE

- A. Administrative Appointments at Wayne State in Last Five Years
- B. Administrative Appointments at Other College/University in Last Five Years
- C. Committee Assignments in Last Five Years
  - 1. University Committee Chaired
  - 2. University Committee Membership
  - 3. College/Department Committee Chaired
    - APS Conference for Undergraduate Women in Physics, 2017
  - 4. College/Department Committee Membership
    - 2022-23:
      - Astro Hiring Committee
      - PAN Seminar
      - Diversity and Inclusion Committee
      - Faculty mentor, Society of Underrepresented Physics Educators and Researchers, (SUPER)
      - Website Redesign Committee
      - PhD Thesis Committee, Ethan Partington
    - 2021-22:
      - Astro Hiring Committee
      - Diversity and Inclusion Committee
      - Faculty mentor, Society of Underrepresented Physics Educators and Researchers, (SUPER)
      - Website Redesign Committee
      - PhD Thesis Committee, Ethan Partington
      - PhD Thesis Committee, Cody Grant
    - 2020-21:
      - Diversity and Inclusion Committee
      - Faculty mentor, Society of Underrepresented Physics Educators and Researchers, (SUPER)
      - Website Redesign Committee
      - PhD Thesis Committee, Ethan Partington
      - PhD Thesis Committee, Cody Grant
      - PhD Thesis Committee, Renae Conlin

- 2019-20:
  - CLAS Diversity and Inclusion Committee
  - Faculty mentor, Society of Underrepresented Physics Educators and Researchers, (SU-PER)
  - Website Redesign Committee
  - Undergraduate Recruitment Committee
  - PhD Thesis Committee, Cody Grant
  - PhD Thesis Committee, Renae Conlin
  
- 2018-9:
  - PhD Thesis Committee, Cody Grant
  - Publicity & Outreach Committee
  - Website Redesign Committee
  - BioPhysics Faculty Hiring Committee
  
- 2017-8:
  - PhD Thesis Committee, Cody Grant
  - Admissions & Recruitment Committee
  - Publicity & Outreach Committee
  - Website Redesign Committee
  - PHY 1020 Course committee
  - Secretary-General Faculty Meetings
  - General Education Curriculum Change
  
- 2016-7:
  - Website Redesign Committee
  - Phy 1020 course committee
  
- 2015-6:
  - Judge for WSU's SPS Undergraduate Research Conference Poster Session
  - Judge for DPF 2015 Poster Session at U of Mich.

D. Positions Held in Professional Associations in Last Five Years

E. Membership/Offices Held in Public or Private Agencies Related to Discipline in Last Five Years

F. Professional Consultation

1. Public Presentations as an Expert in Discipline
2. Testimony before Public Bodies
3. Consulting to Public Agencies, Foundations, Professional Associations  
**Expert Consult:** Grosse Pointe Public Schools Board of Education regarding ventilation and air purification relevant for Covid-19 mitigation measures in schools.

**Referee (Peer Reviewer):** DOE Grant reviewer, Physics Reports, Physical Review D, Journal of High Energy Physics, European Physical Journal C, Computer Physics Communications.

- 4. Consulting to Private Enterprises
- G. Journal/Editorial Activity
  - 1. Editorships
  - 2. Editorial Board Memberships
- H. Other Professionally Related Service

**Professional Development:**

- Attended APS New Faculty Workshop, June 2017

**Convener:**

- BSM: Model Specific Explorations, Energy Frontier, HEP Community Planning Exercise (a.k.a. Snowmass), (March 2020 - Summer 2022).
- NMSSM LHC Higgs XS Working Group, CERN (Nov 2019 - Nov 2023)
- SUSY Pheno sessions, SUSY2021 (Shanghai China, Aug 2021)
- Higgs sessions, ICHEP 2018 (Seoul Korea, 2018).
- SUSY sessions, LHCP 2018 (Bologna Italy, 2018).
- Higgs session, Chicago 2012 Workshop on LHC Physics (Chicago IL, 2012)
- SUSY Pheno session, SUSY2011 (FNAL, Batavia IL, 2011)

**Organizer:**

- “Bystander Workshop”, NSF GEARS, WSU, April 2023.
- “Probing the Mysteries of the Universe”, BCVSPIN (Bangladesh, China, Vietnam, Sri Lanka, Pakistan, India and Nepal) 2021, Jan 2022.
- “A Rainbow of Dark Sectors”, Aspen Winter Conference, 2021.
- Journal Club, HEP theory group, WSU, 2017-18.
- Chair of Local organizing committee, APS 2017 Conference for Undergraduate Women in Physics, WSU, Jan 2017.
- Workshop on “Beyond the Standard Model”, MCTP, Oct 2016.

**Community and Outreach:**

- CLAS - MiSci partnership, Physics Outreach, Michigan Science Center, Detroit MI, Dec 3, 2022.
- Q & A Clean Air Event, Michigan Parent Alliance for Safe Schools, (Virtual), June 30, 2022.



- Physics Demonstrations, Junior Insiders: Take Your Kid to Work Day, WSU Detroit MI, April 28, 2022.
- Physics Demonstrations 6-8th grades, Barack Obama Leadership Academy, Detroit MI, March 25, 2022.
- Quoted in: “A New Idea for How Dark Matter Came to Dominate the Universe”, Dec 23, 2021.
- Podcast, “A new force of nature?”, May 12, 2021.
- Interview, “Meet a Wayne Woman in STEM: Nausheen Shah”, March 15, 2021.
- Interview, “While Many Michiganders Made Masks and Delivered Meals, This Detroit Scientist Created an Air Purification Device” by Ellen Chamberlain, *The Gander*, Jan 25, 2021.
- Author, Strike For Black Lives ParticlesForJustice.org, June 10, 2020.
- Interview, “Scientists and Others Stage a #Strike4BlackLives” by Gary Stix, *Scientific American*, June 09, 2020 (quoted in multiple national and international press articles such as *Inside Higher Ed* etc.
- Judge for DM@LHC Poster Session at U of Washington, Seattle. Aug 13 -16, 2019.
- High School Debate Competition Judge, MIST Detroit 2019, WSU, March 30 - 31, 2019.
- Invited Panelist: Women in STEM, Heritage Junior High School, Sterling Heights MI, Nov 28, 2018.
- Invited Panelist: Diversity and Inclusion, LHC Users Meeting, FermiLab, Batavia IL, Oct 26, 2018.
- Author, HEP Community Statement ParticlesForJustice.org, Oct 5, 2018.
- High School Debate Competition Judge, MIST Detroit 2018, WSU, March 31- April 1, 2018.
- Interview Detroit radio 910 AM, “Between the Lines with Fatima Salman,” Recorded Aug 17, 2017.
- STEMinista 4th Grade Role Model Presentation, Carleton Elementary, Detroit MI, Nov 10, 2016.
- Participated in *Muslims for American Progress*, a project of the Institute for Social Policy and Understanding, Detroit MI, Oct 2016.
- Co-hosted *Physics Cafe*, Aspen CO, Jan 13, 2016.