Rick (P.W.) Mengyan, Ph.D.

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Education

2009–2014 TEXAS TECH UNIVERSITY (Lubbock, Texas)
Ph.D. Physics (May 2014)
Experimental Condensed Matter Physics
Dissertation: *Magnetism in Mn–Doped Chalcopyrites*
(Selected as Outstanding Graduating Ph.D.)

2007-2009 TEXAS TECH UNIVERSITY (Lubbock, Texas)
M.Sc. Physics (May 2009)

2003-2007 NORTHERN MICHIGAN UNIVERSITY (Marquette, Michigan)
B.Sc. Physics (May 2007)
Mathematics (May 2007)
(Minor) Psychology
Dean's List. Cum Laude. Lead trumpet in Jazz Ensemble B.
Physics Club, President (1 sem., elected). Physics club, Vice President (1 sem., elected).

Interests

Experimental condensed matter (Physics), solid-state material characterization, magnetism, semiconductors, superconductors, heavy fermion systems, astronomy, psychology, teaching, education, automotive/motorcycle mechanics and cross-country motorcycle touring

Experience Summary

08/2016-Present **ASSISTANT PROFESSOR**, Northern Michigan University, Physics

- Lecture courses taught:
  Statistical and Thermal Physics; Microcomputer Architecture; Quantum Mechanics; Modern Physics; Physics II; Physics I
- Coordinate and teach labs
  (*Microcomputer architecture, Modern Physics, Physics II* and *Physics I*)
- Maintain active experimental condensed matter (solid state) research program
- Mentor students; involve students in original research
- Service to international research community, university, college and department

05/2014-08/2016 **RESEARCH ASSOCIATE**, Texas Tech University, Physics

Experimental Condensed Matter

- Investigate magnetism and H impurities in Vanadium Oxide compounds
- Characterize early time history of H impurities in SiGe alloys
- Study H dynamics and stability in Transparent Conducting Oxides
- Mentor graduate and undergraduate researchers
- Write and present experiment proposals to national lab evaluation committees

Experience Summary

08/2014-08/2016 **INSTRUCTOR**, Texas Tech University, Physics

- Courses Taught:
  - *Intermediate Physics Lab* for Physics Majors;
    General Physics I (Calculus Based); *General Physics I* (Algebra Based)
- Teach lecture sections; TA training; coordinate lab and discussion sections

05/2009–05/2014 **GRADUATE RESEARCH ASSISTANT**, Texas Tech University, Physics

Experimental Condensed Matter

- Studied magnetism in dilute magnetic II-IV-V_2:Mn chalcopyrite semiconductors establishing a link between local and bulk magnetic features
- Probed local environment of many spin polaron candidate materials exhibiting features such as various types of magnetic order, high T_c superconductivity, magnetoresistance, frustration or heavy fermion behavior
- Investigated early time history of H defect in SiGe alloys via MuSR
- Characterized μ^+ behavior [c.f. H] in several transparent conducting oxides
- Studied Mu^0 and μ^+ [c.f. H] in II-IV-V_2 Chalcopyrites to determine and characterize H impurity states including stability and diffusion parameters

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Experience Details

08/2016−Present **ASSISTANT PROFESSOR,** Northern Michigan University, Physics

Teaching:

- Quantum Mechanics (upper-level/Majors course) [*Wint. '19*]
- Microcomputer Architecture (upper-level), Lecture and lab *[Fall '18, Wint. '19]*
- Statistical and Thermal Physics (upper-level/Majors course) [*Wint. '18*]
- Modern Physics (with lab) [*Wint. '17*]
- General Physics I (Algebra-based), Lecture and lab [*Fall '16, '17*; *Wint. '17*]
- General Physics II (Algebra-based), Lecture and lab
  [*Summer '17; Fall '17, '18; Wint. '18*]

Service duties on department, college and university levels

- Community outreach events such as Physics demos at university events, regional schools and the local children's museum; event supervisor and judge for the regional *Science Olympiad* competition
- Working with the department Physics club (events, outreach, meetings)
- Assist in developing and implementing departmental program assessments
- Mentoring undergraduates (independent research projects and academically)
- Faculty host at parent sessions during new student orientation
- System administrator of Physics department research server

Maintain an active research group [*experimental condensed matter physics*]

- Investigate magnetism and H impurities in Vanadium Oxide compounds
- Study H dynamics and stability in Transparent Conducting Oxides (e.g.: TiO_2)
- Characterize early time history of H impurities in SiGe alloys
- Study Mu Donor and Acceptor levels in Silicon Carbide
- Muonium−photocarrier interaction in Germanium
- Investigate role that H impurity plays in modifying electrical properties of BeO
- Contribute to developing the *Muon Spectroscopy of Excited States* technique for use with semiconductors

Service to International Research Community

- Appointed to serve on the *Muon Experimental Facility Access Panel* for *Rutherford Appleton Lab* (Didcot, UK) *[Began July '17]*

Experience Details

08/2014-08/2016 **INSTRUCTOR**, Texas Tech University, Physics

General Physics I (Algebra-based)

- Teach large lecture, coordinate labs, discussion and TA training [*Fall '14, Spring '15*]

Intermediate Physics Lab

- Upper-level (Physics major) lab-based course on advanced physical principles. Students complete independent experiments in solid state, atomic, nuclear, particle, relativity, electricity and magnetism complete with data acquisition, analyses and formal written reports. [*Spring '15, '16*]

General Physics I (Calculus-based)

- Teach large lecture, coordinate labs, discussion and TA training [*Fall '15, Spring '16*]

05/2014−Present **POSTDOCTORAL RESEARCH ASSOCIATE**, Texas Tech University, Physics

Experimental Condensed Matter

PRIMARY RESPONSIBILITIES:

- Plan and conduct original research on semiconductors and magnetic systems
- Write and present experiment proposals to the evaluation committees to apply for the use of a variety of instruments at national labs *(TRIUMF, Vancouver, BC, Canada; Rutherford Appleton Lab, Didcot, UK; Oak Ridge National Lab, Oak Ridge, TN, USA)*.
- Plan and conduct experiments at these facilities and supporting electrical and magnetic characterization measurements in our local lab
- Analyze and interpret data including relevant modelling and simulations
- Report results (e.g. publications, conference presentations, internal reports for labs and other professional correspondence)
- Supervise, train and assist group members (graduate and undergraduate students) in all aspects of their research

SELECT PRIMARY RESEARCH PROJECTS [ACTIVE]:

- Formation, stability and dynamics of Muonium in TiO_2 (PI)
  Muon spin rotation and relaxation measurements with and without IR optical excitation are underway to explore the **dynamics and Mu^0 formation in TiO_2**. These experiments also serve to study the validity of the Muonium analog to a Hydrogen impurity in semiconductors.
- Magnetism and characteristics of Hydrogen in VO_2 compounds (PI)
  To date, we have completed muon spin rotation and relaxation, X-ray diffraction and neutron scattering measurements in an effort to characterize the fundamental properties of VO_2 compounds including the **newly discovered low temperature magnetic phase**, **hydrogen-like dynamics** and the ultra-fast reversible metal to semiconductor (MST) transition. This ongoing effort will require work with additional samples and a variety of experimental techniques to characterize these properties and the role that impurities play in modifying them.

Experience Details

05/2009–05/2014 **GRADUATE RESEARCH ASSISTANT**, Texas Tech University, Physics

Experimental Condensed Matter

PRIMARY RESPONSIBILITIES:

- Write and present experiment proposals to the evaluation committees to apply for the use of a variety of instruments at national labs (TRIUMF, Vancouver, BC; Rutherford Appleton Lab, Didcot, UK; Oak Ridge National Lab, Oak Ridge, TN, USA).
- Plan and conduct experiments at the above facilities as well as additional sample characterization measurements in our local lab
- Analyze and interpret data
- Report results in various forms (publications, conferences, reports for labs and other forms of professional correspondence)
- Train and assist new group members (graduate and undergraduate)

Research

RESEARCH PROJECTS:

Apr/2013 – Present

- Probing magnetism, the MST and properties of Hydrogen in VO_2 compounds via MuSR (PI)

  Characterize the local electronic and magnetic environment in a variety of **VO_2 compounds** using muon spin research where the muon acts as both an experimentally accessible analog to hydrogen and a very sensitive probe of the local magnetic environment.

  While still in the early stages, preliminary results show a never before detected (to our knowledge) low temperature magnetic phase in VO_2 compounds (investigated, thus far: VO_2, VO_2:Ti, VO_2:W) where the onset temperature is significantly higher in doped materials. This project aims to identify the source of the **magnetic phase**, **characterize** the **muon/hydrogen behavior** and provide insight into the highly debated source of the **metal to semiconductor transition** (including structural and electronic components) occurring near room temperature and tunable by adjusting dopant type and concentration.

Apr/2010 – Dec/2013

- Magnetism in Mn-doped Chalcopyrites (PhD Project; PI)

  Investigate local magnetic environment on **dilute magnetic II-IV-V_2:Mn chalcopyrite semiconducting systems** using muon spin research (where the muon serves as a very sensitive probe to the local magnetic environment), neutron scattering and bulk magnetization (SQUID and AGM) techniques. We have determined that spin polarons may provide the transfer of magnetism from local moments (Mn) to the charge carriers (holes) for which neither of the limiting cases for more standard theories apply.

2001 – Present*

*My involvement begins Aug/2008

- Muonium Defect in SiGe Alloys (Co–PI beginning Oct/2010; Active)

  Investigate various muon states, sites and charge cycles in the **SiGe compounds** over a wide range of alloy content where the implanted μ^+ is an experimentally accessible analog to the H impurity center.

  This is a long standing and ongoing project where we continue to map out properties such as donor and acceptor levels and energy barriers to various charge and site cycle processes.

Experience Details

Jul/2009 – Present - Muonium and μ^+ in Transparent Conducting Oxides [Active]

Investigate various muon states and diffusive behavior in a variety of **transparent conducting oxides** (e.g. In_2O_3, CdO, Ga_2O_3, TiO_2, ZnO *etc*) where the muon serves as an experimentally accessible analog for the hydrogen defect center.

This is a long standing and ongoing project where we have determined muon (Hydrogen) **defect sites** and characterized (muon) **dynamics** (i.e. energy barriers, trapping cross-sections, trap and release rates).

2006 – Present* - Survey of Spin Polaron Candidate Materials

*My involvement begins May/2009 and includes work as listed here

This is a long standing and ongoing project aimed to investigate and characterize the local electronic and magnetic features of a wide variety of material types that show features such as various types of **magnetic order**, **high T_c superconductivity**, **magnetostriction**, **magnetoresistance**, anomalies in specific heat, **frustration in the magnetic system**, **magnetic semiconductors** or **heavy fermion behavior** that may be explained by a **spin** (magnetic) **polaron** based mechanism. So far, over 50 different materials show the spectral signature of a spin polaron, including many correlated electron materials, which may explain a number of these features. Some examples of the specific findings are outlined here

- First direct observation of a magnetic polaron and the MuSR spectroscopy allowing the determination of physical size and net composite spin moment (done in **EuS**, followed by additional characterization in all of the ferromagnetic **Eu*X*** materials)
- Characterized spin polaron seen in **ferromagnetic spinel–structured semiconductor $CdCr_2Se_4$** where magnetic ions have 3*d* character (instead of 4*f* as in EuS). This shows ion exchange follows Hunds rules for addition of an extra electron into the unfilled shell supporting the double application of exchange between the polaronic electron and various different ions that lie within its quasi–localized wave function as the mechanism responsible for aligning the magnetic ions to form the ferromagnetic quasi–particle we call a *spin polaron*
- Indications of spin polarons found in the parent compounds of **high–T_c cuprate superconductors**. Specifically, **$LaCu_2O_4$** and several other **non–BCS superconductors** just outside of the superconducting region. This observation may prove to be an extremely important clue to the pairing interaction, which has yet to be understood with existing models.
- In **MnSi**, spin polaron features develop well above the temperature where the **helical order**ing begins. MnSi is at the boundary between localized and itinerant electron behavior where Fermi–liquid treatment breaks down and is apparently replaced by quantum excitations –– our measurements show one such possibility is spin polaron formation. Our data on this system should provide a good test for proper theory related to spin polaron formation and alignment of the associated large cluster moments in an externally applied B–field.
- We found **AFM ordering** below 15 K in the **spin–gap system NaV_2O_5** with a well-defined internal field of ± 0.17 T at the primary muon-

Spin Polaron candidate materials

Experience Details

(cont.)

stopping site. This ordering occurs deep within the spin–gap state, which has a gap opening up at 35 K. Spin polarons are found at higher temperature as a precursor to formation of the spin gap state. This is the first direct observation of AFM order in this compound, although an anomaly near 15 K in the specific heat was previously known.

- We found spin polaron formation in a second **itinerant–electron ferromagnetic** system, **UGe_2**, which pair nicely with the **MnSi** finding. We suggest that spin polarons are likely responsible for magnetic coupling to yield the triplet superconductivity seen in this material at high pressures.
- We found low temperature spin–polaron bands in several materials but were first observed in **$Cd_2Re_2O_7$**. This **highly correlated metallic pyrochlore** is also a **frustrated antiferromagnet**ic system where we see two small polarons.
- **Colossal magnetoresistive** materials also show spin polaron activity. Our results show strong correlation of the spin polaron activity with the **CMR** regime in **$Lu_2V_2O_7$** are typical of these materials.
- **$FeGa_3$** and **$FeSb_2$** only show a band state where we conclude that the extremely narrow spin polaron band is thermally destroyed above 10K opposed to a smooth transition into the band state as in MnSi and UGe_2.
- A number of **heavy–Fermion** materials show evidence of a small spin polaron that forms, which suggests its importance as a heavy quasi–particle in this class of compounds. Specifically, our observations correlate quite nicely with effects attributed to the heavy–Fermion quasiparticles in terms of the temperature regions in which they are observed and may provide a natural explanation for **co–existence of superconductivity and antiferromagnetism** not offered by existing heavy–fermion quasiparticle models. These results are primarily from work on **UBe_{13}**.

Oct/2008 –Aug/2010 - <u>Mu^0 and μ^+ in II-IV-V_2 Chalcopyrites</u>

Investigate various muon states and diffusive behavior in a variety of II-IV-V_2 chalcopyrite semiconductors where the muon serves as an experimentally accessible analog for the hydrogen defect center.

This work provides information related to the hydrogen defect center in these materials where we show that Mu/H is stable in two different sites as well as establish the energy barriers for various types of dynamics and the final ionization. Additionally, these measurements provide the fundamental understanding of the muon (probe) characteristics in the pure II-IV-V_2 materials, which is required in order to develop a complete understanding of the measurements on the Mn doped II-IV-V_2 dilute magnetic semiconducting materials.

Experience Details

08/2007–12/2010 **TEACHING ASSISTANT**, Texas Tech University, Physics

Responsible for teaching lab and discussion sections for courses, such as

- Physics for non-science majors
- Algebra and Calculus based Physics 1 and 2
- Stellar Astronomy
  Including teaching at TTU's observatory (15 mi N of campus) utilizing a 20" PlaneWave Dall-Kirkham cassegrain telescope (in its own 6m dome equipped with an SBIG CCD or SBIG SGS spectrograph) and portable telescopes (e.g. 8", 10", 12" and 14" Meade).

Fall 2009 –Spring 2013 Assisted in teaching *observatory based* stellar astronomy labs where my responsibilities include telescope setup, operation and training in addition to the typical instructor duties.

Fall 2009 to Spring 2010 Participated in developing and updating undergraduate stellar astronomy laboratory exercises including in-class and observatory based projects

Summer 2008 Participated in developing and updating laboratory exercises for undergraduate Physics 2 (E&M and optics)

10/2003–05/2007 **ASSISTANT TO INSTRUCTIONAL TECHNOLOGIST,**
Center for Instructional Technology at Northern Michigan University

Duties include tasks such as

- Train and provide technical assistance for faculty and staff for use of their computers and technology for classroom use
- Administer and maintain online courses for Northern Michigan University (via WebCT and Blackboard)

01/2005–05/2007 **PHYSICS DEPARTMENT TUTOR**, Northern Michigan University

Lead study sessions and private tutoring for groups and individuals enrolled in Physics courses of all levels

Select Scholarships and Awards

April 2016 Professor of the Year in the Department of Physics (Texas Tech University)
Selected via nomination and vote by TTU students

July 2015 Finalist for the Corbett Prize: Recognizing outstanding young researcher at the *International Conference on Defects in Semiconductors* (Espoo, Finland)

June 2014 ISMS Young Scientist Award: Recognized at *13th International Conference on Muon Spin Rotation Relaxation and Resonance* by the International Society for Muon Spectroscopy (ISMS) as outstanding young researcher in the Muon Spin Research community for my work on VO_2 compounds

May 2014 Outstanding Graduating Ph.D.:
Selected via nomination and vote by TTU Physics department faculty

Spring 2013 3rd Place in *12th Annual Graduate Student Research Poster Competition*

2009, 2012,2013 Mr. Fred and Mrs. Odetta Greer Bucy
Texas Tech University Graduate Scholarship in Applied Physics

2010, 2011 Peter Seibt Memorial Endowed Scholarship

Select Miscellaneous Professional Activities

2018 Invited to write a tutorial and review chapter (~25k wds) on 'The role of muons in semiconductor research' in Tuomisto (ed.) Characterisation and control of defects in semiconductors (IET, London: 2019). *Accepted, Oct '18*

2017–Current Appointed to serve on the *Muon Experimental Facility Access Panel* for *Rutherford Appleton Lab* (Didcot, UK).
One of nine members, chosen based on expertise within the field and of the technique, to provide recommendations to the director of the *Neutron and Muon Source* at *Rutherford Appleton Lab* of a balanced scientific program and facility development.

08/2008–Current Primary investigator on numerous *Muon Spin* and *Neutron* based experiments at *Rutherford Appleton Lab* (UK), *TRIUMF* (Canada) and *Oak Ridge* (US).
Each project requires the presentation of experimental proposals to the lab's evaluation committees (access panels) to be considered for instrument time, which is highly limited, and therefore this is a highly competitive process.

08/2017–Current Active member of *Educational Technology Resources and Policy Committee* for Northern Michigan University.

3/2017 Invited talk (Role of the Muon in Semiconductor Research) at *March Meeting* of the *American Physical Society* (New Orleans, LA)

2/2017, 2/2018 Supervisor and Judge for the hovercraft event at regional *Science Olympiad* tournament (Marquette, MI)

1/2016 Science Fair Judge at *Roscoe Elementary School*, Lubbock, TX

6/2015 Attended *Summer School on the Fundamentals of Neutron Scattering* hosted by the NIST Center for Neutron Research (Gaithersburg, MD 20899)

3/2015 Session chair: Vanadium Oxides, Resistive Switching and Interfaces with Oxides at the *2015 Mar Meeting* of the *Amer. Phys. Soc.* San Antonio, TX

2/2013 & 2/2014 *South Plains Regional Science and Engineering Fair* Judge [K–12]

10/2010–05/2016 Chapter President, *Sigma Pi Sigma* (Physics Honor Society)
- Reinstated chapter. Organized formal inductions, events, meetings and coordinated involvement with local Society of Physics Students (SPS) chapter
- Assisted TTU SPS with operational logistics, community outreach and provided guidance for these students as they progress through their undergraduate career

09/2008−05/2014 President, *Physics Graduate Student Organization*
PRIMARY DUTIES
- Physics graduate student delegate for faculty−student relations
- Promote a positive and supportive atmosphere for Physics graduate student body; for example, I have
    - Lead periodic meetings to maintain an open channel of efficient communication for general department related business, comments, concerns and feedback between faculty and students
    - Organized group attendance to Texas section APS meetings
    - Organized department research symposia

2010, 2011 Organized *Physics Graduate Student Research Symposium* for Texas Tech University Department of Physics

Publications

1. The role of muons in semiconductor research. (**Invited review chapter**)
   P.W. Mengyan, in 'Characterisation and control of defects in semiconductors' F. Tuomisto, ed.
   (IET, London 2019) *Accepted*.
2. Barrier model in muon implantation and application to Lu_2O_3.
   R.C. Vilão, R.B.L. Vieira, H.V. Alberto, J.M. Gil, A. Weidinger, R.L. Lichti, P.W. Mengyan, B.B. Baker and J.S. Lord. *Phys Rev B* **98** (2018) 115201.
3. Dynamics of heavy carriers in the ferromagnetic superconductor UGe_2.
   V.G. Storchak, J.H. Brewer, D.G. Eshchenko, P.W. Mengyan, O.E. Parfenov and A.M. Tokmachev.
   JETP Letts **107** (2018) 470.
4. Coupling of magnetic orders in La_2CuO_{4+x}.
   V.G. Storchak, J.H. Brewer, D.G. Eshchenko, P.W. Mengyan, O.E. Parfenov, A.M. Tokmachev and P. Dosanjh.
   Phys Rev B **94** (2016) 134407.
5. Isolated hydrogen configurations in zirconia as seen by muon spin spectroscopy and ab-initio calculations.
   R.B.L. Vieira, R.C. Vilão, A.G. Marinopoulos, P.M. Gordo, J.A. Paixão, H.V. Alberto, J.M. Gil, A. Weidinger, R.L. Lichti, B.B. Baker, P.W. Mengyan and J.S. Lord. *Phys Rev B* 94 (2016) 115207.
6. Spin gap in heavy fermion compound UBe_{13}.
   V.G. Storchak, J.H. Brewer, D.G. Eshchenko, P.W. Mengyan, O.E. Parfenov, A.M. Tokmachev, P. Dosanjh, Z. Fisk and J.L. Smith. *New Journ Phys* **18** (2016) 83029.
7. Electronic Structure of Interstitial Hydrogen in Lutetium Oxide from DFT+U calculations and Comparison Study with μSR Spectroscopy
   E. Lora da Silva, A.G. Marinopoulos, R.B.L. Vieira, R.C. Vilão, H.V. Alberto, J.M. Gil, R.L. Lichti, P.W. Mengyan and B.B. Baker. *Phys Rev B* **94** (2016) 014104.
8. The muonium donor in rutile TiO_2 and comparison with hydrogen
   R.C. Vilao, R.B.L. Vieira, H.V. Alberto, J.M. Gil, A. Weidinger, R.L. Lichti, B.B. Baker, P.W. Mengyan and J.S. Lord. *Phys Rev B* **92** (2015) 081202(R).
9. Intra-unit-cell magnetic order in stoichiometric La_2CuO_4.
   V.G. Storchak, J.H. Brewer, D.G. Eshchenko, P.W. Mengyan, O.E. Parfenov, A.M. Tokmachev, P. Dosanjh and S.N. Barilo. *Phys Rev B*. **91** (2015) 205122.
10. Spectroscopic identification of shallow muonium acceptors in $Si_{0.06}Ge_{0.94}$.
    B.R. Carroll, R.L. Lichti, P.W. Mengyan, B.B. Baker, Y.G. Celebi, P.J.C. King, K.H. Chow and I. Yonenaga.
    Appl Phys Lett **105** (2014) 122101.
11. Magnetic order and muon motion in VO_2
    P.W. Mengyan, R.L. Lichti, B.B. Baker, G. Jayarathna. *J Phys: Conf Ser* **551** (2014) 012017.
12. Magnetic fluctuations and fields in weakly Mn doped $ZnGeP_2$.
    P.W. Mengyan, R.L. Lichti, Y.G Celebi, B.B. Baker, B.R. Carroll, E. Catak, K.T. Zawilski and P.G. Schunemann. *AIP Conf Proc* **1583** (2014) 190.
13. Spin-polaron band in the ferromagnetic heavy-fermion superconductor UGe_2.
    V.G. Storchak, J.H. Brewer, D.G. Eshchenko, P.W. Mengyan, O.E. Parfenov and D. Sokolov.
    J Phys: Conf Ser **551** (2014) 012016.
14. Search for ALCR- μ^+SR spin polaron resonances in $Cd_2Re_2O_7$ and $FeGa_3$.
    J.H. Brewer, V.G. Storchak, D.G. Eshchenko, R.L. Lichti, P.W. Mengyan and D.J. Arseneau.
    J Phys: Conf Ser **551** (2014) 012022.
15. Local magnetic order in La_2CuO_4 seen via μ^+SR spectroscopy.
    V.G. Storchak, J.H. Brewer, D.G. Eshchenko, P.W. Mengyan, O.E. Parfenov, A.M. Tokmachev, P. Dosanjh and S.N. Barilo. *J Phys: Conf Ser* **551** (2014) 012024.
16. High field study of muonium states in HfO_2 and ZrO_2.
    R.B.L. Vieira, R.C. Vilao, H.V. Alberto, J.M. Gil, A. Weidinger, B.B. Baker, P.W. Mengyan and R.L. Lichti. *J Phys: Conf Ser* **551** (2014) 012048.
17. Transition Dynamics for Mu Acceptor States in $Si_{1-x}Ge_x$ Alloys.
    G. Jayarathna, P.W. Mengyan, R.L. Lichti, B.B. Baker, Y.G. Celebi, B.R. Carroll and I. Yonenaga.
    AIP Conf Proc **1583** (2014) 56.

Publications

18. Motional Characteristics of Positively Charged Muonium Defects in In_2O_3.
B.B. Baker, Y.G. Celebi, R.L. Lichti and P.W. Mengyan. *AIP Conf Proc* **1583** (2014) 323.

19. Observation of magnetic polarons in the magnetoresistive pyrochlore $Lu_2V_2O_7$.
V.G. Storchak, J.H. Brewer, D.G. Eshchenko, P.W. Mengyan, H.D. Zhou and C.R. Wiebe.
J Phys: Cond Matt **25** (2013) 115601.

20. Antiferromagnetism in the spin–gap system NaV_2O_5: Muon spin rotation measurements.
V.G. Storchak, O.E. Parfenov, D.G. Eshchenko, R.L. Lichti, P.W. Mengyan, M. Isobe and Y. Ueda.
Phys Rev B. **85** (2012) 094406.

21. Muonium Transitions in Ge–rich SiGe Alloys.
P.W. Mengyan, R.L. Lichti, Y.G. Celebi, B.R. Carroll, B.B. Baker, H.N. Bani–Salameh, I. Yonenega.
Physica B. **407** (2012) 2829–2832.

22. Motion of Positively Charged Muonium in ZnO.
B.B. Baker, Y.G. Celebi, R.L. Lichti, P.W. Mengyan, H.N. Bani–Salameh and B.R. Carroll.
Physica B. **407** (2012) 2864–2866.

23. Muonium Dynamics in Transparent Conducting Oxides.
Y.G. Celebi, R.L. Lichti, B.B. Baker, P.W. Mengyan and H.N. Bani–Salameh.
Physica B. **407** (2012) 2879–2882.

24. Longitudinal Muon Spin Depolarization in Ge–Rich SiGe Alloys.
P.W. Mengyan, Y.G. Celebi, R.L. Lichti, B.R. Carroll, B.B. Baker, H.N. Bani–Salameh, I. Yonenaga.
Physics Procedia. **30** (2012) 214–218.

25. Motion of Mu^+ in Transparent Conducting Oxides.
Y.G. Celebi, R. L. Lichti, B.B. Baker, P.W. Mengyan, H.N. Bani–Salameh.
Physics Procedia. **30** (2012) 206–209.

26. Initial Study of Positively Charged Muonium Motion in ZnO, CdO, TiO_2 and SnO_2.
B.B. Baker, Y.G. Celebi, R.L. Lichti, H.N. Bani–Salameh, P.W. Mengyan, B.R. Carroll.
Physics Procedia. **30** (2012) 101–104.

27. Spin Polarons in Strongly Correlated Electron Materials
V.G. Storchak, O.E. Parfenov, J.H. Brewer, D.G. Eshchenko, R.L. Lichti, P.W. Mengyan, D.J. Arseneau, and B.Hitti. *Physics Procedia.* **30** (2012) 178–181.

28. Spin Polarons in Correlated Metallic Pyrochlore $Cd_2Re_2O_7$.
V.G. Storchak, J. H. Brewer, S. L. Stubbs, O. E. Parfenov, R. L. Lichti, P. W. Mengyan, J. He, I. Bredeson, D. Hitchcock, D. Mandrus. *Phys. Rev. Lett.* **105** (2010) 076402.

29. Hyperfine spectroscopy and characterization of muonium in $ZnGeP_2$.
P.W. Mengyan, B.B. Baker, R.L. Lichti, K.H. Chow, Y.G. Celebi, K.T. Zawilski, P.G. Schunemann.
Physica B. **404** (2009) 5121–5124.

Select Presentations (Presenter)

1. Initial look at muonium in Brookite TiO_2.
M.R. Goeks, J.A. Horn, P.W. Mengyan, R.L. Lichti, J.S. Lord.
Gordon Research Conference on Defects in Semiconductors. New London, NH. (19-24/Aug/2018).

2. A first look at Anatase TiO_2.
P.W. Mengyan, J.A. Horn, R.L. Lichti, J.S. Lord. *14th International Conference on Muon Spin Rotation, Relaxatoin and Resonance*. Sapporo, Japan. (25-30/Jul/2017).

3. Role of the Muon in Semiconductor Research. (**Invited Talk**)
P.W. Mengyan. *National APS March Meeting 2017.* New Orleans, LA. (13-17/Mar/2017).
http://meetings.aps.org/link/BAPS.2017.MAR.P22.4

Select Presentations (Presenter)

4. Magnetism and Mu Dynamics in VO_2 Compounds.
   P.W. Mengyan, T.D. Ballinger, R.L. Lichti, B.B. Baker.
   28th International Conference on Defects in Semiconductors. Espoo, Finland (27-31/Jul/2015).
5. Magnetism in Bulk Vanadium Dioxide Compounds.
   P.W. Mengyan. *APS March Meeting 2015*. San Antonio, TX (2-6/Mar/2015).
6. Magnetism and Mu Dynamics in Vanadium Dioxide Compounds
   P.W. Mengyan. *Texas Tech University, Department of Physics Colloquium*. Lubbock, TX (30/Oct/2014).
7. Magnetic Order and Muon Motion in VO_2 Compounds.
   P.W. Mengyan, R.L. Lichti, B.B. Baker, G. Jayarathna.
   Gordon Research Conference: Defects in Semiconductors. Waltham, MA (3-8/Aug/2014).
8. Magnetic order and muon diffusion in VO_2.
   P.W. Mengyan, R.L. Lichti, B.B. Baker and G. Jayarathna. *13th International Conference on Muon Spin Rotation, Relaxation and Resonance.* Grindelwald, Switzerland (1-6/Jun/2014)
9. Magnetic Fields and Fluctuations in Weakly Mn Doped $ZnGeP_2$.
   P.W. Mengyan, R.L. Lichti, Y.G. Celebi, B.B. Baker, B.R. Carroll, E. Catak, K. T. Zawilski and P.G. Schunemann. *27th International Conference on Defects in Semiconductors*. Bologna, Italy (21–26/July/2013).
10. Probing Local Features in Dilute Magnetic Semiconducting $ZnGeP_2$:Mn via μ^+SR.
    P.W. Mengyan, R.L. Lichti, Y.G. Celebi, B.B. Baker, E. Catek, K.T. Zawilski and P.G. Schunemann.
    12th Annual Graduate School Poster Competition. Lubbock, TX (22/Mar/2013).
11. Probing Local Features in Dilute Magnetic Semiconducting $ZnGeP_2$:Mn via μ^+SR.
    P.W. Mengyan, R.L. Lichti, Y.G. Celebi, B.B. Baker, E. Catek, K.T. Zawilski and P.G. Schunemann.
    2012 Joint Fall Meeting Texas Section of APS, AAPT & Zone 13 SPS. Lubbock, TX (25–27/Oct/2012).
12. Positive Muonium in In_2O_3.
    B.B. Baker, P.W. Mengyan, R.L. Lichti and Y.G. Celebi. *2012 Joint Fall Meeting Texas Section of APS, AAPT & Zone 13 SPS*. Lubbock, TX (25–27/Oct/2012).
13. Probing Local Features in Dilute Magnetic Semiconducting $ZnGeP_2$:Mn via μ^+SR.
    P.W. Mengyan, R.L. Lichti, Y.G. Celebi, B.B. Baker, E. Catek, K.T. Zawilski and P.G. Schunemann.
    Gordon Research Conference: Defects in Semiconductors. Biddeford, ME (12–17/Aug/2012).
14. Probing the internal magnetic field features of the II–IV–V_2:Mn Dilute Magnetic Semiconducting systems via μSR.
    P.W. Mengyan, R.L. Lichti, Y.G. Celebi, B.B. Baker, L.J. Hudy, E. Catek, K.T. Zawilski and P.G. Schunemann. *Joint Spring 2012 Meeting of the Texas Sections of the APS, AAPT, and Zone 13 of the SPS*. San Angelo, TX (22–24/Mar/2012).
15. Muonium Transitions in Ge–rich SiGe Alloys.
    P.W. Mengyan, Y.G. Celebi, B.R. Carroll, R.L. Lichti, H.N. Bani–Salameh, B.B. Baker and I. Yonenaga.
    26th International Conference on Defects in Semiconductors. Nelson, New Zealand (17–22/July/2011).
16. Longitudinal Muon Spin Depolarization in Ge–rich SiGe Alloys.
    P.W. Mengyan, B.R. Carroll, R.L. Lichti, Y.G. Celebi, B.B. Baker, H.N. Bani–Salameh and I. Yonenaga. *12th International conference on Muon Spin Rotation, Relaxation and Resonance*. Cancun, Mexico (16–20/May/2011).
17. Observing Spin Polarons in Magnetic Semiconductors and Various Other Materials via μ^+SR.
    P.W. Mengyan, R.L. Lichti, V.G. Storchak, D.G. Eshchenko and J.H. Brewer.
    Gordon Research Conference: Defects in Semiconductors. New London, NH (8–13/Aug/2010).
18. Hyperfine Spectroscopy and Characterization of Muonium Centers in $ZnGeP_2$.
    P.W. Mengyan, B.B. Baker, R.L. Lichti, K.H. Chow, Y.G. Celebi, K.T. Zawilski and P.G. Schunemann.
    Texas Section APS Fall Meeting. San Marcos, TX (22–24/Oct/2009).

Skills

Critical thinking; problem solving; experiment setup and design (hardware, software, data collection, data analysis, equipment calibration); electrical characterization of semiconductors (e.g. 4-point probe resistivity, I-V, C-V, electrical typing, etc); magnetic characterization (I setup and maintained a Lakeshore MicroMAG 2900 *Alternating Gradient Magnetometer* and am familiar with *SQUID susceptometry*); *Muon Spin Research* (rotation, relaxation and resonance) on semiconductors and magnetic systems.

I am familiar with the operations of a variety of equipment such as programmable source measure units; bench and handheld multimeters; temperature controllers; oscilloscopes; function and wave form generators; He flow cryostats; cold-finger (closed-cycle refrigeration) setups; Helmholtz coils and superconducting solenoids.

I am proficient with software packages such as Origin, MATLAB, Maple, Linux (Scientific Linux, CentOS), Linux server setup and management (hardware and software), LaTeX, online class management (Moodle, Blackboard, WebAssign) and Microsoft products (Windows, Word, Excel, PowerPoint, Publisher, Outlook, Visio).

References

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