Brian D. Patchett, Ph.D.

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• EDUCATION:

Brigham Young University
Department of Physics and Astronomy
N283 ESC
Provo, UT 84602
(801) 422-4361
PhD Physics, Graduated December 2022.

Utah Valley University
Physics Department
800 W University Pkwy, Orem, UT 84058
(801) 863-4636
BS Physics, Graduated May 2017.

• EMPLOYMENT HISTORY:

Utah Valley University Physics Department
Assistant Professor: 08/01/2023 – Present
Orem, UT
Duties and Responsibilities:

- Course instruction for introductory to advanced students enrolled in a four-year physics program.
- Guided research for undergraduate students in the field of linear and nonlinear acoustics. Including computational modeling, signal processing, and empirical data collection.

Reference: Joseph Jensen, Prof./Dept. Chair UVU Physics Dept., Joseph.Jensen@uvu.edu

Utah Valley University College of Science/Physical Sciences
Lab Manager I: 09/16/2016 – 07/31/2023
Orem, UT
Duties and Responsibilities:

- Lecture Demonstration Support. Sourcing, purchasing, building and training for faculty on all forms of lecture demonstrations in the Physics Dept
- Purchasing. Primary purchaser for non-capital (below $5000) physics department equipment.
- Machine Shop Support. Maintaining the equipment in the physics machine shop. Including; sourcing and purchasing of tools and equipment. Overseeing proper installation. Training faculty and undergraduate students in the proper use of the equipment. And maintaining it for safe use.
- Outreach. I am the primary outreach personnel for the Physics Dept., and an outreach source for the College of Science.
- Repair. I oversee repair and maintenance of high-end research equipment for all physical science departments.

Reference: Joseph Jensen, Prof./Dept. Chair UVU Physics Dept., Joseph.Jensen@uvu.edu

BYU Acoustics RA, Anderson TR Group
Research Assistant: 8/24/17 – 12/16/2022
Provo, UT
Duties: Experimental and theoretical work in the focusing of high-amplitude acoustic waves in the air using a signal processing technique known as time reversal. I developed and designed experimentation methods and techniques for capturing high amplitude waves as they converged to focus, and described the nonlinearities observed both qualitatively and quantitatively. I assisted in the guidance of undergraduate research projects that directly related to my field of study.
Reference: Brian Anderson, Assoc. Prof., BYU Dept. of Physics and Astronomy, bea@byu.edu.

Utah Valley University Physics Dept.
Research Asst. – UVU/Dugway Proving Grounds: 8/24/2014 – 4/24/2016
Orem, UT
Duties: Matlab algorithm design to develop LiDAR sensitivity and microparticle detection methods. Co-invented/developed a device for bio-acoustic levitation, currently under patent application. This required knowledge of the applications of RF power amplifiers, advanced function generators, and the wiring and components necessary to successfully achieve our objective.
Reference: Timothy Doyle, Asst. Prof. UVU Physics Dept., timothy.doyle@uvu.edu (retired)

Utah Valley University Physics Dept.
Physics Demonstration/Stockroom Manager (student position): 1/6/2014 -1/5/2015
Orem, UT
Duties: Organization and upkeep of the Physics demonstration/stockroom, maintenance/repair of demonstrations, preparation of demonstrations for use in classroom lectures.
Reference: Phil Matheson, Prof./Physics Dept. Chair, Phil.Matheson@uvu.edu

Best in Music
Retail Store Manager: 1999-2002, 2008-2012
Orem, UT
Duties: Re-order, stocking, and organization of retail store. Customer service, new hire training, guitar/amplifier repair and service.
Reference: Marcus Hight, General Manager, 801-802-8022.

• TEACHING EXPERIENCE:

Phys 495R-I01/I02: Physics and Standard GRE Prep Course.

- Course Objectives: Students attending the course will be instructed in different study techniques, both individually and in groups, and be exposed to problem solving skills specific to both the PGRE and SGRE Quantitative exam problems. The intention is to develop skills that the student can apply outside of class to prepare more effectively for success in taking these exams.

Phys 2215: Physics 1 Concurrent Lab Course

- Course Objectives: Reinforce the practical application and experimental practices associated with theory learned in the Phys 2210 lecture courses on mechanics and thermodynamics. This course incorporated Arduino microcontrollers for each lab. Allowing students to be exposed to simple coding and early forms of sensor programing and data collecting.

Phys 2025/2225: Physics 2 Concurrent Lab Course

- Course Objectives: Reinforce the practical application and experimental practices associated with theory learned in the Phys 2020 and 2220 lecture courses on electro-statics and dynamic

Phys 1000: Concepts in Physical Science

- This is a G.E. requirement course for all majors. It covers a conceptual and fundamental mathematical understanding of Physics, Chemistry, Earth Science, and Astronomy.

• ADDITIONAL JOB-RELATED SKILLS:

- Oversight of undergraduate research with development and editing of peer-reviewed journal publications with the students as first author.
- Advanced MATLAB programming.
- COMSOL Multiphysics Modeling.
- LabView programming.
- Machining and machine tool maintenance.
- Electronics and electrical circuit construction and debugging.
- Arduino scripting.
- Experience with various inventory methods, purchasing and budget management, as well as hiring/training skills for new staff.

• ADDITIONAL ACCOMPLISHMENTS:

- Acoustical Society of America Royster poster competition winner (2019)
- Outstanding Physics Student of the Year, Utah Valley University, 2013-2014.
- Recipient of the National Science Foundation full academic scholarship.
- Vice President/President (2014/15) of the UVU chapter of SPS.
- President (2015/16) of the UVU chapter of SPS.
- Appeared on the cover as the main story for the UVU Magazine's spring 2016 issue, which focused on my research in acoustics and contributions to the universities profile.

• PEER-REVIEWED PUBLICATIONS (as of 2023):

B. D. Patchett, B. E. Anderson, and A. D. Kingsley, "Numerical modeling of Mach stem formation in high-amplitude time-reversal focusing," J. Acoust. Soc. Am. **153,** 2724-2732 (2023). https://doi.org/10.1121/10.0017974

B. D. Patchett and B. E. Anderson, "Nonlinear characteristics of high amplitude focusing using time reversal in a reverberation chamber," J. Acoust. Soc. Am. **151**, 3603-3614 (2022). https://doi.org/10.1121/10.0011517

B. D. Patchett, B. E. Anderson, and A. D. Kingsley, "The impact of room location on time reversal focusing amplitudes," J. Acoust. Soc. Am. **150**(2), 1424–1433 (2021).

A. Byrnes, C. Rawson, B. Patchett, D. DeMille, and M. Halling, "Oxygen impact and reactivity trials: A new perspective on emergency response precautions," Heliyon **9**(3), e14474 (2023), doi.org/10.1016/j.heliyon.2023.e14474

T. S. Furlong, B. E. Anderson, B. D. Patchett, and S. D. Sommerfeldt, "Active noise control using remotely placed sources: Application to magnetic resonance imaging noise and equivalence to the time reversal inverse filter," Appl. Acoust. **176**, 107902 (2021).

M. L. Willardson, B. E. Anderson, S. M. Young, M. H. Denison, and B. D. Patchett, "Time reversal focusing of high amplitude sound in a reverberation chamber," *J. Acoust. Soc. Am.***, 143**(2), 696-705 (2018).

• PROFESSIONAL CONFERENCE PRESENTATIONS:

B. D. Patchett and B. E. Anderson, "Comparison of high-amplitude focus creation methods with time reversal to help determine a mechanism of nonlinearity," J. Acoust. Soc. Am., **151**, A219 (2022). https://doi.org/10.1121/10.0011107

B. D. Patchett and B. E. Anderson, "Quantifying nonlinear characteristics in time reversal focusing of airborne sound," J. Acoust. Soc. Am., **150** (4), A194-A194 (2021). https://doi.org/10.1121/10.0008100

B. D. Patchett, B. E. Anderson, and A. D. Kingsley, "Modeling time reversal focusing amplitudes in a reverberation chamber using a modal summation approach," J. Acoust. Soc. Am., **149** (4), A67-A67 (2021). https://doi.org/10.1121/10.0004538

B. D. Patchett and B. E. Anderson, "Time reversal focusing of high amplitude sound in a reverberation chamber: Optimizing the placement of transducers," J. Acoust. Soc. Am., **146**, 2793–2793 (2019). https://doi.org/10.1121/1.5136674

B. D. Patchett, B. E. Anderson, M. L. Willardson, and M. Denison, "Nonlinear focusing of high amplitude sound using time-reversal," J. Acoust. Soc. Am., **145**, 1715–1715 (2019). https://doi.org/10.1121/1.5101291

B. D. Patchett, N. C. Sullivan, and T. E. Doyle, "Acoustic levitation device for probing biological cells with high-frequency ultrasound," The Journal of the Acoustical Society of America, **138**, 1846–1846 (2015). https://doi.org/10.1121/1.4933874

• U.S. PATENT:

"System and Method for Harmonic Modulation of Standing Wavefields for Spatial Focusing, Manipulation, and Patterning"
Publication # US 2016/0208213 A1
Inventors: Doyle, Patchett, Sullivan, Johnson