

C.V. for Thomas Huber

Professional Preparation

St. John's University, Collegeville, MN, Physics and Math/Computer Science, B.S. 1983
University of Wyoming, Laramie, WY Physics, Ph.D. 1989
Thesis: Search for Mixing of Muonium and Antimuonium

Appointments

Assistant, Associate, and Full Professor, Gustavus Adolphus College (September 1989-Present)

Undergraduate Physics Courses and Labs Including:

Cosmic Universe, Classical Physics I; Classical Physics II; Modern Physics; Quantum Universe; Applied Mathematical Methods for Physics and Engineering; Electronics I & Lab; Experimental Modern Physics Lab; Mechanics; Advanced Mathematical Methods in Physics; Electronics II & Lab; Electromagnetic Fields; Quantum Mechanics; Statistical and Thermal Physics; Senior Seminar in Physics.

Undergraduate General Education and Service Courses and Labs including:

General Physics I and II; Life Science Physics I and II, Energy: Where are We and What's Next (First Term Seminar and January Term formats); Robotics Workshop; Introduction to Cosmology; Natural World; Fortran for the Physical Sciences; Scientific Programming in C and Matlab; Computer Tools for Physics; How Musical Instruments Work; Physics of Sound & Music.

Research Assistant, University of Wyoming (July 1986 – September 1989)

Thesis experiment at the TRIUMF accelerator in Vancouver, British Columbia, Canada. Performed extensive work with muon beams, nuclear detectors and electronics, ultrahigh vacuum systems, surface science, Monte Carlo simulation and data analysis.

Physics Instructor, St. John's University, Collegeville, MN (September 1985-May 1986)

Undergraduate Physics Courses and Labs Including: Foundations of Physics II; Foundations of Physics III; Mechanics; Digital and Analog Electronics Lab. Undergraduate General Education Course: Physics of Music.

Research Fellowship, Conoco/University of Wyoming (June 1984 – June 1985)

Research and implement Fourier transform methods for inversion of acoustical scattering data sets for oil exploration.

Programmer/Analyst, Numerex Corporation (Summers 1981-83; Consultant 1984-1990)

Developed, implemented and tested numerical algorithms for analysis of data from precision coordinate measuring machines. Worked closely with both engineering and software teams.

Programming / Software

Expert proficiency in MATLAB, C/C++/C#/Visual C++, XCode (for iOS apps), Java (for Android apps), Python, LabVIEW, Javascript, Visual Basic, COMSOL. Extensive experience with wide range of data acquisition/analysis and office/presentation software for all operating systems (Windows, MacOS and linux/unix).

Hardware Expertise

Substantial data acquisition/analysis experience using Polytec laser Doppler vibrometers (scanning and single point), Lock-in amplifiers, DAC/ADC cards, Ultrasound transducers and Pulsers/Rf amplifiers, Precision microphone and needle hydrophone measurement systems, Laser interferometry and optical breadboarding including heterodyne (Bragg cell / Acoustic Optical Modulator) techniques, Test equipment (Oscilloscopes, function generators, multimeters, AC/DC supplies)

Committee Service and Leadership Positions

Chair of Physics Department (2016-17, 2018-Present)
Director of Undergraduate Research, Scholarship and Creativity (2014-2017)
Kendall Center Faculty Associate for Undergraduate Research (2011-2014)
Faculty Senate, Compensation Subcommittee (2013-2015)
Faculty Development Committee (2012-2015), Chair (2014-2015)
International and Domestic Programs Committee (2007-10), Chair (2007-9)
Gustavus Global Insight: China Steering Committee (2007-8), Chair, (2007-8)
International and Experiential Education Committee (2006-7)
Curriculum Committee (2001-2003)
Academic Operations Committee (1997-2001), Co-Chair (1997-8)
Information Technology Advisory Committee (1997-8), Chair (1997-8)
Information Infrastructure Advisory Committee (1998-2000), Chair (1999-2000)
Nobel Conference Organizing Committee and Host
 2013: Universe at its Limits (host for Samuel Ting)
 2009: H₂O Uncertain Resource
 2007: Heating Up: The Energy Debate (host for Joan Ogden)
 2005: The Legacy of Einstein (host for George Ellis)
 1997: Unveiling the Solar System: 30 Years of Exploration (host for Alan Boss)
 1995: The New Shape of Matter: Materials Challenge Science (host for Silvan Schweber)
 1991: The Evolving Cosmos (host for William Fowler)
Gustavus Sigma Xi Chapter (Vice Chair 1993-4, 2007-8; Chair 1995-6, 2008-9)
Gustavus Sigma Xi Grants Selection Committee (1990-4)
Web Advisory Committee (1997-2005)
Instructional Resources Committee (1995-6)
Campus-wide Radiation Safety Officer (1995-6)
Writing Committee (1993-5)
January Term Sub-Committee (1992-4)
Special Programs Sub-Committee (1992-4), Secretary (1993-4)
Teacher Education Sub-Committee (1991-4)
Ad Hoc Committee for Revision of Alcohol Policy (1994)
Guild of St. Ansgar Selection Committee (1990-1993)

Memberships

Acoustical Society of America
American Association of Physics Teachers
Society of Experimental Mechanics

Patent

Vibroacoustic System for Vibration Testing, US Patent 7,987,718 B2,

Inventors: Thomas M. Huber, James F. Greenleaf, Mostafa Fatemi-Booshehri.

Grants Obtained

National Science Foundation (11 Grants with total exceeding \$1.6 Million)

RUI: Detection of ultrasound waves in water and air using a laser interferometer

NSF, \$200,000 (2016-2019)

Collaborative Research: Enabling Non-contact Structural Dynamic Identification with Focused Ultrasound Radiation Force

NSF, with P. Avitabile, C. Niezrecki, X. Wang (University of Massachusetts, Lowell)

\$204,918 (Gustavus), \$313,407(UMass-Lowell) (2013-2016)

RUI: Excitation of Macro and Micro Cantilevers Using Ultrasound Radiation Force

NSF, Research at Undergraduate Institutions

\$219,943 (2009-2014)

MRI-R2: Acquisition of a Scanning Laser Doppler Vibrometer System

NSF, Major Research Instrumentation

\$310,000 (2010-2013)

ARI-R2: Laboratory and Ancillary Space Upgrade to Support Undergraduate Faculty-Student Research in Physics

NSF, Academic Research Infrastructure (Huber, Mellema, Niederriter, Petricka, Saulnier)

\$253,150 (2010-2013)

Modal Testing Using Ultrasound Radiation Force Excitation

National Science Foundation (NSF), Research at Undergraduate Institutions

\$149,947 with \$16,000 college match (2005-2009)

Acquisition of Equipment for Acoustical, Optical, and Computational Scattering Studies

NSF, Major Research Initiative (Saulnier, Huber, Mellema, Niederriter)

\$101,939 with \$43,689 college match (1997-2000)

Reactions of Muonic Hydrogen Isotopes

NSF, Research at Undergraduate Institutions

\$90,423 with \$5,126 college match. (1995-98)

Enhancements in Experimental Nuclear Physics

NSF, Instrumentation and Laboratory Improvement (Huber, Mellema)

\$18,042 with \$18,042 college match. (1994-96)

Computer Simulation of a Muon Catalyzed Fusion Experiment

NSF, Research at Undergraduate Institutions
\$50,000 with \$4,034 college match. (1993-95)

Electronics and Instrumentation Laboratory Development Project

NSF, Instrumentation and Laboratory Improvement (Henry, Huber, Niederriter)
\$23,000 with \$47,516 college match (1992-94)

Other Grants

Robotics Workshop using SunSPOT Processors

Sun SPOT Classroom Curriculum Program (Huber, Hvidsten)
\$6,050 (January Term 2008)

Faculty/Student Research In Acoustics

Gustavus Presidential Faculty/Student Research Collaboration (J. Purdham GAC '05)
\$7,500 (Summer 2004)

Acoustical Scattering Experiments and Computer Simulation

Gustavus Presidential Faculty/Student Research Collaboration (L. Engelhardt GAC '00)
\$7,500 (Summer 1999)

Kinetics of Muon Catalyzed Fusion in a Multilayered Target System

NATO Linkage Grant (With colleagues in Canada and Russia)
\$25,000. (1993-94)

Reactions of Muonic Hydrogen Isotopes

Research Corporation.
Renewal, \$13,320 with \$2,630 college match. (1993-94)

Reactions of Muonic Hydrogen Isotopes

Research Corporation
\$24,500, with \$3,500 College match. (1991-93)

Sample Publications

Over 30 Refereed Publications, and numerous conference presentations and proceedings

N.R. Huber, T.M. Huber, M.T. Huber, *Optical imaging of propagating Mach cones in water using refracto-vibrometry*, J. Acoust. Soc. Am. **141**(3), EL239 (2017).

T.M. Huber, N.M. Beaver, J.R. Helps, *Noncontact Modal Excitation of a Classical Guitar Using Ultrasound Radiation Force*, Experimental Techniques **37**(4), 38-46 (2013)

T.M. Huber, N.M. Beaver, J.R. Helps, *Elimination of standing wave effects in ultrasound radiation force excitation in air using random carrier frequency packets*, J. Acoust. Soc. Am **130**

(4), 1838-43 (2011)

T. M. Huber, B. C. Abell, D. C. Mellema, M. Spletzer, and A. Raman, *Mode-selective noncontact excitation of microcantilevers and microcantilever arrays in air using the ultrasound radiation force*, Appl. Phys. Lett. **97**, 214101, (2010).

T.M. Huber, M. Fatemi, R. Kinnick, and J. Greenleaf, *Noncontact modal analysis of a pipe organ reed using airborne ultrasound stimulated vibrometry*, J. Acoust. Soc. Am. **119** (4), 2476-2482 (2006).

T.M. Huber, A. Adamczak, J.M. Bailey, G.A. Beer, J.L. Beveridge, B.P. Ellerbusch, M.C. Fujiwara, R. Jacot-Guillarmod, P. Kammel, S.K. Kim, P.E. Knowles, A.R. Kunselman, G.J. Lindquist, M. Maier, V.E. Markushin, G.M. Marshall, C.J. Martoff, G.R. Mason, F. Mulhauser, A. Olin, C. Petitjean, T.A. Porcelli, J. Woźniak, and J. Zmeskal, *Time-of-flight studies of emission of μ from frozen hydrogen films*, Hyperfine Interactions **118**, 159-161 (1999).

T.M. Huber, G.A. Beer, T. Bowen, C.A. Fry, P.G. Halverson, B. Heinrich, A.C. Janissen, K.R. Kendall, A.R. Kunselman, G.M. Marshall, G.R. Mason, K. Myrtle, A. Olin, and J.B. Warren, *Search for mixing of muonium and antimuonium*, Physical Review D **41**, 2709 (1990).

T.M. Huber, G.A. Beer, T. Bowen, C.A. Fry, Z. Gelbart, P.G. Halverson, A.C. Janissen, K.R. Kendall, A.R. Kunselman, G.M. Marshall, G.R. Mason, A. Olin, and J.B. Warren, *Search for mixing of (μ^+e^-) and (μ^-e^+) with Fermi coupling strength*, Physical Review Letters **61**, 2189 (1988).

Other Research Activities

The video “Ultrasonic Wave Propagation Measured with Refracto Vibrometry” was the grand prize winner in Gallery of Acoustics at the May 2018 Acoustical Society of America Meeting. <https://tcspasa.org/gallery-of-acoustics>. YouTube channel <http://www.youtube.com/user/HuberPhysics> has videos showing vibrations of guitars, microcantilevers and sound fields using scanning vibrometer.

Prepared curriculum guides and gave presentations for NSF funded project: Faculty Professional Development in Design, Construction, Assembly and Analysis of a solid body electric guitar (Award: DUE-0903336). See curriculum tab at www.guitarbuilding.org. Presenter at Purdue Guitar Workshop, Summers 2007-10; Gave presentations at the Purdue Guitar workshop on “Fundamentals of How Electromagnetic Pickups Work” and “Physics of the Guitar”