Message from the Chair

It was the year of the moose! We had several warnings of campus incursions, one sighting in our parking lot, and three near the house. Almost got a photo, but the camera app misfired.

It was also a year with more snow. The image shows the middle of the landscape in the masthead (looking south from our front porch). A fluctuation back toward the way things used to be, continuing with a rainy spring.

This has not dampened the wild turkeys’ spirits, though. We’ve had five or six males displaying at a time, with these three posing for the newsletter. The flock does make quite a mess. One learned to fly up to a bird feeder and kick it, dropping to the ground to join his friends in the bounty. They can’t perch on the feeders but will try nearby branches as well as the mid-air kicking.

One of our own rabbits also posed. I call this guy El Toro, for his flared nostrils and no-fear approach. He does live behind a six-foot fence to guard against coyotes. One pup of our local pack was found sleeping under a bush beneath our home-office window and has returned a couple times as a teenager. The rest howl from a distance and our dog
howls back, sometimes even mimicking the coyote tonal patterns.

Along with all the wildlife activity, there was quite a bit of physics, as documented here. You can find the usual summaries of publications, presentations, and grant funding. We’ve also gained a new telescope and, as promised in the previous newsletter, a new faculty member doing computational astrophysics and part of the LIGO collaboration on gravitational waves. Articles about both follow below.

The pandemic has eased somewhat, with a return to fully in-person teaching and new activities for the physics club. The club president, Sam Callos, has provided a summary of things they’ve been doing, including some photos. The days of U Idaho Bound have also returned, with campus visits by admitted students and their parents. This gave Marty Ytreberg and me the opportunity to promote our revised Applied Physics BS, which now offers the option to pick electives from a science in addition to the original engineering list. (Marty subbed for me on the eve of Orthodox Easter.) We hope to begin an internship program, particularly with Idaho National Lab but other employers as well, where an Applied BS can be tuned to maximize student preparation for an internship and future related employment. We’ve also been in contact with North Idaho College, to work toward a 2+2 agreement that will facilitate transfers and act as a template for other community colleges; the adjustments in our course offerings, to accommodate four-year completions for transfers have already been made.

I hope that you have had a similarly safe and productive year and look forward to the next!

Best regards,

New Faculty Introduction: Zach Etienne

Greetings! It’s an absolute pleasure to be welcomed among peers in the UI Physics department. John has graciously given me the opportunity to write a few paragraphs introducing myself and my current research. But it would be a disservice to the reputation of long winded professors everywhere if I didn’t write at least seven!

As a child growing up in southern Indiana I loved math and science, and especially computers. I learned what a physicist was in high school, and more excitingly, I learned it was possible to earn a doctorate in the field. How cool is that?! So as an undergraduate at Indiana University, I chose to major in math and physics. It was a tough four years, but like many of my fellow physicists I cherished the intellectual challenge. By the end of it, I had earned B.S. degrees in physics
and math, with a minor in astronomy. I had also accepted a fellowship to attend the University of Illinois Physics PhD program.

My first year at Illinois, I joined Stuart Shapiro’s research group in computational astrophysics and numerical relativity. As these fields lie at the confluence of astronomy, computer science, math, and physics, it was a perfect match for my interests. My PhD work centered on performing pioneering simulations of black holes, neutron stars, and white dwarfs, in which we solved Einstein’s equations of general relativity (GR) coupled to the equations of GR magnetohydrodynamics.

Through my PhD, I spent significant time developing a computational framework that was among the state of the art in my field. To fully leverage the framework, I took the unusual step of staying in the same research group as a postdoc. This was a very productive time in my career. By the end of it, I had accepted a faculty offer in the math department at West Virginia U (WVU) and a JSI Prize Postdoctoral Fellow at NASA Goddard/U of Maryland. I deferred the faculty position to spend another year as postdoc. It was a year well spent; I developed connections with many research groups in my field–connections that remain strong to this day.

Meanwhile at home, my wife had recently given birth to our first son Maverick at the time. In spite of the strong headwinds, she earned her PhD from the venerable U of Illinois Ag Econ program and had received several faculty offers around the time I had received mine. To their credit, WVU was the only institution that solved our two-body problem. WVU also took a big risk in hiring me, as gravitational waves - the gravitational wave observations must be compared to millions of theoretically predicted waves to extract information about the black holes masses and spins. These predictions must be built upon simulations that fully solve the general relativistic field equations, but due to computational expense only a catalog of a few thousand have been constructed to date.

Sophisticated interpolation methods have been developed to bridge the gap from the thousands of waves in the catalog to the millions of predictions needed. This approach has been largely successful with the rather noisy gravitational wave observations to date, but such a small catalog will be insufficient for the more sensitive detectors of the future! To address this core need, I have been working over the past few years to take the unprecedented step of fitting binary black hole simulations on a consumer-grade desktop computer. With this capability, I’ll be launching a volunteer computing/citizen science project called BlackHoles@Home. Progress is rapid these days, and to keep up with what’s happening now... and what’s on the horizon, visit https://blackholesathome.net.

Our years as Assistant Professors at WVU were an absolute whirlwind. Gravitational waves from binary black holes and binary neutron stars were directly observed for the first time, which brought feelings of vindication for more than a decade of work in the field. My wife gave birth to our second son Malcolm, and managed to continue to publish papers at an ungodly rate while I managed to raise well over $1M in funding for my research group. A year after we earned tenure, she applied for an Endowed Chair position in Commodity Risk Management here at UI and was offered the position. By the good graces of this department and university, we managed to solve the two-body problem a second time. For this we will always be grateful, and our family is loving the wide open spaces of Idaho so far!

My research these days mostly focuses on constructing theoretical predictions of gravitational wave sources, like binary black holes and neutron stars. When it comes to the simplest system - binary black holes - the gravitational wave observations must be compared to millions of theoretically predicted waves to extract information about the black holes masses and spins. These predictions must be built upon simulations that fully solve the general relativistic field equations, but due to computational expense only a catalog of a few thousand have been constructed to date.

Sophisticated interpolation methods have been developed to bridge the gap from the thousands of waves in the catalog to the millions of predictions needed. This approach has been largely successful with the rather noisy gravitational wave observations to date, but such a small catalog will be insufficient for the more sensitive detectors of the future! To address this core need, I have been working over the past few years to take the unprecedented step of fitting binary black hole simulations on a consumer-grade desktop computer. With this capability, I’ll be launching a volunteer computing/citizen science project called BlackHoles@Home. Progress is rapid these days, and to keep up with what’s happening now... and what’s on the horizon, visit https://blackholesathome.net.

BlackHoles@Home
New Telescope Acquired
by Jason Barnes

With financial support from the College of Science, the Department has obtained a new telescope with an aperture diameter of 0.5 meters, or 20 inches. We now have the second-largest telescope in the state of Idaho, behind the 24 at the College of Southern Idaho. (We cannot fit one any bigger in our dome, so there was a knee in the price curve there where anything bigger would have been many times the cost). Boise States telescope is a 16. The telescope at Jewett Observatory over at WSU is only a 14, so our telescope has twice the light-collecting area of theirs!

Graduate students Steven Kreyche and Will Miller, along with undergraduate Thomas Gibson and I, retrieved the 350-lb box from central receiving and unboxed the telescope up at the Observatory near the golf course on the west side of campus. We got it installed on the mount on February 14, and then we got some clear skies two nights later.

We astronomers call the event where a telescope looks at the sky for the first time “First Light.” We do not have a real astronomical camera on it yet, but we were able to use the eyepiece to test the telescope. And it looks awesome! I took some really primitive photos through my phone of Tycho crater on the Moon and of the star forming region in the Orion Nebula.

Getting this thing up and running has been a goal of mine ever since Christine Berven showed me the Observatory when I visited campus on the interview shortlist back in March 2008. Sincere thank you to everyone for the help and financial support in getting us finally up and running.

SPS Activities
by Sam Callos, SPS President

This year saw a resurgence of activities for the University of Idaho's Society of Physics Students (SPS) after COVID forced us all online. We were able to re-register SPS as an official club after 7 years!

In September of 2021, SPS traveled to the Fossil Bowl in Clarkia, ID. Fossils were discovered in the area in 1972 and are the result of a lake from about 15 million years ago. A lot of the fossils in the area are from vegetation that was around the area at the time.

In February of 2022, we went to the University of Idaho Library where we saw all the things being offered at The Mill. We learned how to make pins, stickers, and the 3D printer. We were able to use the 3D
printing services to print a spherical cow for UIdaho Bound!

In March, SPS hosted a table at UIdaho Bound where we met many future Vandals. SPS was also given a tour of Dr. Jason Barnes Tesla Model X. We saw how its autopilot worked as well as how it uses power over time - all displayed on the screen in the vehicle.

In April, we hosted UIdaho Bound again and hosted a talk from Dr. Christine Berven about her work on mesoscopic electron transport in 2D electron gas systems. We also visited the Geology Department to see the resident mammoth fossil, nicknamed Cola. Cola was found in Soda Springs, ID in the 1960s and went through several hands before ending up at the University of Idaho. Cola is believed to be a Jeffersonian Mammoth from approximately 11,700 years ago.

At the end of April, SPS was able to view the stars at the observatory on campus using the new 20 inch telescope recently installed. We were able to see many things, including the Beehive Cluster and the Great Globular Cluster in the constellation of Hercules!

The SPS table at UI Bound with Steve Kreyche, Sam Callos, Connor O’Neill, Nathan Rubio, and Kaylee Maret
(photo by J. DeWitt)

UIdaho Bound Event

With the return of in-person events, as the pandemic fades (or lulls – we shall see), the University brought back the days of UIdaho Bound. The first for this year was on March 26. Our department was well rep-
represented, with a table for the department and, right next door, one for the SPS club, in a sea of other tables at the Kibbie Dome. Leah Bergman represented the faculty, Jessica DeWitt the staff, and the SPS club brought President Sam (Samantha) Callos and several members.

UI Bound reps: Leah Bergman, Sam Callos, and Nathan Rubio
(photo by J. DeWitt)

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**Faculty**

**Astrophysics and Planetary Science**

Gwen Barnes, Research Assistant Professor, Ph.D. University of Arizona 2007  
Jason Barnes, Professor and Dyess Faculty Fellow, Ph.D. University of Arizona 2004  
Zachariah Etienne, Associate Professor, Ph.D. University of Illinois 2009  
Matthew Hedman, Associate Professor and Director of Graduate Studies, Ph.D. Princeton University 2002

**Biological Physics**

Andreas Vasdekis, Associate Professor, Ph.D. University of St. Andrews 2008  
F. Marty Ytreberg, Professor and Associate Director of the Institute for Modeling Collaboration and Innovation, Ph.D. University of Maine 2002

**Condensed Matter Physics**

Leah Bergman, Professor, Ph.D. North Carolina State University 1995  
Christine Berven, Associate Professor, Ph.D. University of Oregon 1995  
You Qiang, Professor, Ph.D. University of Freiburg 1997

**Hadronic Physics**

Sophia Chabysheva, Clinical Assistant Professor, Ph.D. Southern Methodist University 2009  
John Hiller, Professor and Chair, Ph.D. University of Maryland 1980  
Ruprecht Machleidt, University Distinguished Professor, Ph.D. University of Bonn 1973  
Francesca Sammarruca, Professor and Secretary of the University Faculty, Ph.D. Virginia Polytechnic Institute 1988
Staff

Jessica DeWitt, Administrative Assistant
Eric Foard, Ph.D., Director of Physics Laboratory Education
Ramachandran Kasu, Ph.D., Postdoctoral Fellow
Brian Petty, Scientific Instrument Maker
Leonardo Werneck, Ph.D., Postdoctoral Fellow

Donations

If you would like to donate to the Physics Department, please contact Eric Bennett, the Director of Development for the College of Science at ebennett@uidaho.edu, 208-885-9106, or University of Idaho College of Science, 875 Perimeter Drive, MS 3025, Moscow, ID 83844-3025. Online donations can be made at https://www.uidaho.edu/giving/way-to-give. Entering ‘Physics’ in the designation field will present you with a list of funds associated with the Department. Thank you!!

Awards in 2022

Dean’s Award: Margot Dillon
Undergraduate research: Sam Callos
Deans Graduate Award: Jonathan Barnes
Best Physics TA: Dillon Morehouse
Outstanding Graduate entry, CoS Student Research Expo: Isiaka Lukman
UI Alumni Silver and Gold Award and Fellow of the Los Alamos National Laboratory: Blas Uberuaga (BA 1994)
DOE Early Career Award: Miles Beaux (PhD 2010)

New Graduates

Margot Dillon (B.S. 2021)
Jonathan Flores (B.S. 2021)
Kari Greenback (B.S. 2022)
Andrew Harley (B.S. 2022)
Andrew Johnson (B.S. 2022)
Jett Kauffman (B.S. 2022)
Stephen Maria (B.S. 2022)
Cole Thompson (B.S. 2021)
Orion Wheeler (Applied B.S. 2022)
Daniel Coulter (M.S. 2022) Advisor: Jason Barnes
Summer Graduate Research Projects 2021

Victor Afigbo (Hedman)
Calculating the amplitudes of density waves in Saturns rings

Elizabeth Atang (G. Barnes)
Variation in the depth of lunar regolith

Mohammad Khan (Qiang)
Defect distribution of Ti Nanoparticle for neutron radiation

Isiaka Lukman (Bergman)
Renewed Raman Selection Rule Calculations for Anisotropic $\beta$-Phase $\text{Ga}_2\text{O}_3$

Dillon Morehouse (Berven)
Measuring and modeling vertical and lateral superconductor-permanent magnet oscillations

Jinming Zhang (Qiang)
Deposition for ion radiation nanodetectors

Completed Thesis Projects

Joseph A’Hearn
PhD thesis: Gravitational Interactions and Resonances in Ring-Moon Systems

While resonances determine the large-scale dynamical structure of planetary systems, interactions among the small bodies in these resonances impact their orbital evolution. We use numerical simulations to study the orbital evolution of interacting small bodies orbiting within two different locations in Saturn’s rings, and of interacting equal-mass co-orbitals. Modeling the clumps in Saturn’s D68 ringlet as co-orbital point-masses reveals the fragility of low-mass co-orbital satellite systems. Simulations of multiple massive bodies in a common corotation resonance site, such as the ring arc of Saturn’s moon Aegaeon, reveal the importance of interaction timescales for multi-body orbital dynamics. We also investigate the planetary normal mode spectra of Uranus and Neptune to predict where in their rings we might expect to see resonant phenomena.

Jonathan Barnes
PhD thesis: Using modeling to understand structure-function relationships in proteins

Proteins are critical to the function of cells and to life. It is well established that changes to the DNA sequence (genotype) of a protein can have a significant impact on how they function or interact within the cell. Understanding the mapping between changes in a protein genotype and how those changes modify an organism phenotype is a largely unsolved problem in biology. Solving this problem will require integration of
experimental methods with computational and mathematical approaches. In this thesis, we utilize both computational and mathematical methodologies. We start by using statistical methods to investigate potential physical features that can explain epistasis in proteins. Here we find a number of intuitive features that play a role, but we can only explain 30% of the observed epistasis in both protein binding and folding. Next, we use molecular dynamics to inform statistical models and predict the spectral sensitivity of opsin proteins with high accuracy. Following that, we investigate a suite of fast methods for predicting protein-protein binding affinity, finding their performance to be largely context dependent. Lastly, we explore using two different molecular modeling techniques to calculate free energies and build a watch list of antibody escape mutations for the current COVID-19 pandemic.

Mohammad Khan

PhD thesis: Radiation Effects on Metal Fe and Core-Shell Ti-TiO$_2$ Nanoparticles by Molecular Dynamics Simulation

Nanoparticles, due to their small size and radiation absorption property, are widely used in nuclear nanotechnology as well as radiation environment. Radiation-induced defects could negatively affect mechanical properties, potentially leading to accidents. In this study, the molecular dynamics (MD) method, as a powerful atomic-level simulation tool, is applied to investigate and characterize formation and evolution of point defects in irradiated Fe nanoparticle (NP) and core-shell Ti-TiO$_2$ NP by using a recent updated many-body interatomic potential. MD especially helps us to gain access to length and time scales that are not accessible experimentally and to learn more about the multi-scale phenomena that occur during the irradiation of nanomaterials. This dissertation has focused on understanding the atomic-level mechanism of irradiation damages and defect formations in Fe nanoparticle (NP) and core-shell Ti-TiO$_2$ NP. To test the NPs compatibility for several neutron energy and temperature stability, a series of MD simulations have been done for Fe NP and core-shell Ti-TiO$_2$ NP. The results from the simulation provide the defect orientation on NP after irradiation and can be used to predict the experimental results.

Recent Publications (2021-22)

Astrophysics and Planetary Science

(Student authors are underlined.)


Mitri, Giuseppe; Barnes, Jason; Coustenis, Athena; Flamini, Enrico; Hayes, Alexander; Lorenz, Ralph D.; Mastrogiuseppe, Marco; Orosei, Roberto; Postberg, Frank; Reh, Kim; Soderblom, Jason M.; Sotin, Christophe; Tobie, Gabriel; Tortora, Paolo; Buitton, Veronique; Wurz, Peter, “Exploration of Enceladus and Titan: Investigating Ocean Worlds’ Evolution and Habitability in the Saturn System”, Experimental Astronomy, 2021 July 22.

Jason W. Barnes; Elizabeth P. Turtle; Melissa G. Trainer; Ralph D. Lorenz; Shannon M. MacKenzie; William B. Brinckerhoff; Morgan L. Cable; Carolyn M. Ernst; Caroline Freissinet; Kevin P. Hand; Alexander G. Hayes; Sarah M. Hörst; Jeffrey R. Johnson; Erich Karkoschka; David J. Lawrence; Alice Le Gall; Juan M. Lora;
Christopher P. McKay; Richard Miller; Scott L. Murchie; Catherine D. Neish; Claire E. Newman; Jorge Núñez; Mark P. Panning; Ann M. Parsons; Patrick N. Paplowski; Lynnae C. Quick; Jani Radebaugh; Scot C. R. Rafkin; Michael A. Ravine; Hiroaki Shiraishi; Jason M. Soderblom; Kristin Dotzen; Angela M. Stickel; Ellen R. Stefan; Cyril Szopa; Tetsuya Tokan; Colin Wilson; R. Aileen Yingst; Kris Zacny; Simon C. Stähler, “Science Goals and Objectives for the Dragonfly Titan Rotorcraft Relocatable Lander”, The Planetary Science Journal, 2:4 #130, 2021 July 19.

MacKenzie, Shannon M.; Birch, Samuel P.D.; Hörst, Sarah; Sotin, Christophe; Barth, Erika; Lora, Juan; Trainer, Melissa G.; Corlies, Paul; Malaska, Michael J.; Sciama-O’Brien, Ella; Thelen, Alexander E.; Turtle, Elizabeth; Radebaugh, Jani; Hanley, Jennifer; Solomonidou, Anezina; Newmann, Claire; Regoli, Leonardo; Rodriguez, Sebastien; Seignovert, Benoit; Hayes, Alex; Journaux, Baptiste; Steckloff, Jordan; Nna-Mvondo, Delphine; Cornet, Thomas; Palmer, Maureen; Lopes, Rosaly; Vinatier, Sandrine; Lorenz, Ralph; Nixon, Conor; Czapinski, Ellen; Barnes, Jason W.; Sittler, Ed; Coates, Andrew, “Titan: Earth-like on the Outside, Ocean World on the Inside”, The Planetary Science Journal, 2:112, 2021 June.


Ralph D. Lorenz; Shannon M. MacKenzie; Catherine D. Neish; Alice Le Gall; Elizabeth P. Turtle; Jason W. Barnes; Melissa G. Trainer; Alyssa Werynski; Joshua Hedgepeth; Erich Karkoschka, “Selection and Characteristics of the Dragonfly Landing Site near Selk Crater, Titan”, The Planetary Science Journal, 2:24 (13pp), 2021 February.


Biological Physics


Condensed Matter Physics


Hadronic Physics


Physics Education


Recent Presentations (2021-22)
(severely curtailed by the pandemic)

Astrophysics and Planetary Science

J. Barnes, “Dragonfly: NASA’s Titan Rotorcraft Lander”, invited colloquium for the Department of Physics at Idaho State University, Pocatello, Idaho (delivered virtually), 2021 August 30; invited colloquium for at the Department of Astronomy at Northern Arizona University, Flagstaff, Arizona (delivered virtually), 2021 November 15.

Z. Etienne, Advancing Multimessenger Astrophysics with Next-Generation Black Hole and Neutron Star Binary Merger Simulations, University of Idaho Physics Colloquium, August 2021.


Biological Physics


F.M. Ytreberg, North Idaho College Undergraduate Student Seminar, Moscow, ID, June 2021

Condensed Matter Physics


Hadronic Physics


J. Hiller, “Simplicity and complexity in the light-front vacuum,” invited virtual talk, APCTP Focus Program in Nuclear Physics 2021 Part II: Science Opportunities with EIC, South Korea, July 2021.


Current External Funding

Astrophysics and Planetary Science


Elizabeth Turtle (JHU/APL), Deputy PI Jason W. Barnes (UIdaho). Dragonfly. NASA New Frontiers, 2018-2038, $849,000,000 ($4,000,000 for UIdaho).


Z. Etienne, REU Site: Undergraduate Astrophysics Research in Appalachia at West Virginia University, NSF Special Programs in Astronomy, 2020-2022, $339,477.

Z. Etienne, Advancing Computational Methods to Understand the Dynamics of Ejection, Accretion, Winds and Jets in Neutron Star Mergers, NASA Theoretical and Computational Astrophysics Networks (TCAN), 2018-2022, $1,590,362 ($295,231 to Etienne).


D.P. Hamilton (PI University of Maryland), M.M. Hedman (Co-I, University of Idaho). NASA Cassini Data Analysis Program, 2018-2022, $439,191 ($27,989 to UIdaho).


D. Blaney (PI JPL), K. Hibbitts (Deputy PI APL), C. Bruce (PM JPL), A. Santo (Deputy PM APL), R. Green (IS JPL), R. Clark (Co-I PSI), B. Dalton (Co-I JPL), A. Davies (Co-I JPL), M.M. Hedman (Co-I University of Idaho), Y. Langevin (Co-I University of Paris), J. Lunine (Co-I Cornell University), T. McCord (Co-I Bear Fight Institute), S. Murchie (Co-I APL), C. Parianicas (Co-I APL), F. Seeles (Co-I APL), J. Soderblum (Co-I MIT), Mapping Imaging Spectrometer for Europa (MISE), NASA Europa Instrument Investigation Program, Funding Dates and Budget TBD ($69,411 to UIdaho).


Biological Physics

A.E. Vasdekis, National Science Foundation, PI, 2041523, Collaborative Research: Multidimensional single-cell phenotyping for elucidating genome to phenome relationships, $362,000, 03/21 03/24.

A.E. Vasdekis, National Science Foundation, senior personnel, (PI: T. Xing), CBET-2019231, MRI: Acquisition of a 3D Printer for Studying Biofluids and Biomechanics, $252,542 (total award), 09/20 08/23.

A.E. Vasdekis, Department of Energy, Genomic Sciences Program, PI, DE-SC0019249, Imaging metabolome and enzyme dynamics for co-optimizing yields and titers in biofuel producing microorganisms, $1,500,000, 09/18 06/22.

A.E. Vasdekis, Department of Energy, Genomic Sciences Program, co-PI: C. Marx, Using gene editing and an accumulated bioproduct as a reported for genotypic and phenotypic heterogeneity in growth-vs-production for M. extorquens conversion of aromatics to butanol, $306,000 (awarded to Vasdekis), 09/18 08/22.

A.E. Vasdekis, Department of Energy, Genomic Sciences Program, PI, DE-SC0002282, Integrative Imaging of Plant Roots during Symbiosis with Mycorrhizal Fungi, $1,700,000, 09/21 08/24.

A.E. Vasdekis, Department of Energy, Genomic Sciences Program, co-PI (PI: G. Stephanopoulos), Improving Fermentation Robustness by Cellular Noise Engineering, $430,000 (awarded to Vasdekis), 09/21 08/24.

A.E. Vasdekis, Department of Energy, Genomic Sciences Program, co-PI (PI: C. J. Marx), Converting methoxy groups on lignin-derived aromatics from a toxic hurdle to a useful resource: a systems-driven approach, $150,000, 09/21 08/24.


Condensed Matter Physics


C. Berven, Co-PI (PI H. Hess), Advanced Energy Storage System for Electric Vehicle Charging Stations for Rural Communities in the Pacific Northwest, Pacific Northwest Transportation Consortium (PacTrans) USDOT University Transportation Center for Federal Region 10, 2020-2022, $40,000 ($20,000 to Berven).


Hadronic Physics

F. Sammarruca and R. Machleidt, Nuclear Theory at the University of Idaho, DOE Office of Science, 2021-2023, $240,000.
Reader Response Form (2022)

Name: ____________________________
Address: ____________________________________________________________
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Please send your reply to John Hiller at the Department of Physics, MS 0903, University of
Idaho, 875 Perimeter Drive, Moscow, ID 83843 or by e-mail to jhiller@uidaho.edu.

Thanks!! We’ll enjoy hearing from you!