Congratulations, 2015 Graduates!

This year saw one Physics and one Engineering Physics major walk the stage to collect their BS degrees. Andrew Leicht (BS in Engineering Physics, minor in Applied Mathematics) and Rhys Taus (BS in Physics, minor in Pure Mathematics) discuss their senior thesis projects and future plans.

Andrew Leicht: “Bone Density Detection”  
Advisor: Prof. Bulman

“My thesis focused on methods of detecting osteoporosis via measurements of bone density. I compared two new parameters to evaluate the health of a bone – qualitative ultrasound (QUS) measuring bone mineral density (BMD) and Biodent® measuring bone material strength (BMS) – as improvements over the traditional method of Dual-energy X-ray Absorptiometry (DXA). I found QUS is a good short-term, low cost candidate for replacing DXA that does not expose the patient to ionizing radiation. In the long term, more studies will have to be conducted to determine which parameter (BMS or BMD) best models real bone, and which can most accurately predict the risk of fracture of any given bone.

After graduation, I plan to enter the workforce at medical device Ventura-based company Implantech. I am considering applying to graduate school, but may end up continuing at Implantech or pursuing a career at a different company. I have yet to discover what awaits me on my post-college adventure, but I am excited to find out!”

Rhys Taus: “Relativistic Orbits in a Generalized Uncertainty Principle Spacetime”  
Advisor: Prof. Mureika

“Many theories of quantum gravity corroborate the notion of a minimal length scale. The generalized uncertainty principle (GUP), an extension of the Heisenberg uncertainty principle also incorporates this feature. Recent work has yielded a modification to the Schwarzschild solution that incorporates the GUP, making the theory self-complete and modifying the associated black hole characteristics. In this project, I explored corrections to the orbits of timelike and lightlike test particles in the GUP spacetime through the modified effective potential. From this, testable corrections to the classical experimental tests can be derived, most notably the advancement of the perihelion of Mercury and the deflection of starlight.

In the future I will be attending the University of Rochester, working towards a Ph.D. in High Energy Physics. This summer I will join the Rochester High Energy Group at the Fermi National Accelerator Laboratory, studying standard model physics and $W^{±}$ asymmetry.”

Fusion Achieved!

The Farnsworth-Hirsch Fusor project is in its sixth year of development and has seen the participation of many students. The team currently consists of Austin Hentrup (left, ELEC) and Josh Solberg (right, MECH). Detectable fusion was achieved on January 15th with the measurement of an isotropic emission rate of $10^4$ neutrons per second. Since neutrons are produced in only half the events, the total fusion rate is double this amount. Additional contributors to the Fusor project include Anders Frankenberger (ENPH) and Reid Byron (MECH, PHYS minor). This continuing research was presented in several posters at LMU’s 7th Annual Undergraduate Research Symposium in March. Anatol Hoemke supervises the project.
**Faculty and Staff News**

Dr. Gabriele Varieschi is currently working with Kelli Ault (PHYS) on the project "Wormhole geometries in fourth-order conformal Weyl gravity," funded by a Continuing Faculty Grant. They will propose a revised version of the movie "Interstellar" in view of their new wormhole calculations (take that, Kip Thorne!).

Dr. Jonas Mureika spent a week in February at the Perimeter Institute for Theoretical Physics collaborating with colleagues. He received a Continuing Faculty Grant to pursue his work on black holes in alternate theories of gravity over the summer.

Dr. Jeff Phillips was recently appointed to the American Association of Physics Teachers’ Committee on Professional Concerns.

**Posters, Colloquia, & Seminars**

(* = LMU student collaborator)


Rhys won an APS Undergraduate Research Presentation Award for this poster, given to individuals who’s work was presented in a professional manner that conveyed understanding of the project. Congratulations!

J. Mureika, Invited Talk: “The Large, the Small, and Things in Between: Generalized Uncertainty Principle Black Holes”, Department of Physics, California State University, Fresno, CA (06 Feb 2015)


**Publications and Preprints**

(* = LMU student co-author)


**Atom Bombs Away!**

On April 17th, several Physics students accompanied Prof. Mureika on his *Weapons of Mass Destruction* class trip to the Nevada National Security Site, 65 miles north of Las Vegas. Over 1000 nuclear tests were conducted at the site between 1951 and 1992. The group is standing in front of Sedan Crater, a 1200 ft wide, 300 ft deep hole dug by a 105-kiloton thermonuclear blast in 1962.

**7th LMU Undergraduate Research Symposium**

The Physics Department was well-represented at this year’s Undergraduate Research Symposium, which took place on Saturday, March 21st in University Hall.

Rhys Taus (PHYS and MATH) talk: “Relativistic Orbits in a Generalized Uncertainty Principle Spacetime.” (Advisor: J. Mureika)

Martin Tangeri (ENPH and MECH) talk: “Design and Construction of a Low-Cost Spectrometer” (Advisor: P. Hassanpour)

Brad Stiehl (PHYS and MATH) poster: “Investigating the Relationship Between Suspots and Magnetic Storms” (Advisors: J. Sanny and D. Berube)

Reid Byron (PHYS and MECH) poster: “Design of Gamma Spectroscopy System for Detection of Neutron Induced Indium Isomers” (Advisor: D. Berube)

Cassandra Jacobsen, Samuel Sabido, Erik Anderson, Travis Weyman (PHYS and MECH), “Designing a Low-Cost Assistive Tricycle for Persons with Cerebral Palsy” (Advisor: M. Siniawski)