



(l→r) Section member Bill Tuszyński, Sam Joynson, John Curry, Prof. Brandon Krick. Not pictured: Jennifer Markham)

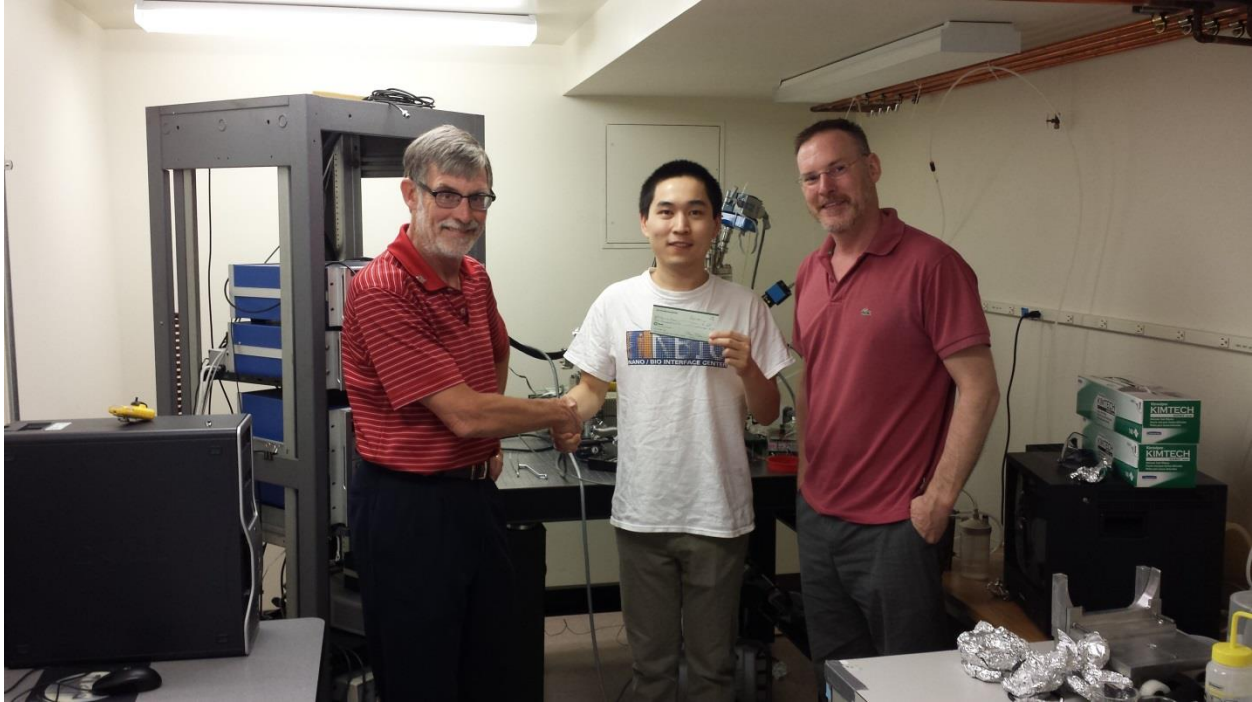
## Philadelphia Section Awards Scholarships to Three Lehigh University Students

The Philadelphia STLE Sections was pleased to award scholarships to three outstanding students at Lehigh University. Graduate student John Curry was awarded \$2,000 while undergraduates Sam Joynson and Jennifer Markham each received \$1,000. All three students are working on tribological projects in the laboratory of Professor Brandon Krick. Joynson, Curry and Krick are pictured with Scholarship Committee member Bill Tuszyński in Lehigh's Packard Hall in front of the first Packard automobile, which dates from 1899.

John Curry is a third year graduate student in Mechanical Engineering. His work includes the design and construction of a multi-purpose tribometer which was presented at the 2015 STLE Annual Meeting. His projects include a joint effort with researchers from the WD-40 Company and fundamental studies on the tribological properties of solid MoS<sub>2</sub> coatings.

Jennifer Markham completed her junior year as majoring in Chemical Engineering. She works on a project sponsored by the WD-40 Company studying the ability of different formulations to penetrate and lubricate steel test samples. In addition to tribological studies, she also characterizes the systems using Attenuated Total Reflection and Infrared Spectroscopy.

Sam Joynson joined Prof. Krick's research group as a freshman and is leading an independent research project in collaboration with Lehigh Heavy forge to investigate tool wear during sheet rolling operations. He is also involved in investigating the wear of 3-D printed materials and is part of a collaborative project with Sandia National Laboratory on the tribology of MoS<sub>2</sub> coatings.



(l→r: Section Member Bill Tuszynski, Scholarship Recipient Kaiwen (Kevin) Tian, Prof. Robert Carpick)

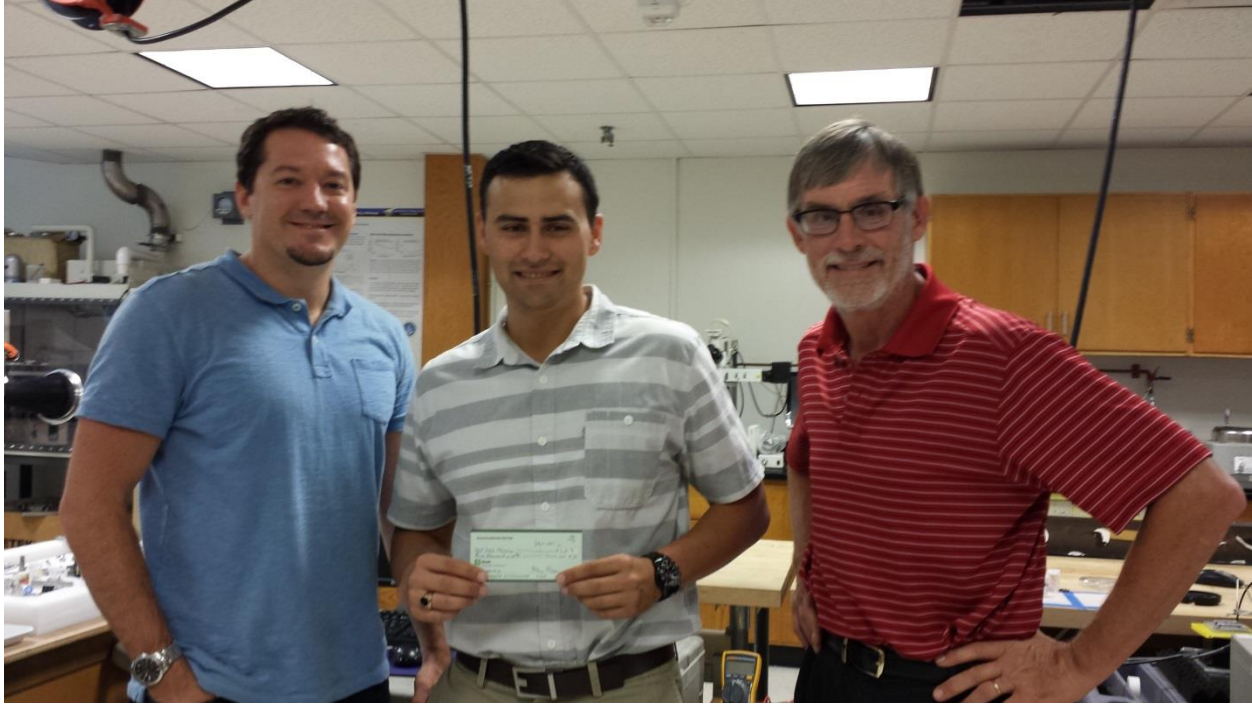
## **U. Penn Student Receives STLE Section Scholarship**

Professor Robert Carpick's lab at the University of Pennsylvania attracts some of the best undergraduate and graduate students in the field of tribology. The Philadelphia Section recognizes this and has frequently awarded one or more scholarships to his students. This year is no exception as the Section is pleased to award a \$2,000 scholarship to Kaiwen (Kevin) Tian.

Tian is a graduate student in Penn's Department of Physics and Astronomy. His thesis project is the application of atomic force microscopy to study the friction properties of geologic materials in collaboration with Penn geoscientist Dr. David Goldsby. By studying the frictional behavior of rocks at the nanoscale, this work will help better understand the processes which occur during earthquakes and other geological phenomena.

To date, Tian's results have demonstrated a physical basis for an empirical model of rock friction and also confirmed a theoretical model based on chemical kinetics through the application of contact mechanics.

In addition to preparing a series of three papers for submission to peer-reviewed publications, Tian has presented his results in 2014 at both the STLE Frontiers Meeting and the Gordon Research Conference on Tribology.



(l→r: Professor David Burris, Scholarship Winner Axel Moore, Section Member Bill Tuszynski))

## **STLE Section Scholarship Awarded to University of Delaware PhD Student**

Axel Moore is a third-year graduate student in the laboratory of Professor David Burris at the University of Delaware. Moore's thesis research is related to studying how a slow moving and non-conforming joint such as the knee provides sufficient lubrication to the articular cartilage. Thus far his work, which bridges the gap between interface science and biology, has provided a new and simple analytical model to explore cartilage mechanics and shown a distinct spatial distribution of material and tribological properties in the knee joint. In elucidating the mechanisms of joint lubrication and their role in joint diseases like osteoarthritis, his unique experimental approaches have given him the ability to quickly gain insights into cartilage lubrication. Moore has already modeled the primary lubrication phenomenon in the joint and experimentally validated the model. Despite decades of prior effort, Moore's work was the first to model the pressurization response of cartilage to sliding, the first to measure the response directly, and the first to experimentally validate his theoretical predictions.

His work has been disseminated through 4 referred journal articles, 2 extended abstracts in TLT, 11 podium presentations, and 9 poster presentations. On the merits of his efforts, Professor Burris was invited to present 'cartilage tribology' at the Gordon Research Conference, an honor reserved for those best representing the cutting edge of research. Moore was invited to speak at Dartmouth and present his work to the faculty and students.

In addition to research and academics, Moore has managed to carve out time to lead no fewer than ten outreach activities with UD's outreach coordinator Mel Jurist. He and Prof. Burris originally developed an educational module that teaches middle school students about animal joint anatomy and function. Moore went well beyond this preliminary effort to develop a number of other outreach activities. He genuinely enjoys teaching others and can clearly accommodate a diverse array of educational backgrounds.





(Scholarship Winner Jonathan Chambers, Section Member Neil Canter)

## **University of Maryland PhD Student Wins STLE Section Scholarship Award**

Jonathan Chambers is a graduate student in the Department of Aerospace Engineering at the University of Maryland – College Park, having completed his undergraduate degree at Auburn University.

Chambers' PhD research is on Magnetorheological (MR) fluid and its application to dampers. MR fluid, which consists of ferromagnetic particles suspended in a nonferrous carrier fluid, provides a damper the ability to instantaneously change its effective damping.

The focus of his research is the characterization of the sedimentation rate of the ferrous particles in MR fluids. In order to maintain predictable and effective use of an MR fluid, a uniform dispersion of the ferrous particles is necessary. Prolonged time between motion of a MR fluid allows the ferrous particles to settle creating a detrimental non-uniform particle density.

Chambers' group is conducting tests on MR samples of varying compositions in an effort to characterize how the rate of sedimentation is affected. The ferrous particle concentration is measured through the correlation of particle concentration and inductance. These tests were laborious and time consuming when performed manually. Recently, he designed and built a device that autonomously measures variations in the concentration of MR fluid samples. This device runs repeatable tests at regular time intervals, and provides a measurement resolution that had previously been virtually impossible. With the continuation of their sedimentation analysis, they hope to increase the number and spectrum of viable applications for MR fluids.