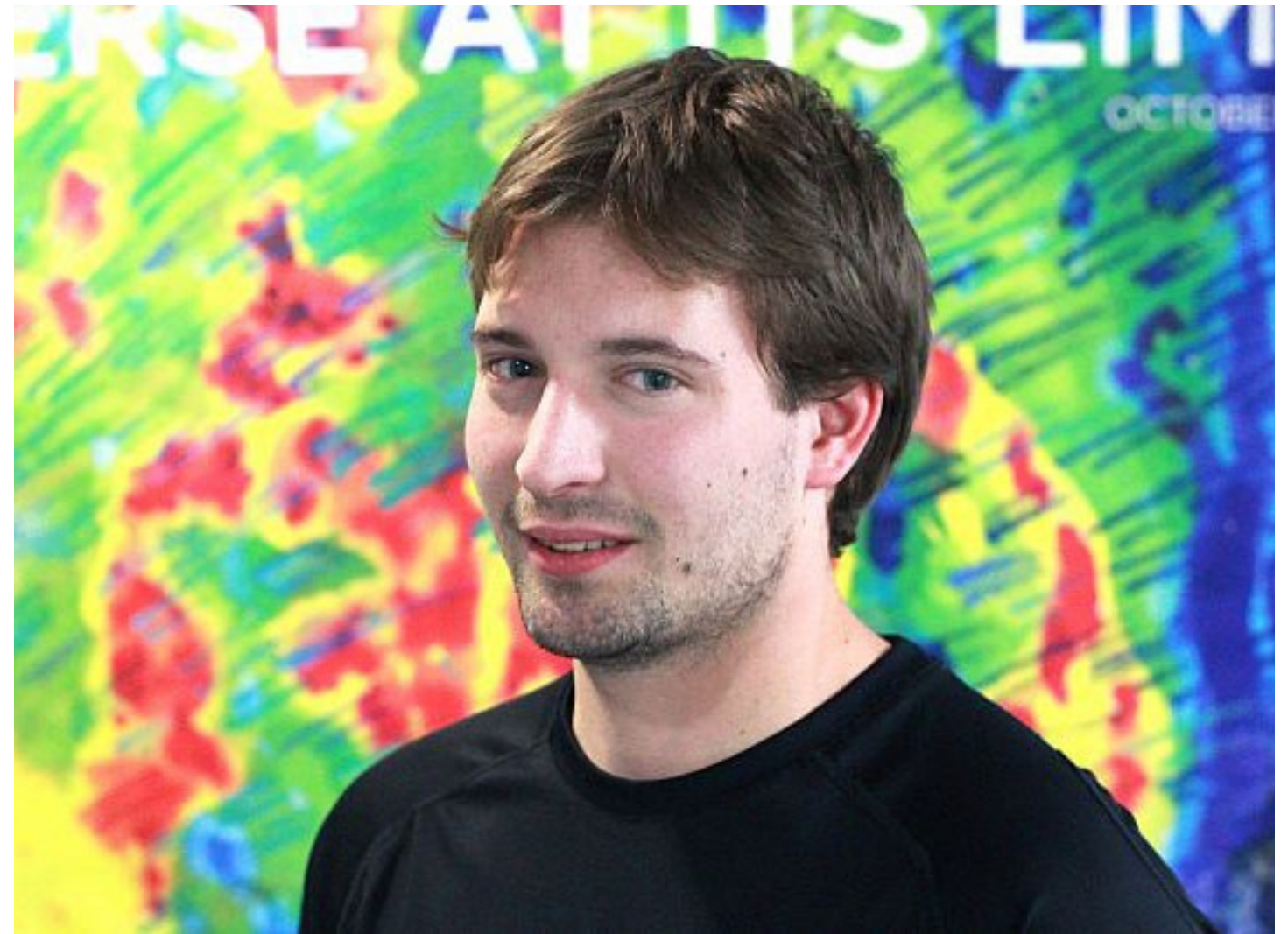




Exploring the Intersection of Physics and Medicine

by Matt Thomas '00



If you take one look at the resumé of James Trevathan '14, it seems as though he hasn't allowed a single academic opportunity to slip past him. He has taken advantage of numerous student-faculty research opportunities, secured a prestigious summer internship at the Mayo Clinic, and applied for and received a scholarship from the Minnesota High Tech Association.

Professor of Physics Steve Mellema calls Trevathan "one of those students who make it really fun to come to work every day." Trevathan's advisor in the Physics Department, Professor Paul Saulnier, had similar glowing statements about the Apple Valley, Minnesota native.

"James is a student who is interested in everything. Outside of class he has done independent research projects with several members of the Physics Department, while in class he is always seeking to go well beyond what is required of him," Saulnier said. "He wants to understand the material at a deep level and not just get an assignment done in the most expedient way."

Trevathan spent the summer of 2011 after this freshman year at Gustavus conducting research in Professor Tom Huber's acoustics

lab. That research involved the vibration of cantilevers with the use of a laser vibrometer and was funded through a grant Huber and the College received from the National Science Foundation.

"That was a great experience – to be able to do research over the summer full time," Trevathan said. "I learned a lot that summer about my interests as well as the process of scientific research."

Trevathan has also conducted research alongside Saulnier in his optics lab. Together, Trevathan and Saulnier studied the intensity distribution of laser speckle produced by the spatially coherent waves passing through diffuse media.

"I've been involved in research with Professor Saulnier since the second semester of my freshman year," Trevathan said. "He's a great guy, an excellent teacher, and I've learned a lot from him."



JAMES TREVATHAN '14

In the summer of 2012, Trevathan decided to go off-campus to enrich his academic profile and was able to secure a prestigious internship at the Mayo Clinic that is typically received by students entering their senior year of undergraduate study.

Trevathan's internship allowed him work at Mayo's CT Clinical Innovations Center under the direction of Dr. Cynthia H. McCollough. The Center is an interdisciplinary collaboration between clinical investigators, research scientists, and industry partners with the mission of facilitating high-impact imaging innovations that will translate into patient care.

Trevathan and his colleagues at the Center worked on a couple of projects including one involving the development of a technique to differentiate between two different types of kidney stones – Calcium Oxalate Monohydrate (COM) stones and Calcium Oxalate Dihydrate (COD) stones. Trevathan says that health care providers want to be able to distinguish between these two types of kidney stones because one breaks up when treated with ultrasound

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lithotripsy and the other does not.

“Standard dual energy CT methods can't distinguish between the two types of stones because they have similar effective atomic masses, so we developed a method that looked at the surface curvature of the stones,” Trevathan said. “One type forms with a smooth surface and the other with a rough outside surface. We developed an algorithm that measured the curvature of the stones surface through CT and then you are able to differentiate between the two types of stones with reasonable accuracy.”

Trevathan is a co-author on a paper regarding this newly developed method that was submitted to the Journal of Urology.

“The CT Clinical Innovations Center was a great lab for me to work in considering what my interests are,” Trevathan said. “I'm interested in the medical applications of physics and biomedical engineering. The Clinical Innovations Center at Mayo had a physics aspect to it and a medical aspect to it.”

Trevathan enjoyed his experience at Mayo so much that he is planning on returning there to work during the summer of 2013. After he graduates from Gustavus in the spring of 2014, he is considering applying for a seven-year graduate school program at



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Mayo that would allow him to earn both an M.D. and a Ph.D in biomedical engineering.

Trevathan also received a nice surprise during the first week of classes in 2012 when he was notified that he was the recipient of a \$5,000 scholarship from the Minnesota High Tech Association (MHTA). The MHTA scholarships are given to promising undergraduate students working toward their degrees in science, technology, engineering, and math (STEM) disciplines.

“Receiving the scholarship was a rewarding experience,” Trevathan said. “I can't thank my mentors here at Gustavus enough, especially the faculty in the Physics Department. My [years] here

at Gustavus have been a great experience and have really laid the foundation for the rest of my career.”

Matt Thomas is the Director of Media Relations and Internal Communication at Gustavus Adolphus College. After graduating from Gustavus in 2000 with degrees in Communication Studies and History, Thomas worked mainly as a sports journalist in the western suburbs of Minneapolis before returning to Gustavus in 2007.

