LOOKING TO THE STARS.
PRODUCING DOWN-TO-EARTH SOLUTIONS.

Chad Sosolik, associate professor of physics and astronomy, is doing more than imagining how stellar forces work in an earthly realm. He is doing it — in his lab, using a custom-designed Electron Beam Ion Trap (EBIT), a rare piece of versatile, nimble equipment that is being funded by the National Science Foundation.

Ions exist only in the bellies of stars as a puddle of stellar matter. So, how is it even possible to harness that power? Sosolik and his colleagues use the EBIT to strip atoms of their electrons and produce highly charged ions. Then they send them hurling down a beamline toward various targets.

The basic question, Sosolik says, is “What happens when these ions are sent flying through the air and crash into a material structure? The one thing we ask ourselves before setting off on any journey of discovery is if what we are doing is worth doing. The potential value must be real.”

One innovation in the works is an impenetrable, damage-resistant surface for the military, an initiative being supported by the Defense Advanced Research Projects Agency. “The highly charged ion beams we create are miniscule and can be very accurately focused. At the same time, they carry enormous amounts of energy,” Sosolik explains. “When they make contact, they break up the target’s existing chemical bonds. We are investigating if we can reconfigure those bonds and grow a hard film coating without using high temperatures. Think, for instance, the kind of coating needed to protect helicopters in combat, and you get a good idea of why defense leaders are so interested in the possibilities.”

For Sosolik, the ever-growing “what’s next?” list ranges from new industrial materials such as radiation-hardened electronics used in space to sending the ions down a fiber-optic cable to treat tumors in the body. The applications seem limitless.

The Competition for the Best

Professors such as Chad Sosolik are rare — and highly sought after by colleges and universities around the world. So while the competition is
stiff, our goal of recruiting and retaining top faculty means that Clemson must stay in the race. Already, Clemson is fortunate to be home to some of the country’s top academics. Out of a pool of 42,000 professors nationwide, five Clemson professors were listed in the 2012 *Princeton Review*’s list of “The Best 300 Professors.” Clemson faculty and staff serve as heads of their professional societies, participate on national boards, are recognized by the White House, capture prestigious grants and are honored by their peers, industry, business and government at an astounding rate.

But the race continues.

At the very core of a great university are these men and women who, in the classroom, in the lab and in the field, inspire, encourage, mentor and build the future leaders of our state — and indeed, our world. Even in the face of technological upheaval in colleges and universities, the students and the universities that serve them will continue to succeed and thrive as long as higher education is able to focus on supporting the work of innovative teachers and great researchers.

### The Need for Support

With competition for faculty of the highest caliber intense and coming from every corner of the globe, Clemson needs the support of private donors to recruit and retain these top achievers.

In order to reach — and exceed — the goals of the University, Clemson must

- reward current faculty excellence,
- recruit additional teaching and research talent,
- add endowed chairs and professorships.

The entire Clemson Family, as well as the state of South Carolina benefits from outstanding faculty members who not only conduct research and teach classes, but who also contribute to the greater good of society. Funding endowed chairs and professorships will:

- bring together intellectual capital needed to put the University at the pinnacle of academic research,
- bring the world’s leading researchers and scholars to South Carolina, enhancing economic opportunities for individuals and industries throughout the state,
- recruit more of the nation’s top students to Clemson.

---

Chad Sosolik holds a Ph.D. from Cornell University. The Clemson EBIT, under his guidance, took two years to build and is just the third beamline of its kind in the United States and one of only 17 in the world. Sosolik is collaborating with 13 other universities and research labs on work related to this project. He is also committed to making this flexible technology available to Clemson undergraduates studying atomic and nuclear physics, electronic materials and fusion energy.