A SUMMER OF EXCITEMENT, ENLIGHTENMENT

Juliana Herran and Ibro Tutic, who are majoring in Chemistry and Physics at the University of Northern Iowa respectively, came to know about the Research Experience for Undergraduates (REU) program at the University of Nebraska–Lincoln (UNL) from different sources.

Ibro got an email from his department that said Dr. Pavel Lukashev was looking for students interested to participate in the program. He met with the Physics professor and expressed his interest, and he was on board.

Juliana, on the other hand, came to know about the program at a conference.

“I attended a conference at my school [in the Department of Chemistry] where they explained the ongoing research projects in the physics department,” the Chemistry major recalls. “I got interested in this particular one, applied, got accepted, and got in.”

So, off they went to Nebraska this summer with Dr. Lukashev for theoretical and experimental studies of various Heusler compounds.

“I did computational analyses of four different half-metal Heusler and semi-Heusler metal alloys, and an experimental semi-Heusler analysis,” Juliana says. “The computations were based on VASP [Vienna Ab-initio Simulation Package].”

“I essentially ran calculations that gave us an idea of the properties of Heusler alloys,” Ibro says. “These calculations showed the contribution of spin up and spin down states from each metal in the alloy.”

Heusler compounds exhibit highly spin-polarized current at a room temperature. In case of 100% spin polarization such materials are called half-metals, and have enormous potential for practical device applications in an emerging field of spintronics.

Juliana and Ibro believe the studies are significant because of the potential application of these materials in spintronic devices such as hard drives or computer memory and also because these studies may contribute to discovering new Heusler alloys.

The REU program, sponsored by the National Science Foundation, recruits faculty/student pairs from regional four-year colleges and universities for summer research with the faculty at the UNL’s Materials Research Science and Engineering Center (MRSEC).

The program benefits students, especially those interested to go to graduate school, in multiple ways, says Dr. Lukashev.

“First, students get unprecedented experience working with world-class professional researchers and scholars. The experience is invaluable, especially as a transition step from predominantly undergraduate institution to a graduate school.

“Second, typically REU program results in publication(s) in professional journals. For example, Ibro Tutic and Juliana Herran (students working with me this last summer) are co-authors on four papers I recently submitted for publication (one has been published already, others are under review). Peer-reviewed publications strongly increase student’s chances of acceptance to a good graduate program.

“Third, students participating in the REU program typically benefit from a wide range of academic networking opportunities. And when it comes to career advancement, professional network is one of the most important aspects.
“Last but not least, students simply meet new friends and colleagues (the REU program usually provides various informal socializing opportunities).” Juliana and Ibro cannot agree more. “The experience was amazing,” Juliana says. “I was able to make connections with scholars and students from other disciplines. It also gave me confidence in my work.”

The work environment at the MRSEC is “very good,” she adds. “The people who work there are wonderful and helpful. I learned lots of things from them.”

“Extremely enjoyable” is how Ibro describes his experience. “I learned a lot about Heusler alloys, UNIX scripting while working on the UNL supercomputer, and what actual academic research entails,” he says.

Ibro rates his meeting with other students in this program who, like him, are “extremely interested in science” as one of the best things that he has experienced.

“I don’t really interact often with people who have that kind of drive to explore the realm of science,” he says. “Everybody was extremely intelligent and always had something interesting to add to the conversation.”

It was not all work in any way.

“I played sports with them often, almost daily in some cases,” Ibro recalls. “Everybody was there to have a good time and have fun.”

And there was competitiveness, which he did not expect.

“You could tell that everyone had some sort of a competitive nature, especially when playing soccer/ultimate,” he says. “But it just made playing sports so much more enjoyable since I am not used to playing at that level of competitiveness anymore.”

Like Juliana, Ibro also thinks highly of the people who work at the center.

“The thing that I liked most about working at the MRSEC at the UNL was the people I met while working there,” he says.

He also liked the program called “Science by the Slice.”

“Usually every Friday they would buy pizza and students could come in and listen to a science-related lecture from a faculty at the UNL and have lunch,” he says. “I learned a good amount of material regarding physics [from these lectures].”

For Dr. Lukashev, who worked as a post-doctoral research associate in the University of Nebraska system, first in Omaha (UNO) and then in Lincoln (UNL), between 2007 and 2014, it was kind of a homecoming.

“I know well people at the Physics Department at UNL, and it was a pleasure to meet with them again, and to work with them,” he says.

“So, it was not only a professional interaction (although this aspect was very important), but also an opportunity to meet with friends and spend some good time together,” he adds.

Was there any glitch or hitch? Anything funny or interesting?

“The crazy pictures taken with other students and faculty were funny,” Juliana says.

Ibro remembers the day when he could not log into the supercomputer.

“I triple-checked login name and password but could not log in,” he recounts. “After a while of trying to fix the issue myself, I emailed someone at the support center.”

So, what happened? Ibro had somehow forgotten that the first letter in the password was capital.

“I felt like a complete idiot when I made the first letter capital and it worked,” he recalls. “Keep in mind that I had been logging in daily for about two or three weeks before this incident.”