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# UNH Student From Berlin Goes From Building Racecars To Space-Based Detectors

David Sims

Robert Emro

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## UNH Student From Berlin Goes From Building Racecars To Space-Based Detectors

Contact: [David Sims](#)  
603-862-5369  
Science Writer  
Institute for the Study of Earth, Oceans, and Space

[Robert Emro](#)  
603-862-3102  
Writer  
College of Engineering and Physical Sciences

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DURHAM, N.H. -- Alan Enman builds racecars. So, naturally, University of New Hampshire astrophysicist Jim Connell chose the mechanical engineering junior from a field of 11 candidates to help build a device that would degrade a beam of high-energy calcium-48 nuclei at the National Superconducting Cyclotron Laboratory (NSCL) at Michigan State University.

“Jim mentioned that one reason they wanted me on the team was because of my experience building racecars. They said they’d be throwing me some odd problems to solve and maybe the race car experience would give me an advantage,” says Enman.

Since 1997, the Berlin, N.H. native has designed racecars, done mechanical fabrication, welded, and “even done some driving.”

Last August, Connell, of the Institute for the Study of Earth, Oceans, and Space (EOS) and Department of Physics, fellow astrophysicist Bruce McKibben and Enman spent 10 days at the NSCL conducting tests on Connell’s Angle Detecting Inclined Sensor instrument, or ADIS, which is intended to fly on future space missions. The group continues to analyze data from last summer’s tests and make refinements to the instrument. They hope to return to NSCL with an improved instrument some time next year.

In addition to a “nimble mind,” Connell explains, “Alan knew how things fit into a system and was used to working in a team setting.”

This latter skill would come in particularly handy when, at the NSCL, Connell, McKibben, and Enman spent 22 straight hours testing the ADIS instrument as the cyclotron blasted it with calcium-48 nuclei.

Says Enman, “It definitely wasn’t my first all’nighter. It’s also not something that everyone gets to do – work at a superconducting cyclotron on an instrument that may go into space.”

Connell's ADIS instrument, an archetype of design simplicity and elegance, uses four small disks about the size of a quarter and positioned at varying angles of inclination to intercept high-energy ions in space and measure their energy, direction and composition. Connell's work is funded by a three-year, \$140,000 per year grant from NASA.

In the past, such measurements have required elaborate position sensing detectors that measure the position of these particles. Additionally, to interpret the data from position sensing detectors, a series of corrections and mathematical calculations must be performed.

Says Connell, "It turns out that the mathematics required to analyze the data from ADIS is very simple compared to position sensing detectors, so we can program this into the data-processing unit on the flight instrument and let it analyze the data in flight." This saves money and time spent on measuring and transmitting data.

Before any space-based data can be had, ADIS needed an initial test run. And this is where Enman's skills, and stamina, came in.

In order to "degrade" the beam being generated by the superconducting cyclotron and, thereby, replicate the large range of energies of particles in space, Enman was charged with building a simple, inexpensive contraption that would do the trick.

"My specific instructions to him were, 'It ain't gotta be pretty, it's just gotta work.' The device met both those criteria, and I was very pleased with it," Connell says.

The device, dubbed "the guillotine," was five-feet high, two-feet wide and outfitted with an inexpensive, 1-rpm display-case motor that powered an aluminum wedge of varying thickness. The wedge moved vertically up and down the frame once every minute to degrade the beam energy and allow Connell and company to get a range of energies that would be encountered in space.

And so, for 22 straight hours, Enman swapped out ADIS detector discs, changing sizes and angles to generate data that will allow Connell to refine the instrument.

Says Enman, "Playing with \$2,000 quarters every half hour gets stressful after a while, especially when you're on your twenty-first hour."

Remarkably, not a single, fragile disk was destroyed during the marathon. Of his experience, which also included designing test fixtures for calibrating the detectors with radioactive sources, Enman adds, "I didn't really have any intention of getting into space science, but after all this there's always that chance."

Is there a chance that he'll repay Connell for the unique research opportunity by building the scientist a racecar?

"No," Connell says flatly. Turning towards Enman, Connell, tongue firmly in cheek, adds, "But what I should do is turn him loose on what I've got now. You want to put a turbocharger on my Beamer?"

**EDITORS: Two digital photos are available:**

<http://www.unh.edu/news/img/eos/ADIS.jpg>

**Caption#1: The Angle Detecting Inclined Sensor (ADIS) instrument**

<http://www.unh.edu/news/img/eos/jimandalan.jpg>

**Caption#2: UNH Astrophysicist Jim Connell and UNH junior Alan Enman of Berlin**