

# Synchrotron Receives \$109 Million to Develop New X-Ray Technology

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By [Eliza LaJoie](#) –The Cornell Daily Sun

The facility is used by scientists from around the world to study various types of matter in great detail. Important areas of study include disease research, as X-rays allow for the minute examination of the atoms in a virus. The Cornell High Energy Synchrotron Source has received grants totaling \$109 million to continue operation and to develop the latest in X-ray technology.

The Synchrotron Source — known as CHESS — produces strong X-rays to help scientists study the atomic structure of matter. The grants include \$7 million from the National Health Institute for biomedical research; \$77 million from the National Science Foundation to help the facility to continue functioning through at least 2014; and an additional \$32 million from the NSF to research and develop prototypes of the most advanced type of X-ray generator, the Energy Recovery Linac (ERL).

“The money for research and development is a major vote of confidence from the federal government for Cornell’s leadership in accelerator physics and X-ray technology,” CHESS Director Sol Gruner stated.

The facility is used by scientists from around the world to study various types of matter in great detail. Important areas of study include disease research, as X-rays allow for the minute examination of the atoms in a virus. CHESS has also been used to study and perfect the materials in products ranging from airplane wings to batteries.

Gruner emphasized the importance to the University of keeping such advanced technology on campus.

“One of the most important functions our lab plays is to train imaginative students who become the science and engineering leaders of tomorrow,” Gruner said. “Because CHESS is embedded in the central Cornell campus, it is deeply integrated into the educational activities of the University. This is the reason why so many graduates from the Cornell synchrotron center have gone on to build and manage many accelerator-based scientific facilities across the globe.”

Undergraduate and graduate students work closely with professors to solve problems and develop machine parts. The most important development work now centers around the creation of the Energy Recovery Linac, to which \$32 million of the NSF grant is dedicated.

CHESS Associate Director Don Bilderback described the ERL as an idea that has been germinating for nearly three decades and that may now finally become a reality with the help of this grant.

He described ERL technology as far more advanced than that which Cornell or any other research institution now possesses. It will be able to produce X-ray beams that are smaller and more focused, thus providing a more powerful view.

“It will offer factors of 100 to 1000 more scientific capability than we have right now,” he stated, describing how ERL will allow for the close examination of single nano-particles in materials like fuel cells.

“We’ll be able to see further inside matter than ever before ... ERL will push us past what we can do today,” Bilderback said. “People are really excited about that.”

He said that the NSF grant came at a time when the CHESS machine was becoming “a bit old,” and that it would prevent Cornell’s program from becoming obsolete, keeping it instead at the forefront of X-ray technology. He now hopes the ERL design study will be ready for presentation to the NSF in the next three to six months.

“Without money, you can’t keep a large project like this alive,” he said. “People have to keep doing things and developing things. It’s time to take the next step.”