NSF awards NJIT physicist $832,927 to study radio waves

September 27 2004

Solar physicists want to know more about the sun's magnetic fields because they are cited as the cause behind potentially damaging outbursts such as solar flares and coronal mass ejections. Such ejections sometimes throw matter and magnetic fields toward Earth that can cause dangerous radiation levels in space, and, if they hit Earth, will trigger magnetic storms.

The National Science Foundation (NSF) has awarded Dale Gary, PhD, professor of physics at New Jersey Institute of Technology (NJIT) $832,927 to continue his research **to develop a global network of 100 radio telescopes** to learn more about radio waves from the sun. NSF awarded Gary $400,000 for this project in 2002. Radio waves are one means of studying the sun's magnetic fields. In astronomy circles, Gary's project has come to be known as the Frequency Agile Solar Radiotelescope (FASR) consortium.

"The FASR consortium will ultimately create 100 receiving satellite dishes," said Gary. "For now, however, we're still testing data to see the best way to build these telescopes. "That's why we're calling this current project a FASR test-bed. From it, we hope to learn more about how to design and build FASR, but we will also do some new solar science.

Project goals include the construction of a broadband (eight GHz), digital three-element interferometer system. The funding will also support research into broadband radio observations such as how to eliminate radio frequency interference. The rise in cell phones, wireless

data systems, and communication satellites has made radio astronomy more of a challenge.

Gary and his team will build the new apparatus onto his solar telescope in his laboratory at Owens Valley, CA. Gary is part of a group of solar physicists at NJIT who are associated with Big Bear Solar Observatory (BBSO) in Big Bear, CA, managed by NJIT Distinguished Professor of Physics Phil Goode. Gary's laboratory is located near Big Bear. In 1997, NJIT took over management of BBSO from California Institute of Technology.

Magnetic storms are fueled by the collision between the coronal mass ejections and Earth's magnetic field. The collisions cause auroras, or northern lights, in regions normally limited to the Earth's poles. Particularly severe storms cause the auroras to spread southward and if they do, they can destroy power transformers and disrupt some forms of radio communication.

"Until very recently, magnetic storms have been difficult to predict," said Gary. There are many people, though, who want to know more about such patterns. Doing a better job of predicting the solar causes of these storms is one of the goals of the FASR facility.

Magnetic storms can impact airline flights, because they produce dangerous levels of radiation for crews who regularly fly certain routes. Crews, traversing Siberia, a known target for storms, are vulnerable. "Suddenly we see an increasing interest in learning how to forecast solar storms because airlines, aiming to protect employees, prefer to steer clear of them," said Gary. Space forecasters, who provide information on the space environment, and satellite operators, who use radio waves for communications broadcasts, also need the information. Power plant operators are also concerned.

Source: New Jersey Institute of Technology