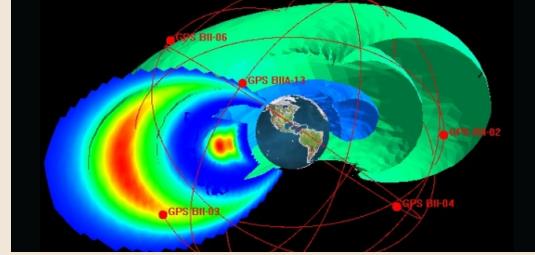


SOLAR RESEARCH

- » Forecast solar activity
- » Understand solar particle transport
- » Model solar wind transport

SPACE WEATHER

- » Measure/model Van Allen belts
- » Develop space radiation sensors
- » Forecast dangerous radiation levels

IONOSPHERIC EFFECTS ON POSITIONING SYSTEMS

- » Determine systems' positional uncertainty
- » Assess equatorial/polar aircraft routes
- » Model worst case error budgets

SPACE DATA ACQUISITION

- » Deploy/maintain global sensor networks
- » Maintain space data center for Department of Defense (DOD) researchers
- » Perform data quality control/repository

PLASMA CHEMISTRY

- » Conduct high-temperature chemistry R&D
- » Investigate re-entry plasma phenomenology
- » Develop nanosensors for space flight

INTERNATIONAL OUTREACH

- » Collaborate with scientists in Africa/South America
- » Expand global cooperation in space research
- » Exploit space knowledge for societal benefits

Boston College's ISR conducts basic/applied research for government and industry. Projects include:

SOLAR RESEARCH AND SPACE WEATHER: ISR scientists developed real-time models of the space environment that are now being routinely applied to forecasting space weather conditions on a global scale. ISR's models can depict how the weather evolves and responds to various stimuli from the sun. Space weather research is a very active scientific discipline because of society's great reliance on costly, space-based systems that represent a critical component of the nation's infrastructure.

IONOSPHERIC EFFECTS ON POSITIONING SYSTEMS: ISR supports the Federal Aviation Administration (FAA) in the development and monitoring of their Wide Area Augmentation System (WAAS). WAAS has the capability to guide aircraft to 200 feet above a runway without the benefit of legacy instrument landing systems—even in low-visibility conditions. Ongoing applied research for the FAA includes a feasibility study to determine the effectiveness of a Global Navigation Satellite System (GNSS) augmentation system in equatorial regions where characterizing and modeling the impact of ionospheric behavior on aircraft navigation is very challenging. Models predicting the severity and distribution of these ionospheric disturbance effects are also being developed for the US Air Force.

SPACE DATA ACQUISITION: ISR scientists have deployed and maintain a worldwide network of ionospheric sensors for radio wave propagation and space physics studies. Sensors include GNSS receivers, ionospheric density sounders, magnetometers, and radars.

PLASMA CHEMISTRY: ISR provides on-site support to the space and plasma chemistry laboratories at the Air Force Research Laboratory, Kirtland Air Force Base, New Mexico. Here, ISR chemists are working in the Air Force's experimental labs to develop nanosensor technology that will be capable of being used on a series of miniature satellites to give a real-time three-dimensional map of the neutral oxygen atom concentration in low-earth orbit. This information would be used to minimize potential mission-limiting damage to space vehicles from the high levels of corrosive, oxygen flux present in the atmosphere.

INTERNATIONAL OUTREACH: ISR physicists are deploying a network of ground-based scientific sensors across South America for use in aircraft global navigation and to study equatorial electrodynamics. In Africa, they are collaborating with local universities to provide training in the use of satellite navigation for scientific exploration and for practical applications such as farming, mapping, and emergency location services. ISR scientists continue to work with international colleagues to expand space weather understanding and to use GNSS for scientific exploration and applications with societal benefits.

ABOUT US

Welcome to the Institute for Scientific Research (ISR) at Boston College. Formed in 1954, the ISR is the largest sponsored research center at Boston College. It embodies the University's motto "Ever to Excel." It has been and continues to be at the forefront of world-class innovative research.

Our highly skilled team of scientists, engineers, mathematicians, and research associates uses its expertise for theoretical and experimental studies that include space physics, space chemistry, plasma chemistry, solar-terrestrial research, space weather, and ionospheric studies.

Our current projects include heavenly explorations—for example, observing the celestial sky to interpret the changes in infrared emissions in space—and earthbound pursuits, such as defining the effects of solar storms on space-based communication and navigation systems.

ISR researchers are fully dedicated to their work and have achieved numerous awards and acclaim from our sponsors. These sponsors include:

- Air Force Research Laboratory
- Air Force Office of Scientific Research
- Office of Naval Research
- Federal Aviation Administration
- National Science Foundation
- National Aeronautics and Space Administration

and other sponsors and partners from industry and academia.

Historically, the Institute's programs have helped put space shuttles in orbit, made significant contributions in studies of space weather phenomena, and supported America's defense systems. More recent projects address current interests in space exploration, mitigating the effects of space weather, and social justice with international partnerships that address building capacity for scientific research in underdeveloped countries.

Today, the Institute, with nearly 60 staff members, continues to evolve as a nationally and internationally recognized research institution dedicated to space and earth-based scientific exploration.

WORKING WITH ISR

The Institute for Scientific Research at Boston College is a sponsored research center that performs both basic and applied research in space physics, plasma physics, space weather, space chemistry, and ionospheric studies. Our efforts are primarily performed at our offices on the Newton Campus of Boston College and on-site for some of our government sponsors.

With well over 50 years' experience, ISR is known to perform innovative and ethical research that is performed in full compliance with federal regulations. Our professional staff is also known for its creativity in designing research projects that focus on questions of importance to our sponsors.

As an organized research institute at Boston College, ISR supports the research mission of Boston College: to conduct significant research—at the national and international level—that advances insight and understanding, enriches culture, and addresses pressing social needs. Through our research, workshops, and outreach programs, ISR also fosters the intellectual development of young scientists from around the world.

For more information on working with ISR, please contact the director or visit our website.

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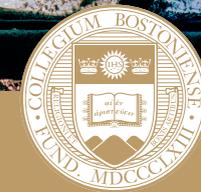
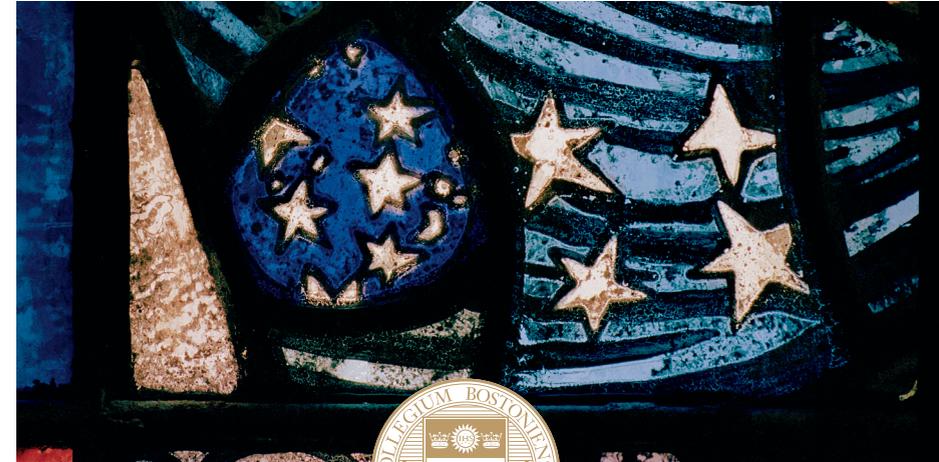
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BOSTON COLLEGE



INSTITUTE FOR SCIENTIFIC RESEARCH



Mission: Conduct ethical and innovative research in both experimental and theoretical aspects of space physics, space weather, and the space environment's effects on human activities.

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