William M. Staerkel PLANETARIUM

Teacher's Guide to

IBEX: Search for the Edge of the Solar System

OBJECTIVES:

- To see how real science is done through a space mission
- To learn how the Sun protects us from radiation in the galaxy
- To learn how the Sun affects the Earth

This show conforms to the following state Illinois science standards: 13.B.1c, 12.F.2c, 12.F.3c. Next Generation Science Standards: HS.ESS1.1

BRIEF SHOW DESCRIPTION:

Designed for visitors with an appreciation for the challenges of space science and a desire to learn more about science research, *IBEX: Search for the Edge of the Solar System* follows the creation of NASA's Interstellar Boundary Explorer (IBEX). Audiences will get an in-depth look at the mission and how IBEX is collecting high-speed atoms to create a map of our Solar System's boundary. Narrated by two inquisitive teenagers, audiences will hear from the scientists and engineers that developed the IBEX mission and created the spacecraft, and get the latest updates on the mission's discoveries.

PRE-VISIT ACTIVITIES/TOPICS FOR DISCUSSION:

- What does it mean to have a boundary? Does your backyard have a boundary? How do you know where it is?
- Make a list of all the things we have in our solar system. Where does the solar system end? How would we know if we had left the solar system?
- Atoms with all of their electrons aren't affected by magnetism but ions (atoms that have lost one or more electrons) can have their paths of travel bent in a magnetic field. Get a hold of some magnets of all shapes and sizes and let the class play with them. What happens when you put a north pole near a north pole?

POST-VISIT ACTIVITIES/TOPICS FOR DISCUSSION:

- You can demonstrate a "termination shock" by pouring water into a large pan. As the water spreads out after hitting the pan, the water disperses in all directions, but it slows down and creates a circular shock wave centered on the spot where the water stream hits.
- It is difficult to understand how IBEX collects atoms instead of light. Our eyes collect light. Think of IBEX as someone standing in the room with a waste basket and the atoms are wadded up pieces of paper. Have students throw the paper into the basket. By looking at the direction the paper came from, you can make a map of where the students area in the room in two dimensions.

VOCABULARY LIST:

Atoms
Coronal Mass Ejection
Cosmic rays
Heliosphere
Interstellar Medium
Galaxy
Milky Way
Plasma
Proton
Solar Flare

Solar medium Termination Shock

INTERNET RESOURCES:

- IBEX web site: http://ibex.swri.edu/
- NASA's IBEX page: http://www.nasa.gov/mission_pages/ibex/index.html
- Online IBEX games: http://ibex.swri.edu/games/index.shtml
- Spaceweather and how the Sun affects us: http://www.spaceweather.com
- SOHO home site: http://sohowww.nascom.nasa.gov/
- Solar Dynamics Explorer site: http://sdo.gsfc.nasa.gov/