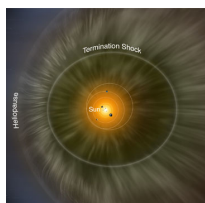


# Heliosphere and IBEX resources for Space Explorers Club Leaders

Created by [Andi Nelson](#) Last updated 4/5/2014

These are resources (images, information, activities, etc.) that I have compiled to support the Space Explorers Clubs in Chicago, IL.



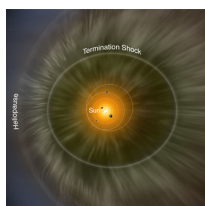
## The Heliosphere

**Notes:** This is a lithograph diagramming the parts of the heliosphere. On the back is an explanation of what the heliosphere is, what it is made of, why it is important, and why it can be used to define the boundary of our solar system. It is written at a middle school level for student reading. Also included on the back is a demonstration activity that uses water to model the heliosphere.

**AAAS Benchmarks:** [11B/M4](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-149>

**Resource URL:** [http://ibex.swri.edu/planetaria/IBEX\\_lithograph.pdf](http://ibex.swri.edu/planetaria/IBEX_lithograph.pdf)



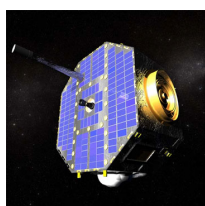
## La Heliosfera

**Notes:** This is the Spanish language version of the heliosphere lithograph also on this list. The same demonstration activity is also found on the back.

**AAAS Benchmarks:** [11B/M4](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-231>

**Resource URL:** [http://ibex.swri.edu/planetaria/IBEX\\_lithograph\\_spanish.pdf](http://ibex.swri.edu/planetaria/IBEX_lithograph_spanish.pdf)



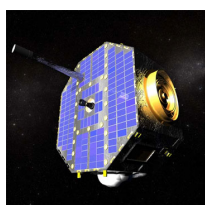
## IBEX: Exploring the Edge of Our Solar System

**Notes:** This is the English PDF version of the IBEX poster. It has a very comprehensive overview of the science, mission, satellite and heliosphere on the second page. Good resource to be able to answer many IBEX questions and tie into learning about the heliosphere.

**AAAS Benchmarks:** [1B/H1](#), [4A/H3](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-228>

**Resource URL:** [http://ibex.swri.edu/planetaria/IBEX\\_missionposter.pdf](http://ibex.swri.edu/planetaria/IBEX_missionposter.pdf)



## IBEX: Explorador de la Frontera Interestelar

**Notes:** This is the Spanish language PDF version of the IBEX poster also on this list.

**AAAS Benchmarks:** [1B/H1](#), [4A/H3](#)

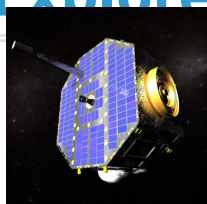
**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-229>

**Resource URL:** [http://ibex.swri.edu/planetaria/IBEX\\_mission\\_spanish.pdf](http://ibex.swri.edu/planetaria/IBEX_mission_spanish.pdf)



## Heliosphere and IBEX resources for Space Explorers Club Leaders

### Interstellar Boundary Explorer Lithograph

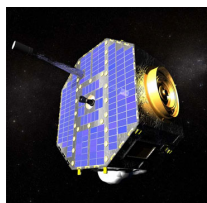


**Notes:** This is the digital English version of the lithograph you received at the PD. The information is written at a middle school level for students and gives a comprehensive overview of the mission, science and data from IBEX. Also included is a great hands-on activity that has students model to scale the Sun-Earth-Moon system.

**AAAS Benchmarks:** [4A/H3](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-469>

**Resource URL:** <http://ibex.swri.edu/planetaria/IBEXLitho4.pdf>



### Explorador de la Frontera Interestelar Lithograph

**Notes:** This is the digital Spanish language version of the IBEX lithograph you received in the PD. The English version is also on this list.

**AAAS Benchmarks:** [4A/H3](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-152>

**Resource URL:** [http://ibex.swri.edu/planetaria/IBEX\\_litho4\\_spanish.pdf](http://ibex.swri.edu/planetaria/IBEX_litho4_spanish.pdf)



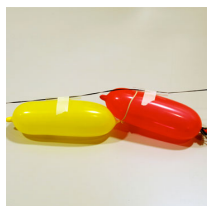
### Particle Detection

**Notes:** This is an activity about the functioning of the Interstellar Boundary Explorer, or IBEX, spacecraft. Learners will participate in an interactive demonstration to illustrate how the IBEX spacecraft uses its particle detectors to collect and sort particles that come from the boundary of the Solar System. This activity complements other IBEX informal education materials. An instructional video explaining how to facilitate this activity is available: <http://bit.ly/YqwWCd>. - See more at: <http://nasawavelength.org/resource/nw-000-000-003-150/#sthash.Z2zKqRZY.dpuf>

**AAAS Benchmarks:** [4A/H3](#), [11B/M6](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-150>

**Resource URL:** [http://ibex.swri.edu/planetaria/Particle\\_Detection.pdf](http://ibex.swri.edu/planetaria/Particle_Detection.pdf)



### Achieving Orbit

**Notes:** This is an engineering design challenge activity. Learners will use balloons to investigate how a multi-stage rocket, like that used to launch the Interstellar Boundary Explorer, or IBEX, spacecraft, can propel a satellite to a specific orbit. Learners will construct a two-stage balloon rocket that will be required to reach a particular location on the balloon track, simulating the proper orbit around Earth to be reached by the IBEX satellite. This activity complements other IBEX informal education materials. An instructional video explaining how to facilitate this activity is available: <http://bit.ly/ZwIFf4>. - See more at:



# Heliosphere and IBEX resources for Space Explorers Club Leaders

<http://nasawavelength.org/resource-search?qq=IBEX&educationalLevel=#sthash.4M9G2P8U.dpuf>

**AAAS Benchmarks:** [11B/M6](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-162>

**Resource URL:** [http://ibex.swri.edu/planetaria/Achieving\\_Orbit.pdf](http://ibex.swri.edu/planetaria/Achieving_Orbit.pdf)



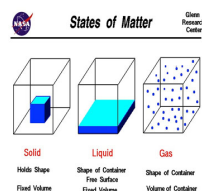
## Postcards from Space

**Notes:** This is an activity about boundaries. Participants will imagine they have taken a journey from Earth through the Solar System out into the Milky Way Galaxy. Using images on the front of the My Place in Space lithograph, they will write or draw on the back of the lithograph to tell their friends about their journey and the real and imaginary boundaries they crossed on their journey. The activity includes connections to science related to the Interstellar Boundary Explorer, or IBEX, spacecraft. This activity complements other IBEX informal education materials. An instructional video explaining how to facilitate this activity is available: <http://bit.ly/14IoHVN>.

**AAAS Benchmarks:** [12D/E2](#), [12D/E7](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-235>

**Resource URL:** [http://ibex.swri.edu/planetaria/Postcards\\_from\\_Space.pdf](http://ibex.swri.edu/planetaria/Postcards_from_Space.pdf)



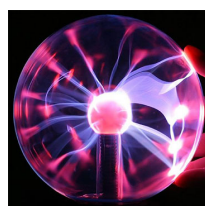
## Four of the States of Matter

**Notes:** This is a lesson about the states of matter. Learners will participate in a kinesthetic activity to reintroduce them to three states of matter, solid, liquid, and gas and introduce them to a fourth state of matter, plasma, its connection to the Sun, and connections to science related to the Interstellar Boundary Explorer, or IBEX, spacecraft. This activity also demonstrates how the addition of energy can transform matter from one state to another and reviews common examples of matter in each state. This activity complements other IBEX informal education materials. An instructional video explaining how to facilitate this activity is available: <http://bit.ly/16eHjjh>

**AAAS Benchmarks:** [4D/M3cd](#), [4D/M8](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-163>

**Resource URL:** [http://ibex.swri.edu/planetaria/Four\\_of\\_the\\_States\\_of\\_Matter.pdf](http://ibex.swri.edu/planetaria/Four_of_the_States_of_Matter.pdf)



## Mystery Matter

**Notes:** This is an activity about the states of matter. Learners will participate in a demonstration to reintroduce them to three states of matter: solid, liquid, and gas. The demonstration also introduces them to a fourth state of matter, plasma, through investigation of the properties of volume and shape as they relate to common solids,



# Heliosphere and IBEX resources for Space Explorers Club Leaders

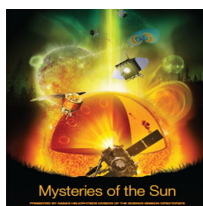
liquids, and gases, and to the mystery matter later identified at the end as plasma.

The demonstration also covers plasma's connection to the Sun and connections to science related to the Interstellar Boundary Explorer, or IBEX, spacecraft. This activity complements other IBEX informal education materials. The demonstration requires use of a small plasma ball and, ideally, a slightly darkened room so that the plasma ball can be more easily seen. An instructional video explaining how to facilitate this activity is available: <http://bit.ly/125ZW5k>

**AAAS Benchmarks:** [4D/M8](#), [9C/M1](#), [11D/M1](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-234>

**Resource URL:** [http://ibex.swri.edu/planetaria/Mystery\\_Matter.pdf](http://ibex.swri.edu/planetaria/Mystery_Matter.pdf)



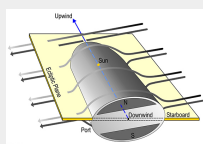
## Mysteries of the Sun

**Notes:** This is also a great resource to supplement Unit 1 of the GEMS SSS. This is a resource about the Sun and its effects on the rest of the Solar System. Learners will watch movie clips and read a guidebook of information about space weather, solar variability, the heliosphere, Earth's magnetosphere and upper atmosphere, as well as the solar mysteries that scientists are still studying.

**AAAS Benchmarks:** [4A/H2cd](#), [4E/M2](#), [4F/M8](#), [4G/H7](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-003-157>

**Resource URL:** <http://missionscience.nasa.gov/sun/index.html>



## IBEX: Interstellar Boundary Explorer

**Notes:** This is the website for the IBEX mission. On this site you can find current data connections, information about the mission and the heliosphere, and online games that students can play that work with helioscience.

**External Resource URL:** <http://ibex.swri.edu>



## Particle Detection - YouTube

**Notes:** Video guide for the IBEX Particle Detection activity.

**External Resource URL:** <http://bit.ly/YqwWCd>



## Achieving Orbit - YouTube

**Notes:** Video guide for the IBEX Achieving Orbit activity.

**External Resource URL:** <http://bit.ly/ZwLFf4>





## Heliosphere and IBEX resources for Space

### Explorers Club Leaders



#### Postcards From Space - YouTube

**Notes:** Video guide for the IBEX Postcards From Space activity.

**External Resource URL:** <http://bit.ly/14loHVN>



#### Four of the States of Matter - YouTube

**Notes:** Video guide for the IBEX Four of the States of Matter activity.

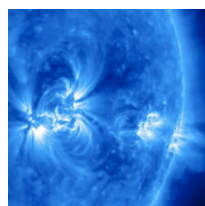
**External Resource URL:** <http://bit.ly/16eHjjh>



#### Mystery Matter - YouTube

**Notes:** Video guide for the IBEX Mystery Matter activity.

**External Resource URL:** <http://bit.ly/125ZW5k>



#### Sun and Space Weather: Presentation for Elementary School Teachers

**Notes:** This is for teachers only, but is great for learning more about the Sun and its effects.

**AAAS Benchmarks:** [11C/E2a](#), [6A/E2](#)

**More info:** <http://www.nasawavelength.org/resource/nw-000-000-002-694>

**Resource URL:** [http://stereo.gsfc.nasa.gov/img/Swweb\\_elem.zip](http://stereo.gsfc.nasa.gov/img/Swweb_elem.zip)

