IBEX: The Edge of Our Solar System

- Sun
- Termination Shock
- Bow Shock
- Heliopause
- Heliosheath
What is the boundary of our solar system?

The boundary of our Solar System is defined by the termination shock, which marks the outer limits of the Sun’s influence. At this point, the solar wind, a stream of charged particles emitted by the Sun, interacting with the interstellar medium, slows down and eventually stops. Beyond this point, the plasma sheet is detached from the solar wind, and the interstellar medium becomes dominant. This boundary is not fixed and can change, but it is generally located around 100-1000 AU (astronomical units) from the Sun, depending on the solar wind conditions and the interstellar medium properties.

What is the solar wind?

The solar wind is a continuous stream of charged particles, primarily protons and electrons, that escape from the Sun’s corona and travel out into interstellar space. The solar wind is generated by the Sun’s magnetic field and is accelerated by the solar wind pressure. It is responsible for shaping the heliosphere, the bubble-like region of solar wind that surrounds the Sun, and for interacting with the interstellar medium. The solar wind velocity depends on the solar activity and is typically between 300 and 800 km/s (1 million miles per hour).

What is the interstellar medium?

The interstellar medium is the vast region between the stars, consisting of gas and dust, which make up 99% of the mass of the galaxy. It is a dynamic environment where new stars are formed. The ISM is composed of hydrogen and helium, along with trace amounts of heavier elements. The density of the ISM ranges from 0.003 particles per cubic centimeter in the outer regions to about 200,000 particles per cubic centimeter near the Sun. The temperature of the ISM ranges from 0.01 °C to 1 million °C, with the coldest regions being the dust grains, which can be colder than the ISM gas.

What is the heliosphere?

The heliosphere is the bubble-like region that the Sun’s magnetic field and solar wind have created around the Sun. It is the boundary of our Solar System and extends out to about 100-1000 AU from the Sun. The heliosphere is shaped by the interaction of the solar wind with the interstellar medium, which is denser and slower than the solar wind. The heliosphere is divided into two regions: the inner heliosphere, which is dominated by the solar wind, and the outer heliosphere, which is dominated by the interstellar medium. The boundary of the heliosphere is defined by the termination shock, which separates the solar wind from the interstellar medium.