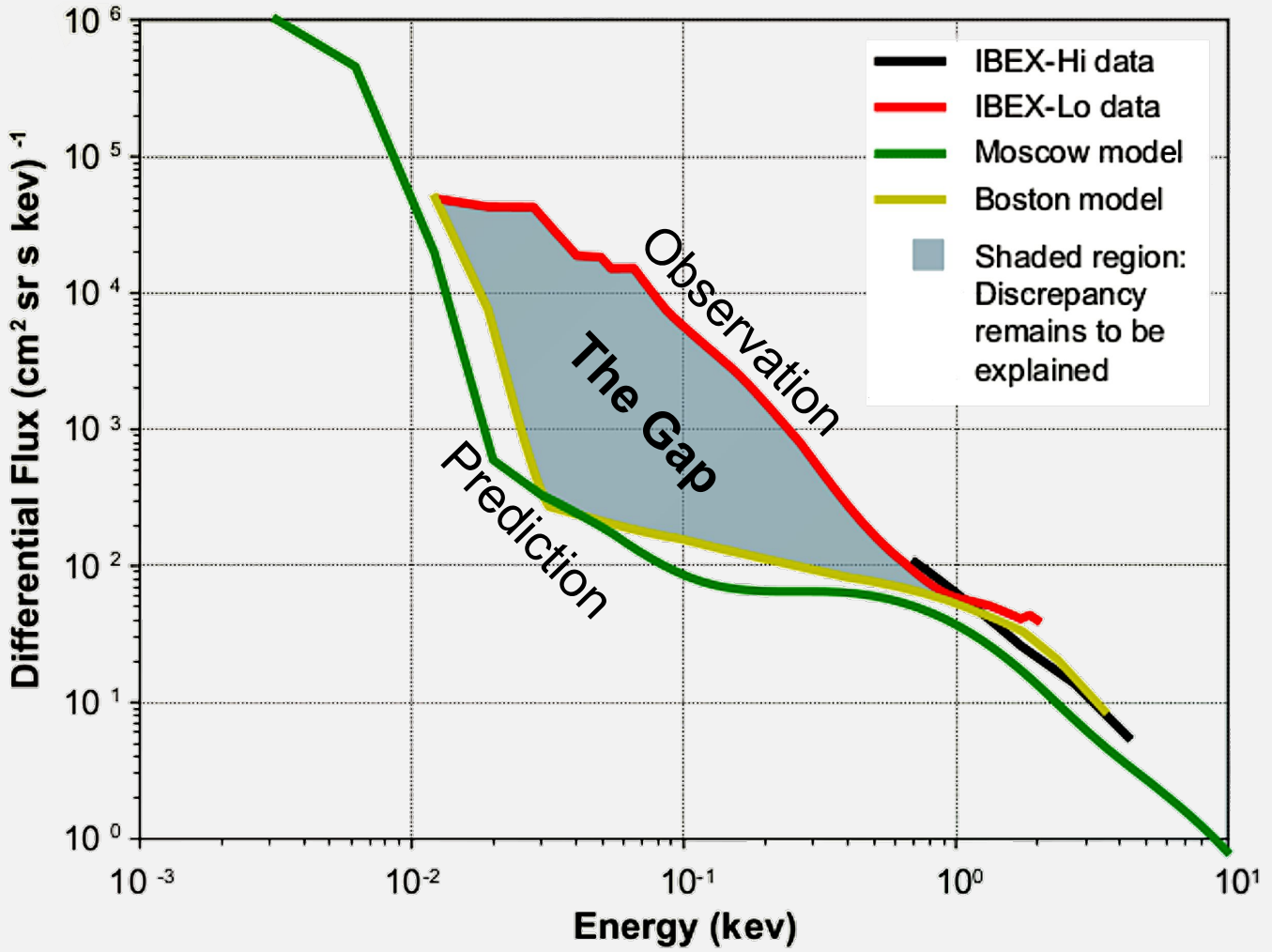
Mind The Gap // Discrepancy of Observed & Predicted ENA below the Solar Wind Energy

An energetic neutral atom (ENA) is created when a fast ion exchanges its charge with a neutral atom. Measuring such ENAs allows scientists to study the utmost boundary regions of our sun's astrosphere, called the heliosphere, from afar. ENAs provide the means to place the in-situ plasma measurements in a global context and image large parts of the sky simultaneously.

Space scientists measure the number of ENAs coming from the heliosphere's boundary using NASA spacecraft, such as the Interstellar Boundary Explorer (IBEX; https://science.nasa.gov/mission/ibex/). SHIELD researchers use computer models to make predictions about these ENA measurements. Recent work analyzed the number of observed ENAs that are less energetic than the solar wind coming from all parts of the heliosphere's boundary. Over the course of an 11-year solar cycle, this showed that there is a large gap between measurements and models for all sky directions. At some energies, there is as much as 100 times smaller ENA intensity predicted in the models than seen in observations. This drastic difference indicates that we do not fully understand the ENA observations below the solar wind energy and that our computer models need to be improved. SHIELD researchers will continue working on improving our understanding of the important processes in the heliosphere, our home in the interstellar environment.



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