PICKUP ION DISTRIBUTION & ENA FLUXES WITH VOYAGER DATA

Pickup ions (PUIs) are the energetically dominant in the heliosheath and are the main source of energetic neutral atoms (ENAs) observed by Interstellar Boundary Explorer (IBEX) and Interstellar Mapping and Acceleration Probe (IMAP). However, pickup ions are not measured by Voyager instruments directly.

Science Question:

- Can we constrain PUI distribution and ENA fluxes using available Voyager data?

Methods:

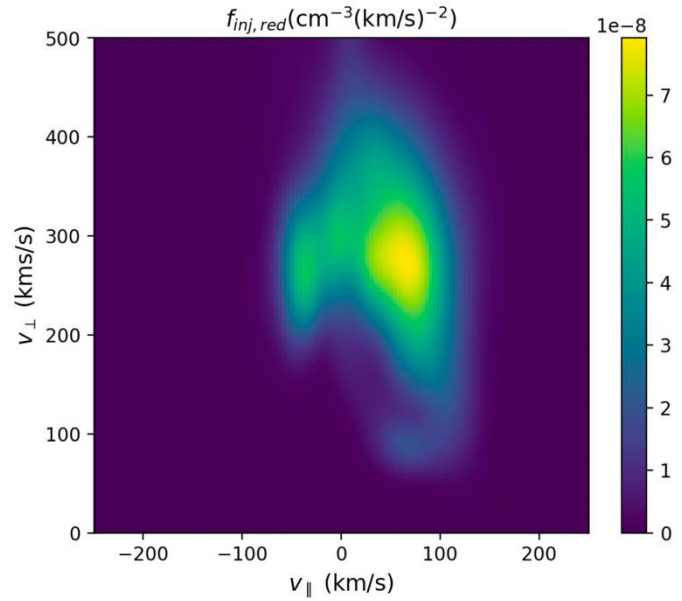
- We model the anisotropic PUI velocity distribution along Voyager 2 trajectory in the heliosheath using the measured plasma parameters and magnetic field. The distribution is then used to model the ENA fluxes in Voyager 2 direction.

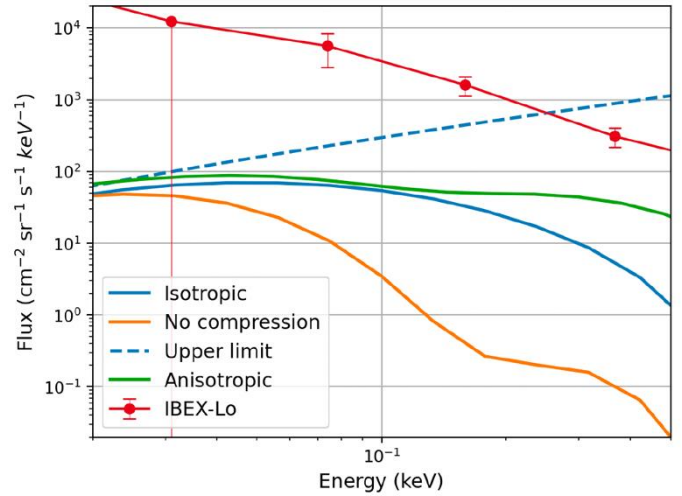
Results:

- The top figure shows the modeled velocity distribution of PUIs as a function of $v_{\parallel}$ and $v_{\perp}$ (relative to the magnetic field) near the heliopause. The bottom figure shows that the modeled ENA fluxes underpredict IBEX data. It also shows that the effects of anisotropy and compression are important.

Impacts:

- The discrepancy between our Voyager modeling and IBEX data suggests missing physical processes that need to be investigated in future works.





Du et al. ApJS, [2026]; https://doi.org/10.3847/1538-4365/aea206