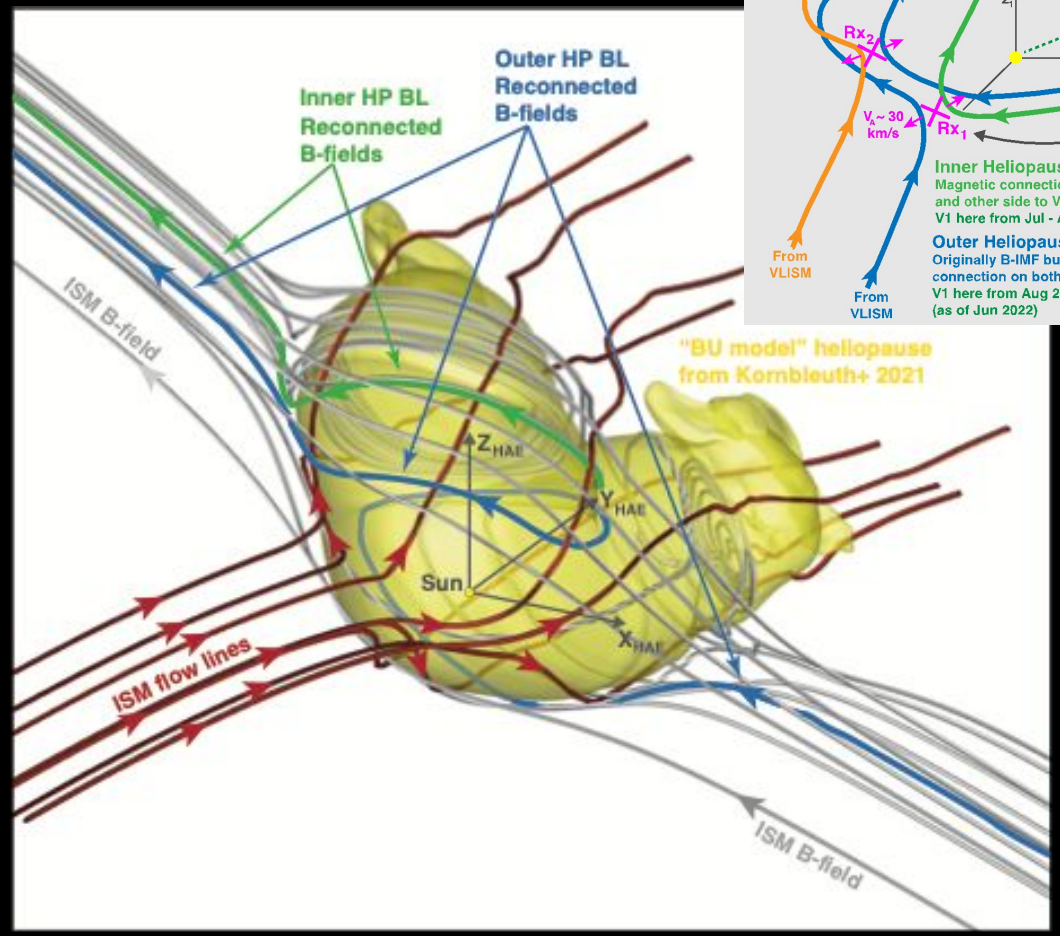
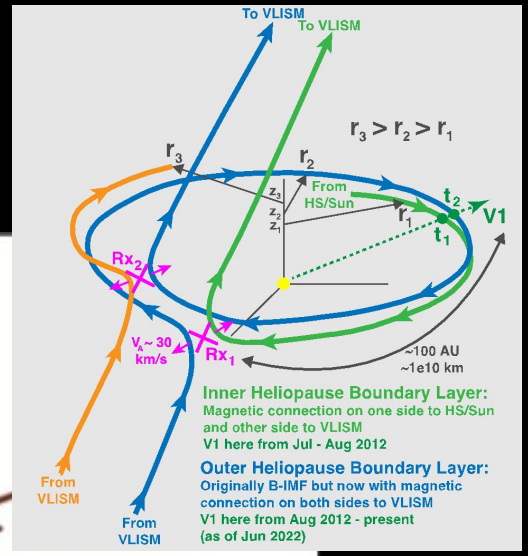
New Take on A Magnetic Mystery // Heliosphere and LISM Interactions

- Voyager 1 and 2 both crossed the heliopause from the solar wind into the very local interstellar medium (VLISM), but neither observed the expected rotation of the magnetic field when they crossed that boundary
- New insights from NASA's near-Earth Magnetospheric Multiscale (MMS) mission show that this mysterious magnetic field signature might be caused by merging of solar and VLISM magnetic field lines, a process known as magnetic reconnection. The reconnected VLISM field lines are twisted toward the solar wind field direction as observed
- This solution indicates that the heliopause is a thick but porous boundary layer, not a thin surface, which has implications ranging from the shape of the heliosphere to particle acceleration and cosmic ray accessibility





This new perspective on the data suggests that Voyager 1 may not have transited into pure interstellar space and offers new insight on the nature of the heliosphere's interaction with the LISM

Turner et al., *Astrophys. J.*, [2024]; DOI:10.3847/1538-4357/ad05d3