

Three Galactic Travelers Teach Us About Solar System Formation & Evolution

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Friday, March 22nd, 2024, Time: 3:30PM

In 2017 the first macroscopic object from another world was seen hurtling through our solar system. Deemed 1I/Oumuamua (or “Traveler” in Hawaiian), its tumbling, elongated point source-like nature remains unexplained to this day. It was followed ~2 years later by 2I/Borisov, a comet-like object that met most researchers’ expectations. No new 3I has been observed since, and more easily detected Borisov was found second. I will review the ISO’s puzzling circumstances, current leading formation hypotheses, and prospects for further future detection in the era of LSST/Rubin.

In 2021 our group used the NASA Chandra X-ray Observatory to observe the well-known debris disk system HD61005. A nearby ~100 Myr old Sun-like G9V star at the other side of the Local Bubble, HD61005 is well known for having a bright disk of orbiting circumstellar dust surrounded by two swept-back wings. Observed edge-on, these wings are thought to be due to blowback of small dust particles by interstellar medium (ISM) ram pressure effects as HD61005 travels through a locally dense part of the Milky Way galaxy. The same dense ISM should also cause a strong stellar wind-ISM interaction called charge exchange (CXE) which produces XUV line radiation. We report the first ever detection of a resolved bubble of CXE x-rays around HD61005, a young main sequence G-star at only 2% of the Sun's present age, showing us what our own system’s protective heliosphere looked like from the outside in its infancy.