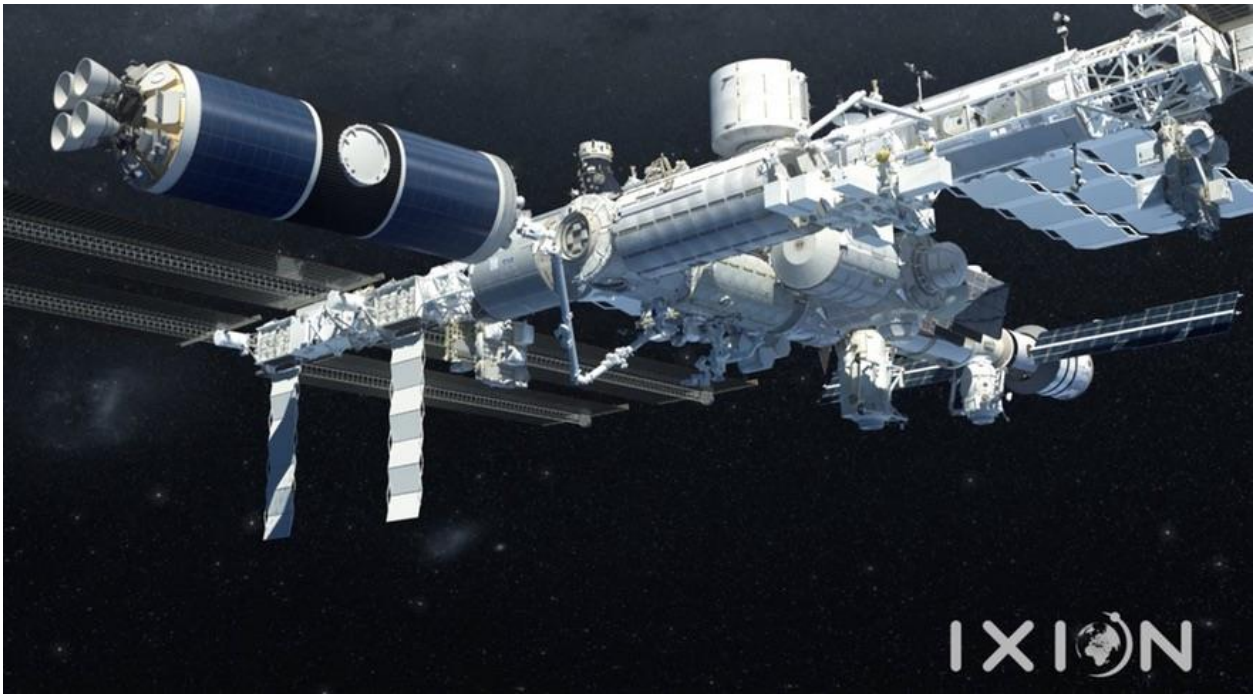
IXION: A WET-LAB HABITAT PLATFORM FOR LEO AND THE DEEP SPACE GATEWAY. S. I. Wald[1], C. K. Cummins[2], and J. Manber[3], [1]Affiliation NanoRacks, Senior Engineer, swald@nanoracks.com, [2]NanoRacks, COO, [3]NanoRacks, CEO).



Abstract:

In the 1960s, NASA MSFC engineer and architect Wernher von Braun quickly recognized the value of repurposing rocket upper stages as habitats. Since rocket upper stages are placed in LEO as part of the overall launch activity and they are large, space-worthy structures, von Braun saw great potential for lowering habitat costs while developing robust capabilities. During the Shuttle era, engineers considered converting the large External Tank into a 'web-lab', however, despite many inherent benefits, the concept remained technically challenging and was never implemented. Today, with new advances in launch hardware and robotics, the strategy of repurposing rocket upper stages to serve as habitats is more appealing than ever, and could revolutionize the capacity and costs of in-space habitation.

In 2017, an industry team known as Ixion and comprised of NanoRacks, MDA / Space Systems Loral (MDA/SSL) and Space Adventurers, in close coordination with NASA, methodically demonstrated that the concept of repurposing the upper stages of ULA's Atlas 5 into habitats is practical, safe, and far more affordable than traditional habitat development options. Ixion development will continue over the coming years so that NASA, the science community, and commercial and international partners may enjoy the substantive and financial benefits of this innovative concept, including eliminating much of the launch costs associated with hardware built on the ground for in-space use.. The Ixion platform provides a basis for exploration and scientific utilization in cislunar space in the form of the DSG as well as LEO as a commercial ISS habitation augmentation module and DSG test-bed.

While each of these use cases will provide their own unique applications for utilization, they share the benefits of the wet-lab architecture. The habitats, based on the ACES upper stage, provides significant interior pressurized volume at minimal cost. Integrated power, thermal, ECLSS and MMOD systems allow for up to four Ixion crewmembers and the support of numerous internal and external payloads for long durations. The airlock enables ingress and egress of crew and cargo.. Robotic systems used for interior outfitting of the propellant tanks are used for in-space assembly of payloads and operations during uncrewed peeriods. Docking and berthing ports allow for both visiting vehicles as well as further expansion of the station.

Th Ixion team presents detailed specifications of both LEO and cislunar habitats and discuss possible use cases for each. We look forward to discussing the needs of the scientific community as we move forward with development of the habitats.