

**DISTINGUISHED SEMINAR SERIES**

# *CRYOGENIC FLUID MANAGEMENT FOR FUTURE SPACE MISSIONS*



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**THURSDAY, APRIL 23RD  
1:30PM, POTR 234**

BIO: Dr. O'Neill holds a B.S. in Mechanical Engineering from Auburn University and an M.S. and Ph.D. from Purdue University. His doctoral work at Purdue focused on experimental investigation, analytic modeling, and computational simulations of flow boiling and flow condensation heat transfer, with special emphasis on isolating and understanding body force effects. Since joining Creare in 2019, Dr. O'Neill has played a key role in several technology areas, most notably leading development of novel cryogenic fluid management (CFM) and miniature vacuum pump technologies. His recent CFM work includes development of (1) Creare's lightweight screened channel LADs, (2) a novel lightweight, high flow cryogenic valve, (3) a re-usable cryogenic quick disconnect fluid coupling, (4) improved submodels for CFD modeling of cryogenic propellant tanks, and (5) cryogenic pool boiling measurement work to facilitate advanced cryogenic propellant tank design.

**ABSTRACT:** Orbital refueling of cryogenic propellants is a key enabling technology that will extend the usable life of spacecraft around Earth and facilitate the next generation of advanced exploration missions. Propellant management on orbit requires advanced propellant tanks, cryocoolers, liquid acquisition devices, propellant transfer pumps, space rated valves, and other subcomponents compatible with common propellants and designed for use at cryogenic temperatures. Development of these components, in turn, requires design tools tailored for capture of key thermophysical processes in this low temperature, microgravity environment. This seminar will (1) establish the need case for orbital propellant storage, (2) summarize key recent developments by NASA and its industry partners, and (3) provide case studies on recent CFM technology development programs at Creare, including high efficiency reverse Brayton cryocoolers for zero boil off propellant storage, fluid handling devices, and novel design tools for modeling key processes.