

The American Institute of Aeronautics and Astronautics (AIAA)

**Lunch & Learn**

The AIAA Houston Section History Technical Committee presents

# The Interstellar Ramjet: A Technical History

by **Dr. Albert Allen Jackson IV, Triton Systems LLC**

Date & Time: Friday, April 26, 2024, 11:30 AM to 1:00 PM

Place: Hybrid event signup [link](#). To attend without ordering lunch, just fill out the first question.

- In-person option: NASA/JSC Gilruth Center Lone Star Room (#216) - 18600 Space Center Blvd
- Online option
  - Video call link: <https://meet.google.com/iyr-kzbv-pbc>
  - Or dial: (US) +1 314-474-3017 PIN: 913 841 786#
  - More phone numbers: <https://tel.meet/iyr-kzbv-pbc?pin=9178300833796>

Cost: Free event. Bring your own lunch (no charge) or order lunch in advance (\$15)

- Please submit lunch orders no later than Wed. April 24 COB using the signup link above.
- Meal choices: Jason's Deli box lunch & iced tea
  - Deli Club Box (includes ham sandwich)
  - Cali Club Box (includes turkey sandwich)
  - Vegetarian Box

Walk-ins welcome.

In 1960 Robert Bussard published a solution to the mass ratio problem for interstellar flight. He laid out the design of a starship that scooped interstellar hydrogen compressed it in a fusion reactor, extracted energy and produced thrust. The process is similar to a terrestrial ramjet. Bussard outlined the propulsion method, presented the equations of motion and made general assessments of performance and propulsion efficiency.

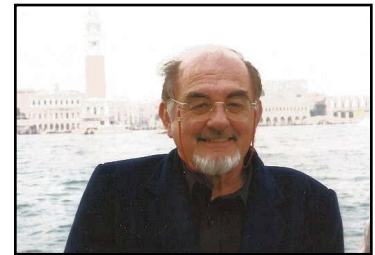
Sagan suggested magnetic 'scoops' for collecting working matter from the interstellar medium. Fishback in 1969 calculated important limitations on the ramjet magnetic intake and quantified drag and radiation losses for the ramjet.

Fishback showed there was a limiting Lorentz factor for an interstellar ramjet imposed by the material properties of the scoop source.

Tony Martin expanded Fishback study and made some important observations. The main problem with the concept was using proton-proton reactions for fusion, this proves very difficult.

In 1975 Dan Whitmire made progress towards solving the fusion reactor problem of the interstellar ramjet by noting that one could use the CNO process rather than the PP mechanism as method of fusion operation.

Bond and Jackson suggested alternative ramjet operation using augmentation. An alternative to the Bussard Ramjet was presented in 1977. The Laser Powered Interstellar Ramjet, LPIR. This vehicle uses a solar system-based laser beaming power to a vehicle which scoops interstellar hydrogen and uses a linear accelerator to boost the collected particle energy for propulsion bypassing fusion reactor problems.



Albert Allen Jackson IV entered the US civil service in January of 1966 as an engineer, first crew training on the Gemini Crew Trainer, then working on a simulator for the Lunar Landing Training Vehicle, and then becoming a full time Apollo crew trainer on the Lunar Module Simulator with the subsystem the Abort Guidance System. He returned to graduate work in physics in late 1970 gaining his Ph.D. in physics in January 1975 specializing in "applied" General Relativity. He returned to the Johnson Space Center working for McDonnell Douglas and Computer Science Corporation on flight planning software for the Space Shuttle Orbiter. In 1988 he moved to Lockheed Corporation working 5 years on solar system dust dynamics, and then 5 years on Orbital Debris. In 1998 he moved to Engineering Simulation and worked there for 12 years. He was a visiting scientist at the Lunar and Planetary Institute in Houston Texas for 30 years. Currently he is an astronautics consultant at Triton Systems LLC.

**Event contact:** Douglas Yazell, History technical committee Chair, 832-366-5292 iPhone