

Ion space drive is said to break fuel efficiency record

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Credit: Neumann Space

What's that? A space drive that reportedly wipes out NASA's fuel efficiency record? The news comes from Australia, from Neumann Space.

"We've built a brand new kind of ion engine (that's a kind of rocket), that has just broken the <u>world record</u> for specific impulse previously held by NASA's HIPEP thruster."

Talking about news from the School of Physics, the University of Sydney student newspaper *Honi Soit* on September 17 ran the story with the headline, "University of Sydney Student Smashes NASA Record For



Fuel Efficiency; "Mars and Back on a Tank of Fuel."

Ion drives are propulsion systems that work by throwing particles backwards really <u>fast</u> in order to propel a spacecraft forward, said Fiona MacDonald in *ScienceAlert*.

A University of Sydney doctoral candidate in Physics, Patrick (Paddy) Neumann, <u>developed</u> the ion space drive which was reported to have smashed the current record for <u>fuel efficiency</u> held by NASA. Professors David McKenzie and Marcela Bilek assisted in his work, said *Honi Soit*.

Neumann acknowledged his Masters and PhD supervisors, Bilek and McKenzie, in *Business Insider*, as two who "helped him to narrow his focus and interpret any funky <u>results</u> that cropped up."

Honi Soit: "The current record, held by NASA's HiPEP system, allows 9600 (+/- 200) seconds of specific impulse. However, results recorded by the Neumann Drive have been as high as 14,690 (+/- 2000), with even conservative results performing well above NASA's best. That suggests the drive is using fuel far more efficiently, allowing for it to operate for longer. Furthermore NASA's HiPEP runs on Xenon gas, while the Neumann Drive can be powered on a number of different metals, the most efficient tested so far being <u>magnesium</u>."

How does it actually work? According to Neumann Space, "The Neumann Drive uses solid fuel and electricity to produce thrust. It is a "wire-triggered pulsed cathodic arc system" and works something similar to an arc <u>welder</u>.

The *Honi Soit* article said it works through a reaction between electricity and metal. Electric arcs "strike the chosen fuel (in this case, magnesium) and cause ions to spray, which are then focused by a magnetic nozzle to



produce thrust."

Other fuels that it can use: Neumann and team have tried various materials including vanadium, magnesium, titanium and bismuth.

How does his kind of ion space drive contrast with what is considered industry standard chemical propulsion devices? The latter operate through short, high-powered bursts of thrust and then coasting. In contrast, said *Honi Soit*, Neumann's drive "runs on a continuous rhythm of short and light bursts, preserving the fuel source but requiring long-term missions."

Business Insider also made the distinctions: "Whereas NASA's model runs on <u>xenon gas</u>, Neumann's creates particles by hitting a fuel source such as magnesium with electric arcs. The ions that spray off are channeled through a magnetic nozzle, producing thrust."

How would the Neumann Drive be used? Reports say it would be mainly relevant for cargo missions, outperforming in fuel efficiency rather than acceleration. The drive's level of fuel efficiency is such that it could be used for keeping satellites in proper position in orbit or sending all the heavy equipment ahead of a manned mission somewhere, what *Honi Soit* called a "packhorse of space travel."

This level of fuel efficiency is such that it could be great for keeping satellites in their proper position in orbit, or cheaply sending all the heavy equipment ahead of a manned mission somewhere.—what Honi Soit called a "packhorse of space travel."

The Neumann Drive is also notable as it uses a variety of fuels. Neumann Space's answer to the question, what does it burn for fuel, is "anything that conducts electricity, though some things work better than others. We've tried various kinds of metals and even carbon rods. Some



of which give us more fuel efficiency, some more power, and some are just more ubiquitous in outer <u>space</u>."

Another question came up on as to whether it could run on Vegemite and/or beer. The answer, from Neumann Space, was "it can work on both used beer and used Vegemite, if these are properly reduced down to their constituent carbon, and that carbon is sintered into a fuel rod that can fit one of the mostly-tungsten trigger wires."

Neumann will talk about the Neumann Drive soon, at the upcoming 15th Australian Space Research Conference, which runs from September 29 to October 1.

More information: www.neumannspace.com/p/science.html

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