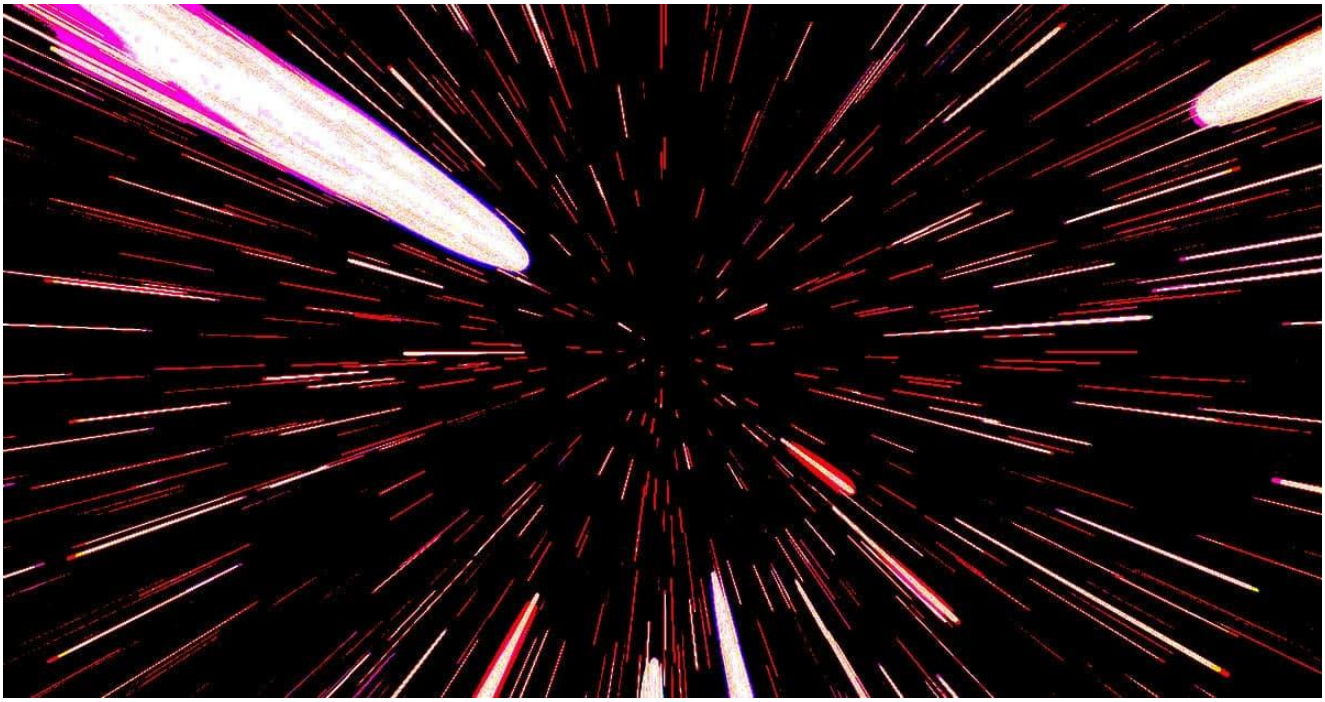
EXODUS



Former NASA Engineer Says He's Invented a Thruster That Doesn't Require Propellant

Space startup Exodus Propulsion Technologies claims to have achieved a breakthrough, stumbling upon an entirely new force of nature that could power thrusters that don't need propellant to work.

As *The Debrief* reports, co-founder Charles Buhler — a former NASA engineer who's worked on a number of major programs including the International Space Station, the Hubble Space Telescope, and the Space Shuttle — said the discovery could be a major turning point in humanity's quest to explore space.

Buhler makes some wildly ambitious claims that will likely face plenty of scrutiny from the scientific community — and it's unclear if his startup's claims will survive.

"There are rules that include conservation of energy, but if done correctly, one can generate forces unlike anything humankind has done before," Buhler told *The Debrief*. "It will be this force that we will use to propel objects for the next 1,000 years... until the next thing comes."

The startup recently presented its findings at the Alternative Propulsion Energy Conference (APEC), a highly unusual "anti-gravity club" that attracts some of the biggest names in the field.

The team's drive, which it says uses electrostatics to enable Buhler's "new force," isn't exactly a powerhouse, producing a mere 10 milliNewtons. To put that into perspective, holding a mass of about 100 grams, or a medium-sized apple, in the palm of your hand exerts 1 Newton, or 100 times more force.

But the "magnitude is not important, really, since anything above zero would work in space!" Buhler assured *The Debrief*.

"Our materials are composed of many types of charge carrier coatings that have to be supported on a dielectric film," he explained. "Our aim is to make it as lightweight as possible, but that is sometimes difficult since the films and their coatings have to have a high dielectric breakdown strength."

To Buhler, it's a major breakthrough that means "that there's some underlying physics that can essentially place force on an object" given "an asymmetry in either electrostatic pressure or some kind of electrostatic divergent field."

Of course, Buhler's comments should be taken with a grain of salt, given the subject matter and the device's strained relationship with the established laws of physics.

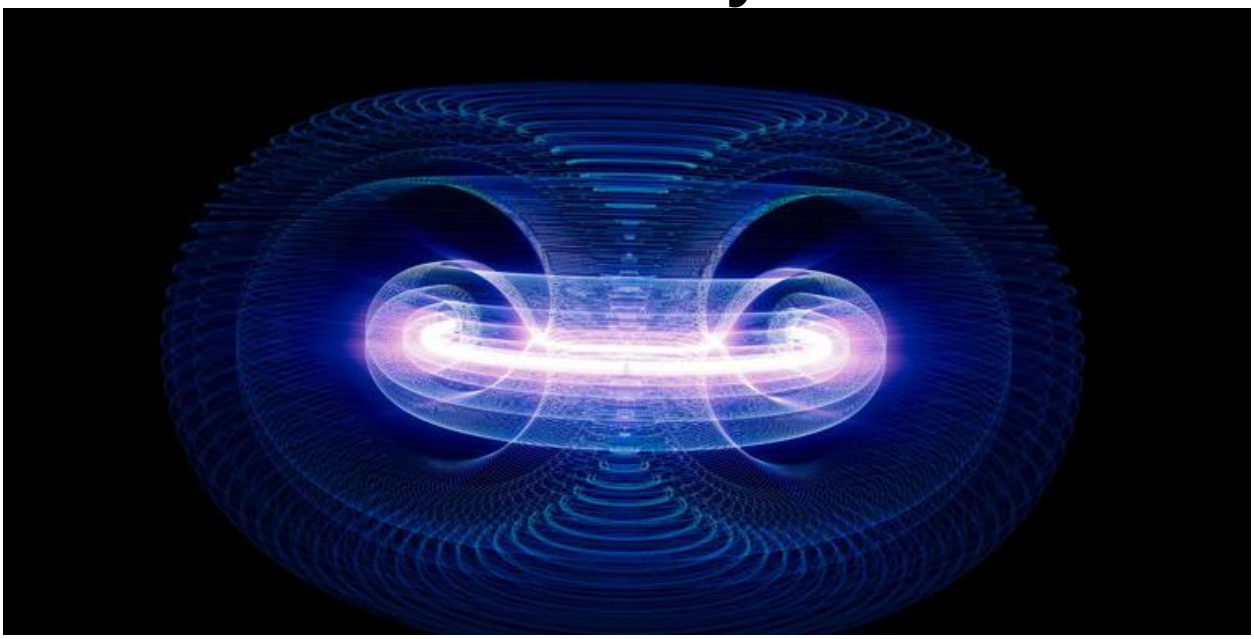
"It's very hard to reconcile, from a scientific point of view because it does seem to violate a lot of energy laws that we have," Buhler told APEC cofounder and moderator Tim Ventura, adding that "we're hoping to do some demos" in space.

It's a Moonshot reminiscent of other propulsion drives we've come across, like NASA's highly controversial EmDrive and startup Applied Physics' "warp drive," both of which similarly appear to break the laws of physics.

But let's be honest: if they *do* somehow make propellantless propulsion work, it would be very, very cool.

July 18, 2025

An Engineer Says He's Found a Way to Overcome Earth's Gravity



This new propulsion system could rewrite the rules of spaceflight—not to mention completely defy conventional physics.© dani3315 - Getty Images

Here's what you'll learn when you read this story:

- Discovering a machine that could somehow produce thrust without releasing propellant would be a game-changer for human space travel. There's just one problem—such a device would defy the laws of physics.
- This limitation has not stopped people from investigating the possibility, and the latest addition to the propellant-less club is an electrostatic design developed by a former NASA engineer.
- While the company behind the drive, Exodus Propulsion Technologies, says that the drive can achieve a thrust to counteract Earth's gravity, such a claim still needs independent verification and a healthy dose of skepticism.

In 2001, British Electrical Engineer Roger Shawyer first introduced the "impossible drive," known as the EmDrive. It was called "impossible" because its creator purported that the drive was reactionless, meaning no propellant required—in other words, it defied the known laws of physics (specifically, the conservation of momentum).

As with anything that appears to thumb its nose at Newton and Einstein, scientists raised more than a few eyebrows, and two decades of testing eventually boiled down to an inevitable (and somewhat predictable) conclusion in 2021: the EmDrive was bunk. But that's the nature of the scientific method—take a seemingly impossible idea, put it through rigorous testing, and hopefully get to an unassailable conclusion (or new discoveries that lead in other directions).

The not-based-in-physics dream of a propellant-less machine, however, didn't die with the EmDrive. Instead, a new challenger approaches, and this one has a former NASA scientist backing it up.

While at NASA, Charles Buhler helped establish the Electrostatics and Surface Physics Laboratory at Kennedy Space Center in Florida—a *very* important lab that basically ensures rockets don't explode. Now, as co-founder of the space company Exodus Propulsion Technologies, Buhler told the website *The Debrief* that they've created a drive powered by a "New Force" outside our current known laws of physics, giving the propellant-less drive enough boost to overcome gravity.

"The most important message to convey to the public is that a major discovery occurred," Buhler told *The Debrief*. "This discovery of a New Force is fundamental in that electric fields alone can generate a sustainable force onto an object and allow center-of-mass translation of said object without expelling mass."

Buhler stressed that this work is unaffiliated with NASA, and that he recently presented his findings at the Alternative Propulsion Energy Conference (APEC), which is a club of engineers and enthusiasts eager to find ways to overcome the limitations of gravity and physics—and not always with the most scientifically sound methods.

In an interview with APEC's co-founder Tim Ventura, Buhler explained how his background in electrostatics led to the discovery. He says his team—made up of people from NASA, Blue Origin, and the Air Force—investigated propellant-less drives for decades before arriving at electrostatics. For years, their devices produced negligible thrust, but saw increases with each new iteration. This culminated in 2023, when this "New Force"-powered drive generated enough thrust to overcome Earth's gravity.

"Essentially, what we've discovered is that systems that contain an asymmetry in either electrostatic pressure or some kind of electrostatic divergent field can give a system of a center of mass a non-zero force component," Buhler told *The Debrief*. "So, what that basically means is that there's some underlying physics that can essentially place force on an object should those two constraints be met."

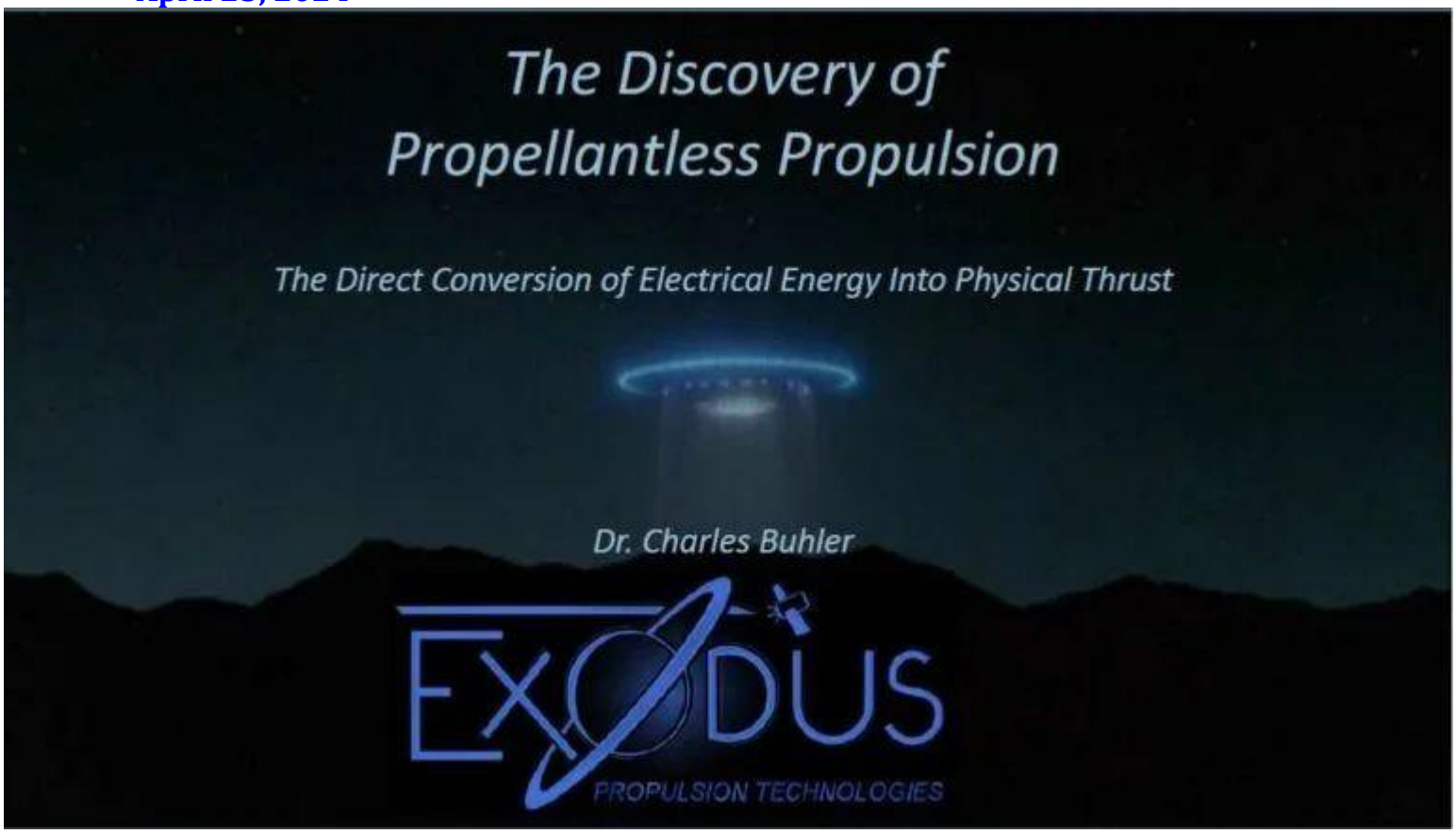
Obviously Buhler's claims are pretty "woah, if true," but the history of propellant-less drives is filled with seemingly positive results that are eventually dashed upon the rocks of scientific reality. For the EmDrive, hopes for the device skyrocketed after NASA's Eagleworks team, which is dedicated to investigating new forms of propulsion (i.e., warp drives), claimed to measure thrust from the "impossible" drive in 2016. However, subsequent studies—including an exhaustive (no pun intended) one at the Dresden University of Technology—found zero thrust.

Before any alternative propulsion enthusiasts start popping corks, rigorous, third-party research will have to verify the results again and again. While it's not impossible that Buhler et. al stumbled across some unknown quirk of physics, it's an extremely unlikely outcome.

For now, let's call it an "improbable engine."

THE MYTH OF PROPELLANTLESS SPACE PROPULSION REFUSES TO DIE

April 25, 2024



In a Universe ruled by the harsh and unyielding laws of Physics, it's often tempting to dream of mechanisms which defy these rigid restrictions. Although over the past hundred years we have made astounding progress in uncovering ways to work within these restrictions — including splitting and fusing atoms to liberate immense amounts of energy — there are those who dream of making reality a bit more magical. The concept of asymmetrical electrostatic propulsion is a major player here, with the EmDrive the infamous example. More recently [Dr. Charles Buhler] proposed trying it again, as part of his company Exodus Propulsion Technologies.

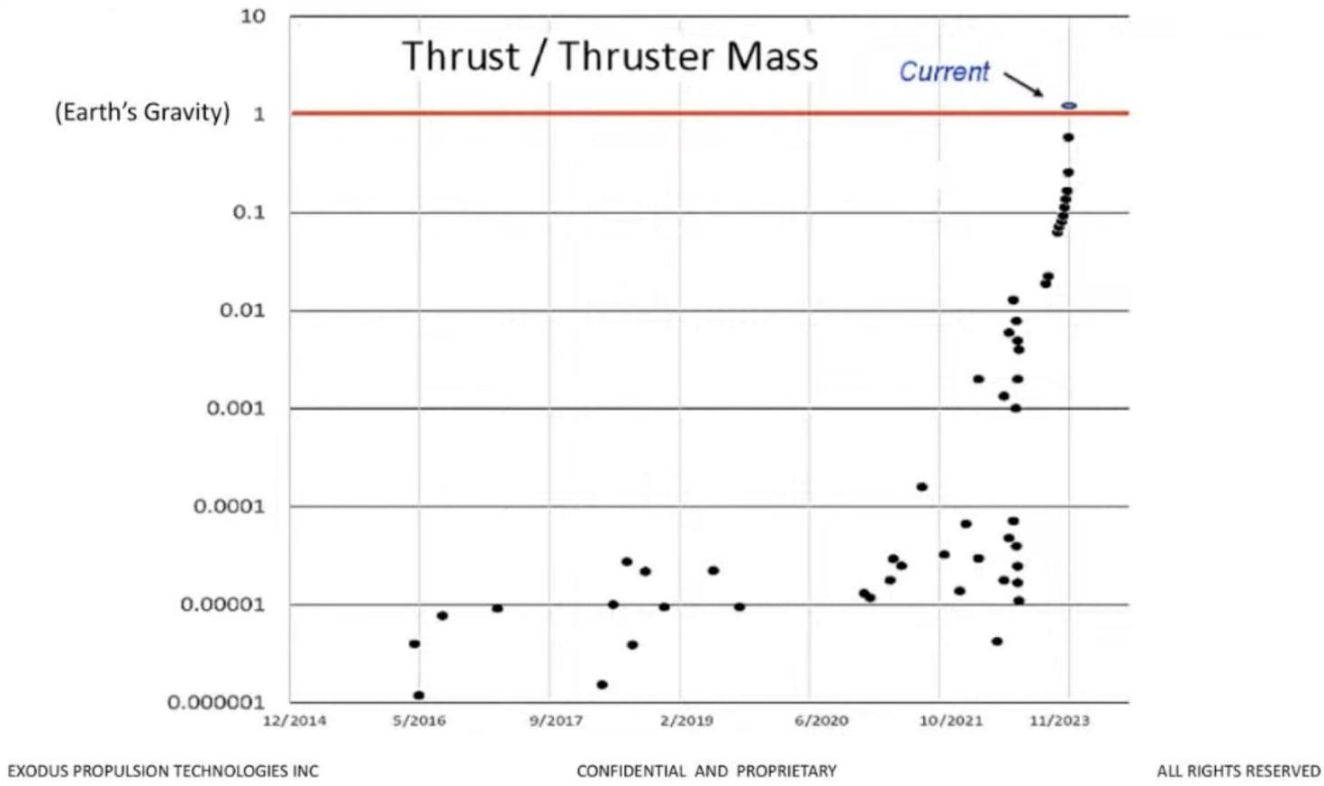
This slide from Dr. Buhler's APEC presentation shows the custom-made vacuum chamber built to test their propellantless Propulsion drive in a simulated space environment. Image Credit: Exodus Propulsion Technologies, Buhler, et al.

The problem with such propellantless space propulsion proposals is that they violate the core what we know about the physical rules, such as the conclusion by Newton that for any action there has to be an opposite reaction. If you induce an

electrostatic field or whatever in some kind of device, you'd expect any kind of force ('thrust') this creates to act in all directions equally, ergo for thrust to exist, it has to push on something in the other direction. Rocket and ion engines (thrusters) solve this by using propellant that create the reaction mass.

The EmDrive was firmly disproven 2021 by [M. Tajmar] and colleagues in their paper titled *High-accuracy thrust measurements of the EMDrive and elimination of false-positive effects* as published in *CEAS Space Journal*, which had the researchers isolate the EmDrive from all possible outside influences. Since the reported thrust was on the level of a merest fraction of a Newton, even the impact from lighting in a room and body heat from the researchers can throw off the results, not to mention the heat developed from a microwave emitter as used in the EmDrive.
Meanwhile True Believers flock to the 'Alt Propulsion Engineering Conference' (APEC), as no self-respecting conference or scientific paper will accept such wishful claims. In the case of [Buhler], he claims that their new-and-improved EmDrive shows a force of 10 mN in a 'stacked system', yet no credible paper on the experiments can be found other than APEC presentations. Until their prototype is tested the way the EmDrive was tested by [M. Tajmar] et al., it seems fair to assume that the rules of physics as we know them today remain firmly intact.

Dr Charles Buhler's Electrostatic Differential Propulsion Breakthrough



Exodus Propulsion Technologies Claims Huge Space Propulsion Breakthrough

April 20, 2024 by Brian Wang

Dr. Charles Buhler and Exodus Technologies claims that systems with electrostatic pressure differences or electrostatic divergent fields gives systems with a center of mass with non-zero force component (aka generate movement). Buhler is NASA's subject matter expert on electrostatics. They want to move to demo the system in orbit. These kinds of claims are controversial but the work seems to be thorough. It will only cost about $500k to $1M to create a rideshare mission into orbit to test the system. The mass of an early orbital system would greatly exceed

the active materials of the propulsion, which would reduce performance. High performance space propulsion would need to increase the active materials as a percentage of the mass of the craft.

Dr. Charles Buhler discusses an experimental propulsion results based on asymmetrical electrostatic pressure, in a device described in International Patent# WO2020159603A2. The device is described as a system and method for generating a force from a voltage difference applied across at least one electrically conductive surface. The applied voltage difference creates an electric field resulting in an electrostatic pressure force acting on at least one surface of an object. Asymmetries in the resulting electrostatic pressure force vectors result in a net resulting electrostatic pressure force acting on the object. The magnitude of the net resulting electrostatic pressure force is a function of the geometry of the electrically conductive surfaces, the applied voltage, and the dielectric constant of any material present in the gap between electrodes.

Dr. Buhler has experience working with electrostatic discharge & ESD safety for the Space Shuttle Program, the International Space Station Program and the Hubble Space Telescope Program. He was also a Co-Investigator for three NASA Research Announcements funded by the Mars Exploration Program, and is currently working on NASA's Dust Project focused on utilizing electrostatic methods to remove dust from personnel and equipment that will be sent to the Moon through NASA's Constellation Program.

Dr. Buhler discussed his independent research into field-effect propulsion systems at Exodus Technologies, leading to a patented new propulsion technology that requires no fuel or ejection-mass to produce thrust.

Buhler told The Debrief that measuring thrust in terms of a percentage of gravity reflects the force generated divided by the test article.

In 2019, the system was 100,000 times weaker than the mass of the test article. They seem to have maintained the thrust whil greatly reducing
the mass of the system. The thrust was about 300-400 micronewtons in 2019 experiments. The claim of over one test mass of force could be 1 millinewton and a 0.1 gram test article. If they increase the thrust to 1 newton then a 100 gram

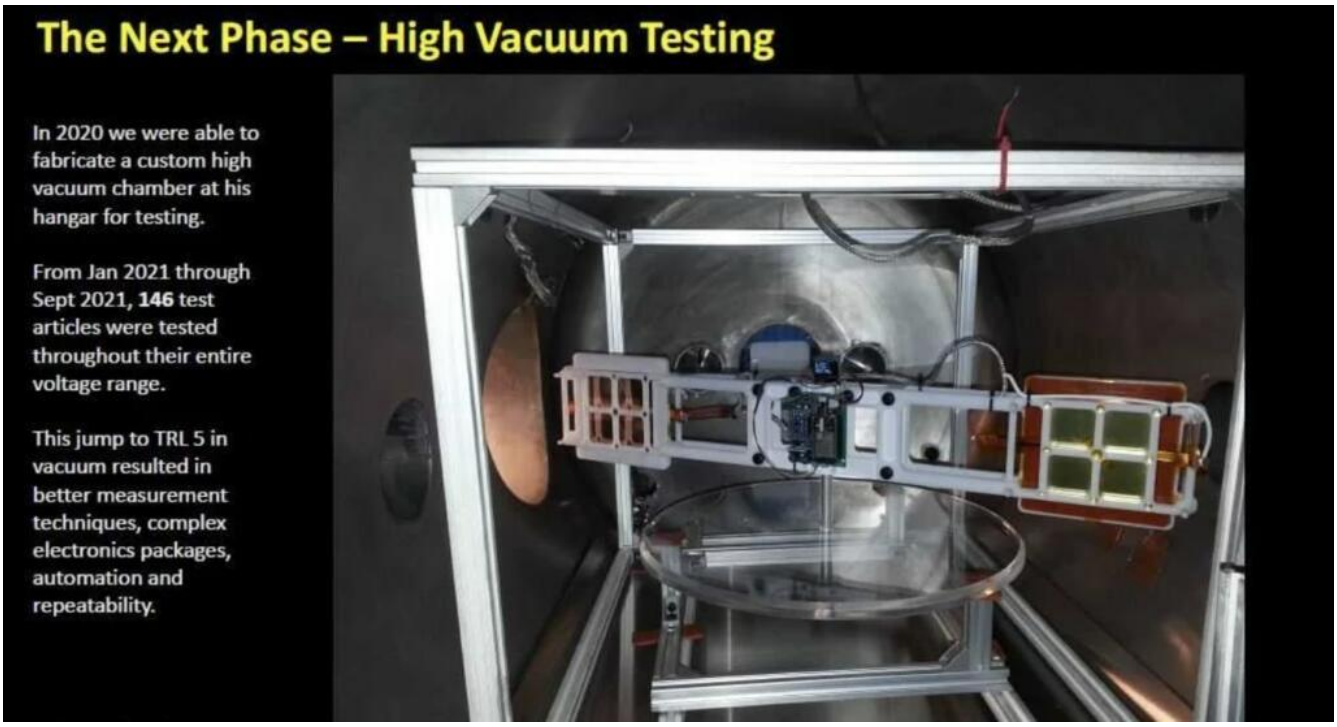
test article would could be self lifting or levitating. The system would have strong performance in orbit.

One newton (N) of force is required to lift a mass of 100 grams vertically upwards.

Another viable combination would be 10 millinewtons for a 1 gram test article. They have said that the strongest force they generated is 10 millinewtons. IF they can setup the experiment correctly they could levitate a 1 gram test article. He described it again to Tim Ventura. He describes the current device as kind of like a crappy battery.

Buhler says they commonly measured the forces in milliNewtons, but they prefer to describe the thrust in terms of gravity since that is the ultimate goal of propulsion physics.

They moved it into a high vacuum experimental system (in 2021), which eliminated noise and other issues.



Any current in the system makes the force go away.

They went away from asymmetrical electrostatic to thin film types and then to liquids applied to surfaces. the liquids applied to surfaces is something like a battery. He applies free and bound charges to get the forces. They are optimizing the chemistry to optimize the charge injection. The system is microscopic but the force stays high.

This seems to imply that the forces were not increased that much but the mass was greatly reduced. This would suggest 1 millinewton and a 0.1 gram test article. They were doing DC tests. The effect is field based and not frequency based. There are ways to increase the force with AC.

There are theoretical versions that are RF based which could have great results.

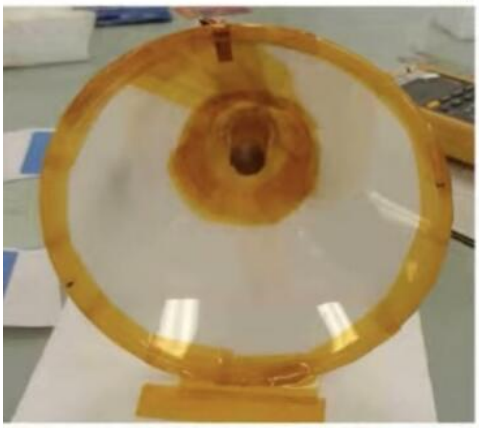
Their theory of the electrostatics and the physics seems to work. As they change what they are doing, all of the expected forces are created. They will eventually hit dielectric limits.

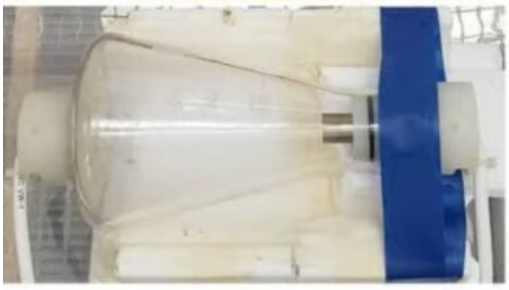
The original talk was here at the Dec 23, 2023 APEC conference. The APEC talk was heavy on theory and formulas.

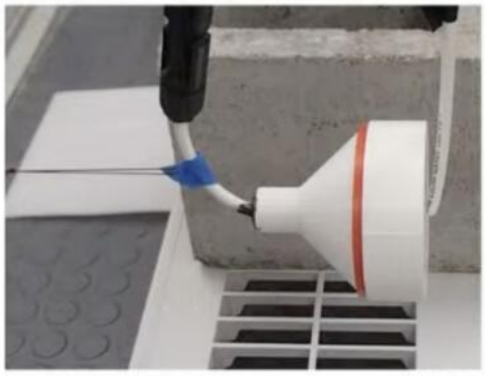
Andrew Neil Aurigema and Charles Buhler are named on the patent.

The magnitude of the net resulting electrostatic pressure force is a function of the geometry of the electrically conductive surfaces, the applied voltage, and the dielectric constant of any material present in the gap between electrodes. The invention may be produced on a nanoscale using nanostructures such as carbon nanotubes. The invention may be utilized to provide a motivating force to an object. A non-limiting use case example is the use of electrostatic pressure force apparatus as a thruster to propel a spacecraft through a vacuum.

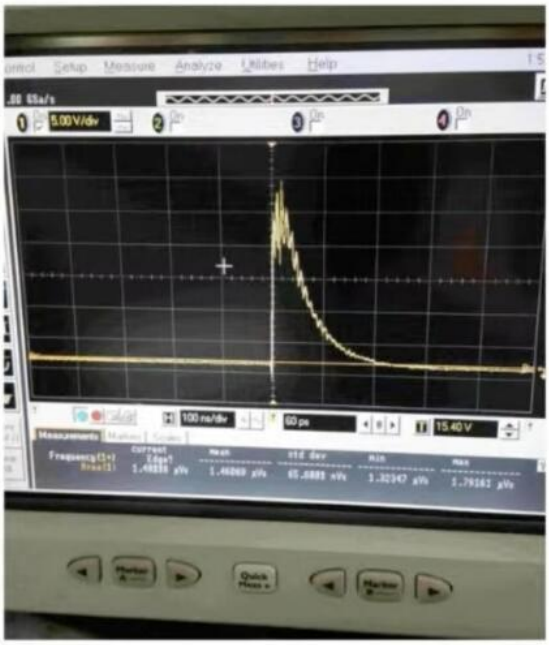
Sharp Tube-type Thrusters







All was not well with the theory (early 2018)



Forces due to Faraday's Law

In order to account for the forces observed experimentally, the current in each brush discharge (Trichelet discharges) had to be *above an amp* to generate the B-fields necessary to create the Faraday fields needed to generate the force.

Once we were able to measure the high voltage discharge waveforms, we had to rule out this theory of operation for the thrusters.

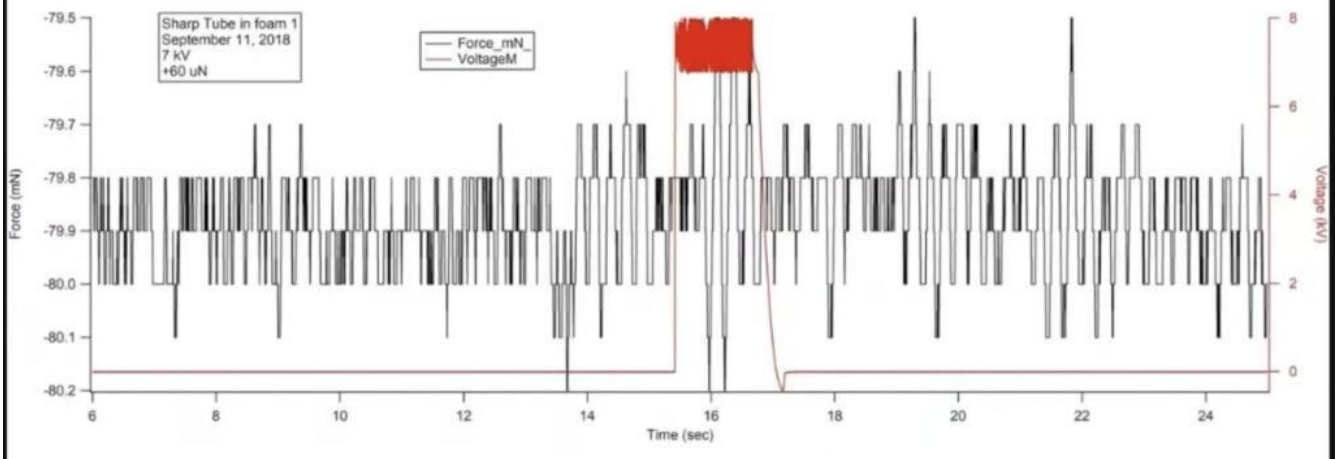
...Moving on

The lack of a well-defined theory did not discourage further testing. Many ideas were proposed and were all soon discarded once disproven.

Until one day we got brave. It wasn't quite clear to us that the discharges were responsible for the force, so we decided to immerse a sharpened tube into a block of Styrofoam. Now the ITO box is the ground but there's no possibility of a discharge.

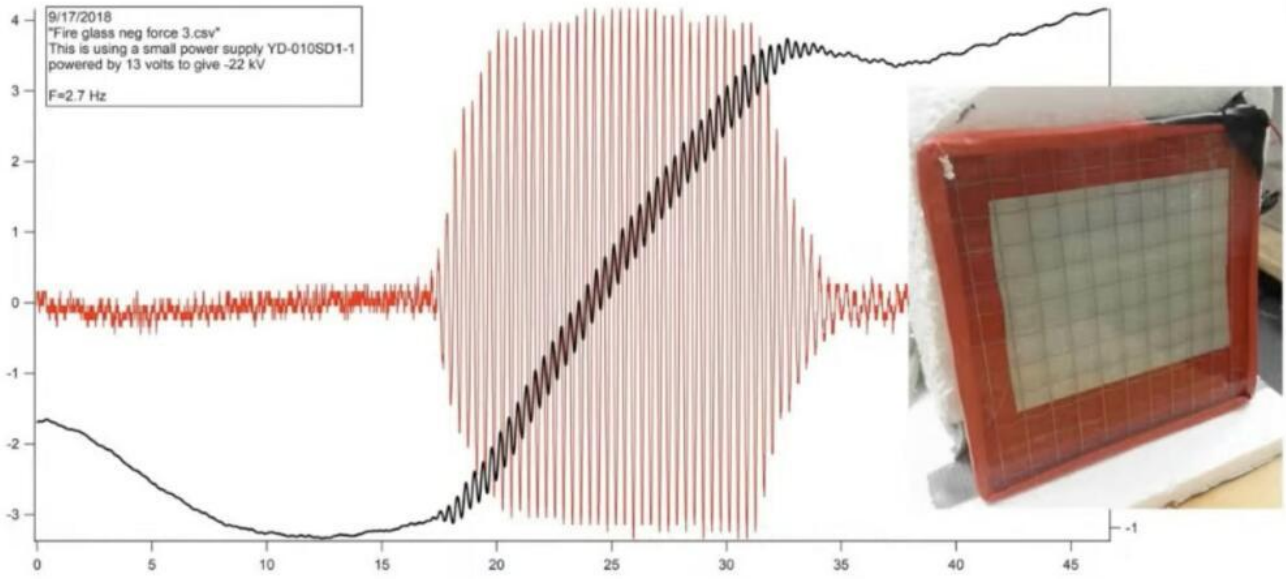
!New Discovery

What we discovered was that the tube charged to 7 kV gave the system 60 μN of thrust above the noise.



!New Discovery

This was immediately followed up by testing Fire glass which cannot form corona or any other discharge.



?Center of mass motion

Conservation of Energy

$$0 = \mathrm{T} + \mathrm{U}$$

$$0 = \frac{1}{2}Mv^2 + U$$

$$Mv = -\frac{2}{v}U \qquad v = \frac{dx}{dt}$$

$$Mv = -\frac{2\,Udt}{dx}$$

T is kinetic energy, U is potential energy
M is the mass of the system, *v* is the velocity

Mv is the momentum *P* of the system [McDonald 2002]

We want the derivative with respect to energy not time. Requires a transformation.

$S = Ut$ The action *S* is defined as the energy-time product in classical mechanics.

$\delta S = \delta(Ut) = d(Ut) = 0$ Nature chooses the path of ***Least Action***

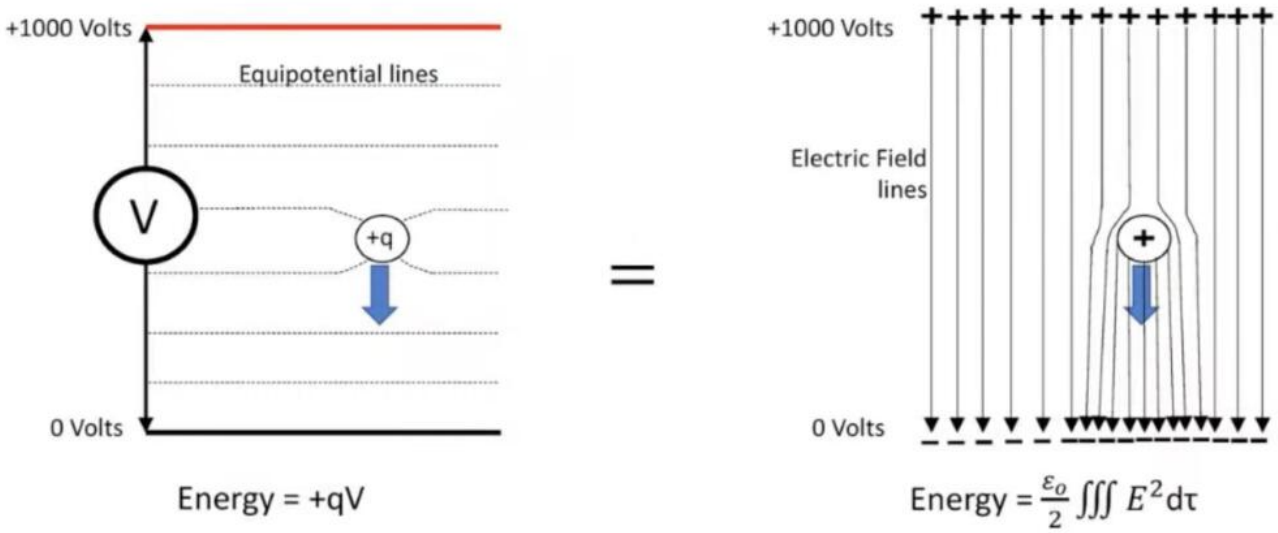
$$d(Ut) = Udt + tdU = 0$$

$$Udt = -tdU$$

Conservation of Momentum becomes $\boxed{Mv = +2t\frac{dU}{dx}}$

McDonald, K.T. *"Hidden" Momentum in a Coaxial Cable*. 2002 [cited; Available from: http://puhep1.princeton.edu/~mcdonald/examples/hidden.pdf

Potential Energy



Energy = +qV

Energy = $\frac{\varepsilon_o}{2}\iiint E^2 d\tau$

The purely Electric Field thrusters were born.

Classical Theory

What did we do that others didn't?

We replaced the commonly used expression of potential energy in electrostatic systems ($U = qV$) with

$$U = qV \rightarrow \frac{\varepsilon_o}{2}\int E^2\, d\tau$$

Instead of charge, the energy is now in terms of fields

$$Mv = +2t\frac{dU}{dx} = \varepsilon_o\, t\, \frac{d}{dx}\left[\iiint E^2 dx\, dy\, dz\right]$$

ε_o is 8.85×10^{-12} F/m permittivity of free space

We use the chain rule to operate the derivative on both the field and the volume

$$Mv = \varepsilon_o t\, d\left(\iint E^2\, dy\, dz\right) + \varepsilon_o t\, V\frac{d}{dx}(E^2)$$

$$= \varepsilon_o t\, \Delta(E^2\, A) + \varepsilon_o t 2VE\frac{dE}{dx}$$

A is area, V is volume

$$= \varepsilon_o\, t\, [E_2^2 A_2 - E_1^2 A_1] + \varepsilon_o t 2VE\frac{dE}{dx}$$

$$\boxed{F = \frac{dP}{dt} = \varepsilon_o[E_2^2 A_2 - E_1^2 A_1]} + \varepsilon_o 2VE\frac{dE}{dx}$$

$\varepsilon_o E^2$ Electrostatic Pressure (well known to science)

Electrostatic Pressure Force

DIVinE Force "DIVergence in E"

Electrostatic Pressure Force

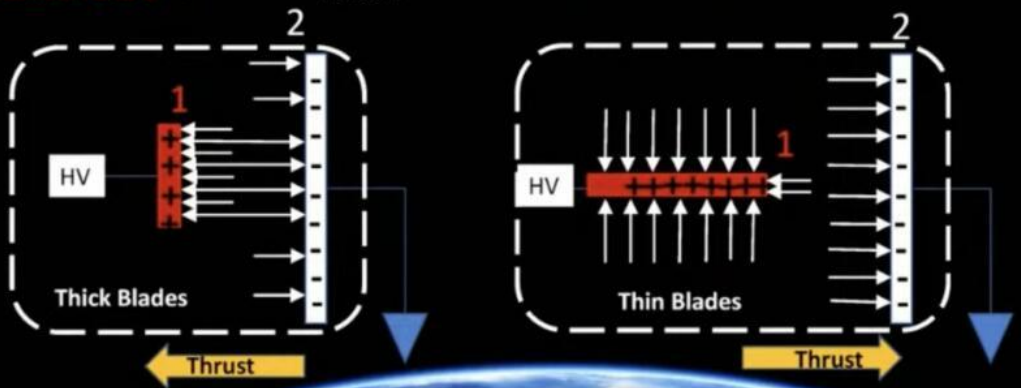
This implies that an asymmetrical capacitor should experience a net force. In fact, forces on asymmetrical capacitors have been seen for over 100 years but do date no one has been able to explain why or how. Without an explanation, it has been impossible to quantify, reproduce or predict behavior in asymmetrical systems.

Until now..

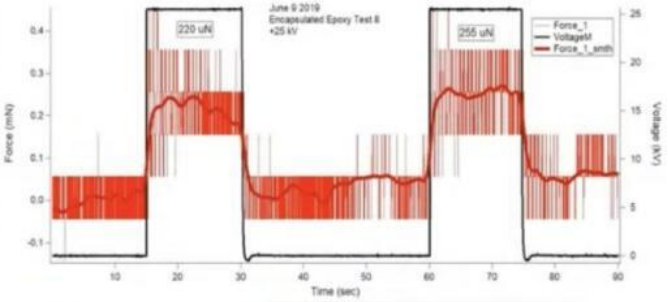
$$F = \frac{dP}{dt} = \frac{\varepsilon_o}{2}[E_2^2 A_2 - E_1^2 A_1]$$

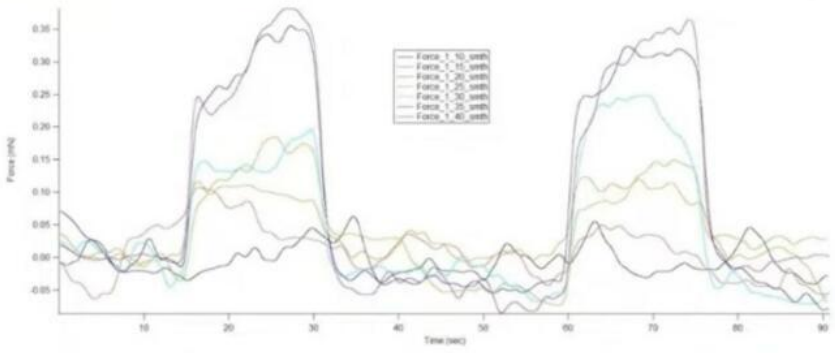
Electrostatic Pressure Force 1 > Electrostatic Pressure Force 2

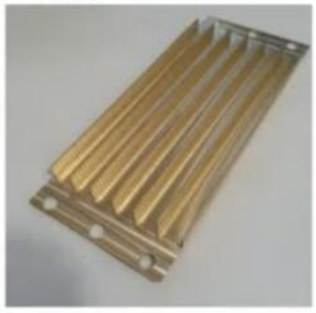
Electrostatic Pressure Force 1 < Electrostatic Pressure Force 2



Off to the races!

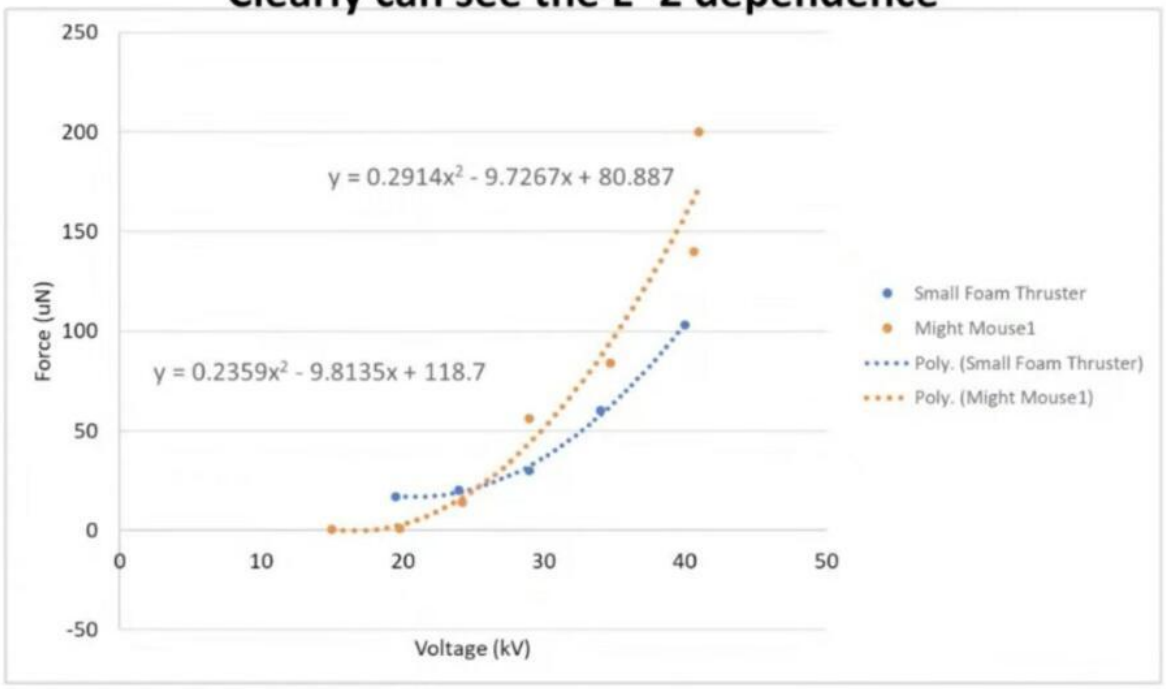






Rotators

Clearly can see the E^2 dependence



NASA Scientist Creates a Space Rocket That Runs Without Fuel

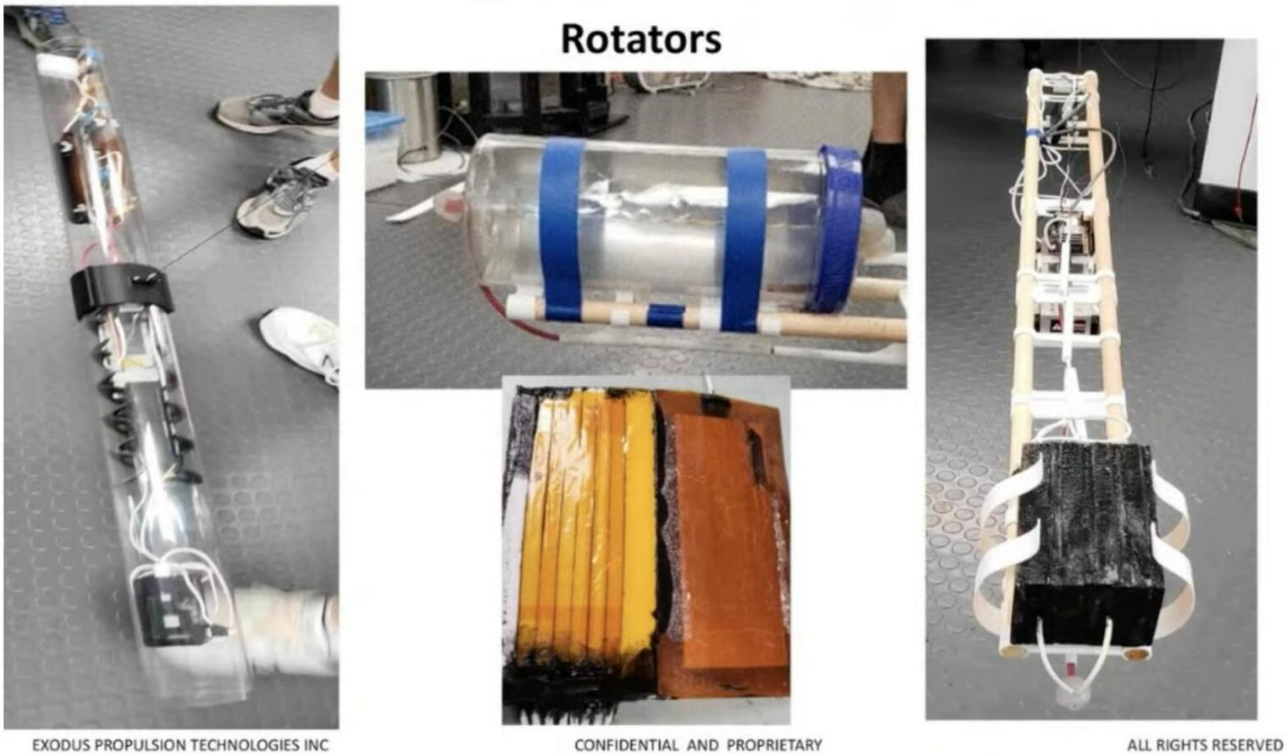
Dr. Charles Buhler's propellantless propulsion drive has successfully countered Earth's gravity, challenging long-standing principles of physics.

JOSEPH SHAVIT
Published Mar 3, 2025

Dr. Charles Buhler, a veteran NASA engineer and co-founder of Exodus Propulsion Technologies, has revealed a startling breakthrough. His team's propellantless propulsion drive has successfully countered Earth's gravity, challenging long-standing principles of physics.

With decades of experience on projects like the Space Shuttle and the International Space Station, Buhler sees this as a game-changer for space travel. He believes their discovery could reshape propulsion technology for generations.

"The most important message to convey to the public is that a major discovery occurred," he said, underscoring the significance of their findings.

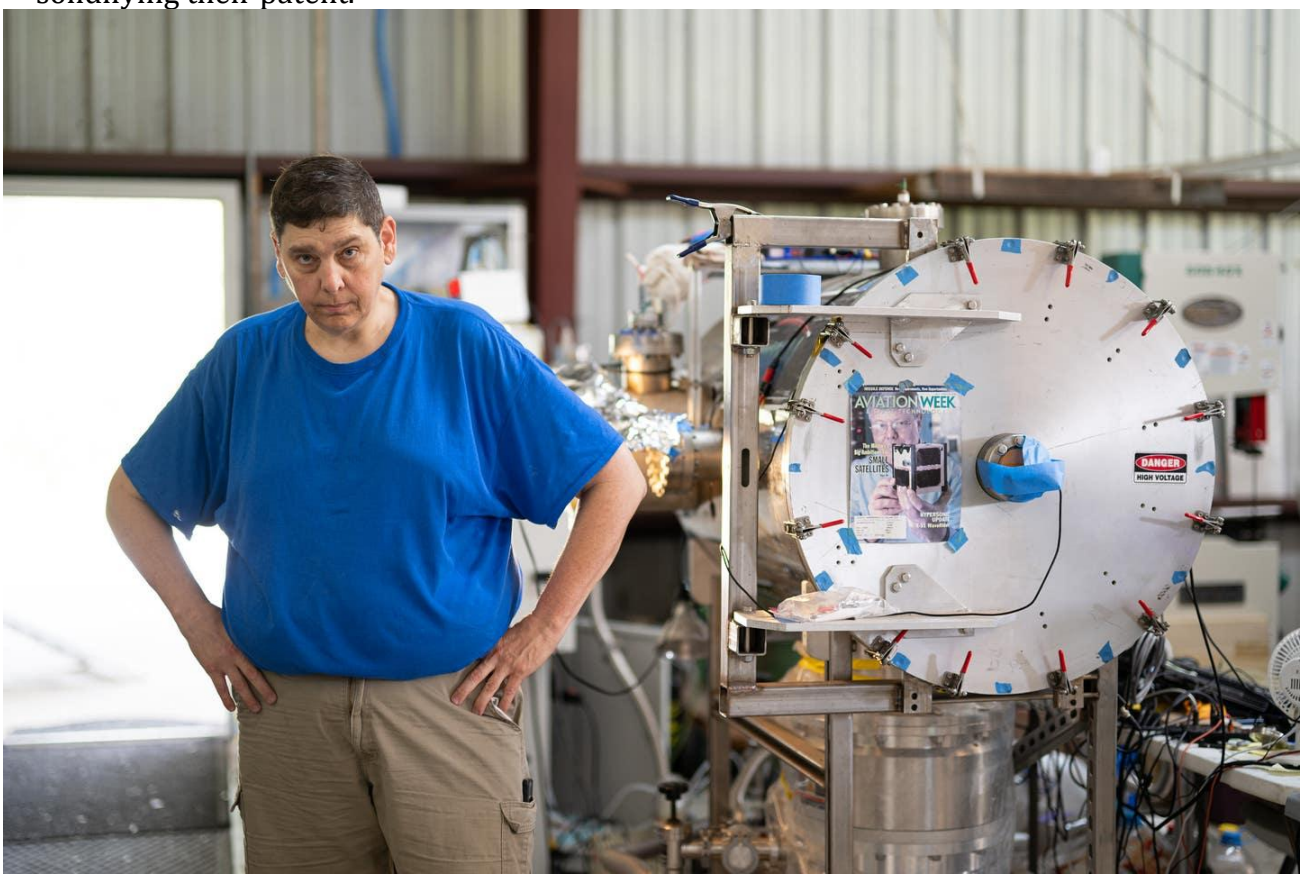


Their innovation, harnessing electric fields to generate sustainable thrust without expelling mass, represents a paradigm shift in propulsion physics. (CREDIT: Exodus Propulsion Technologies)

Their system generates thrust using electric fields rather than expelling mass, a radical departure from traditional propulsion. If scalable, this technology could revolutionize how objects move through space, extending exploration far beyond current limits.
Buhler and his team presented their work at the Alternative Propulsion Energy Conference (APEC), where they detailed the years of experimentation behind the discovery. Initial skepticism did not deter them. Instead, they turned to electrostatics—a field where Buhler is a recognized expert—to explore new possibilities.
Collaboration played a key role in their success. Experts from top institutions and industries contributed insights, pushing the boundaries of what was thought possible.

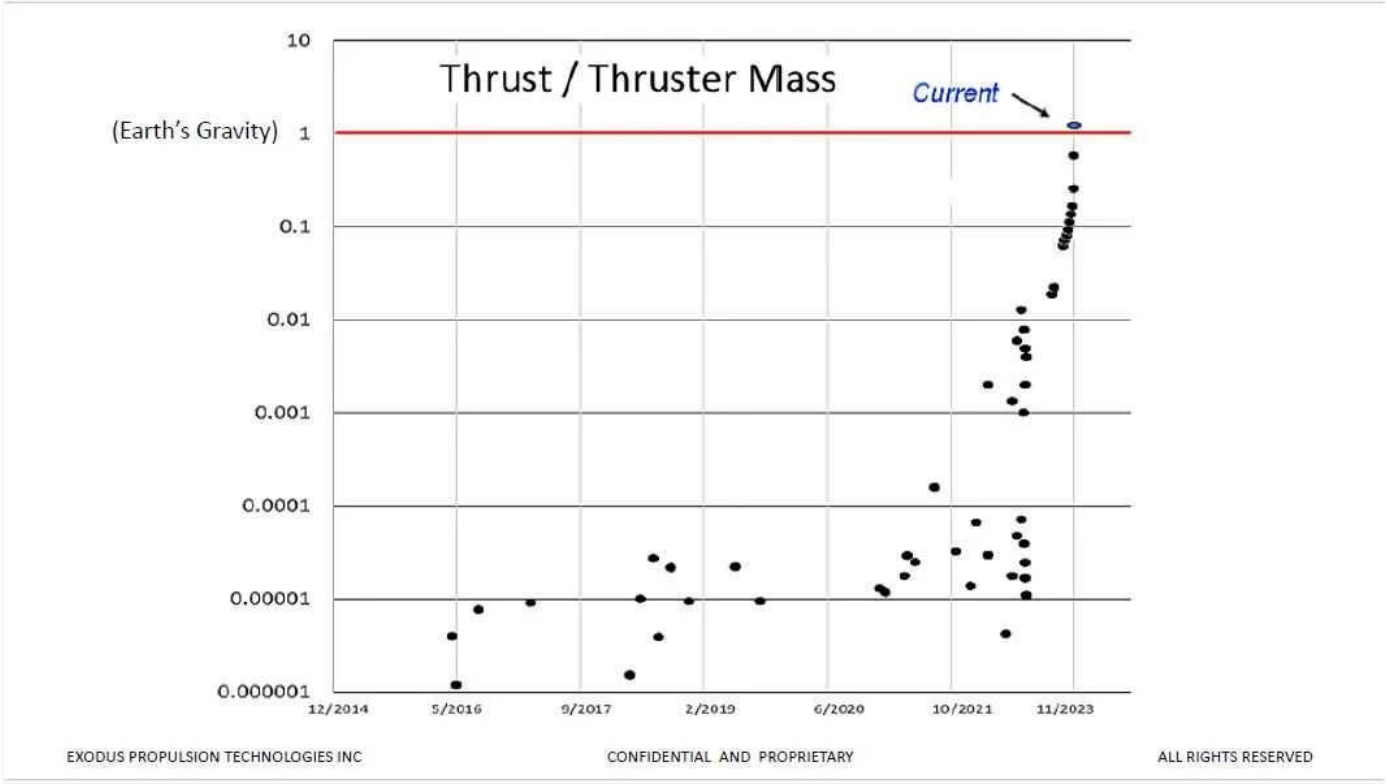
-

Over a span of decades, the team meticulously conducted experiments, culminating in their propellantless propulsion drive.
Through iterative refinement and rigorous testing, they achieved thrust measurements exceeding previous limits. Notably, their latest iteration exhibited a remarkable feat: generating thrust equivalent to one Earth gravity, a milestone in their quest.
Detailing their methodology, Dr. Buhler explained the significance of their tests conducted in a custom-made vacuum chamber simulating deep space conditions. These experiments validated their propulsion drive's efficacy, eliminating alternative explanations and solidifying their patent.



Dr. Charles Buhler, a seasoned NASA engineer and co-founder of Exodus Propulsion Technologies. (CREDIT: Exodus Propulsion Technologies)

Despite their pioneering success, Dr. Buhler acknowledged the existence of competing concepts like the EM Drive and Quantum Drive. While these initiatives showcase potential, Exodus Propulsion Technologies' breakthrough offers a unique perspective.
Dr. Buhler welcomes collaboration with interested parties, offering their expertise to advance propulsion technologies mutually.
Notably, their experiments unveiled intriguing phenomena, including sustained thrust without continuous electrical input. Such anomalies prompt further inquiry and underscore the complexity of the underlying physics. Seeking funding for space demonstrations, Dr. Buhler envisions expanding their understanding and inspiring scientific exploration.
Reflecting on the broader implications, Dr. Buhler emphasized the role of science in dissecting their discovery's implications.
While their experiments provide empirical evidence, understanding the underlying principles remains a collective endeavor. He remains optimistic that their findings could illuminate profound scientific inquiries, challenging conventional understanding.
Dr. Buhler's revelation marks a pivotal moment in space exploration, unlocking new possibilities for propulsion technologies.



A few of the hundreds of tests the team ran on their propellantless propulsion drive between 2016 and 2023. (CREDIT: Exodus Propulsion Technologies, Buhler, et al.)
As scientists delve deeper into the mysteries of their discovery, the horizon of human exploration expands, propelled by ingenuity and curiosity.

“This Engineer Says He’s Found a Way”: this anti-gravity propulsion system could rewrite every rule of physics and space travel

In a groundbreaking development that challenges the very foundations of physics, a former NASA engineer claims to have created a propellant-less drive capable of overcoming Earth's gravity, potentially revolutionizing space travel.

April 5, 2025

A revolutionary concept in space propulsion: the cutting-edge drive from Exodus Propulsion Technologies aims to overcome Earth's gravity without propellant.

IN A NUTSHELL

- **Exodus Propulsion Technologies** claims to have developed a propellant-less drive that challenges known physics.
- The drive is powered by a “New Force” that operates through **electrostatic** fields without expelling mass.
- Former NASA engineer Charles Buhler leads the project, emphasizing the need for independent verification.
- The discovery could potentially revolutionize **space travel** by enabling thrust without propellant.

In the realm of space exploration, the idea of a propellant-less drive has long been the stuff of dreams. The ability to produce thrust without expelling mass could revolutionize the way we explore the cosmos. Recently, a former NASA engineer and his company, Exodus Propulsion Technologies, have claimed to have discovered a way to achieve this. The claim is that their drive can produce enough thrust to counteract Earth’s gravity, a feat that would defy the laws of physics as we know them. This article delves into the fascinating story of this “New Force” and its potential impact on space travel.

The Birth of the Impossible Drive

The quest for a propellant-less drive took a significant turn in 2001 when British Electrical Engineer Roger Shawyer introduced the EmDrive. Dubbed the “impossible drive,” it was said to be reactionless, challenging the principles of physics, particularly the conservation of momentum. The scientific community greeted this claim with skepticism, given the revolutionary nature of such a discovery.

Over the next two decades, the EmDrive underwent extensive testing, with scientists eager to see if it could truly defy the laws of physics. By 2021, the consensus was clear: the EmDrive could not deliver on its promises. Despite the device's failure, the pursuit of a propellant-less drive did not end there. Researchers continued to explore new possibilities, driven by the dream of unlocking a new era of space travel.

The Emergence of a New Challenger

As the EmDrive faded into scientific history, a new contender emerged, led by Charles Buhler, a former NASA scientist. Buhler's work at the Kennedy Space Center's Electrostatics and Surface Physics Laboratory laid the foundation for his current endeavors. Now, as a co-founder of Exodus Propulsion Technologies, he claims to have developed a drive powered by a "New Force" that operates outside the known laws of physics. This innovative drive is said to generate a sustainable force through electric fields alone, allowing for center-of-mass translation without the expulsion of mass. Such a discovery, if verified, would fundamentally alter our understanding of physics and open up new possibilities for propulsion technology. However, Buhler acknowledges that independent verification is crucial to confirm these groundbreaking claims.

The Role of Electrostatics in Propulsion

Buhler's journey into the realm of electrostatic propulsion began with his expertise in the field. His team, composed of individuals from NASA, Blue Origin, and the Air Force, has spent decades investigating propellant-less drives. Their efforts culminated in the development of a drive that, for the first time, generated enough thrust to overcome Earth's gravity using electrostatics.

The key to this success lies in the discovery that systems with asymmetry in electrostatic pressure or electrostatic divergent fields can produce a non-zero force component. This means that under certain conditions, a force can be applied to an object without the need for propellant. Such a breakthrough could pave the way for new propulsion systems that redefine the limits of space exploration.

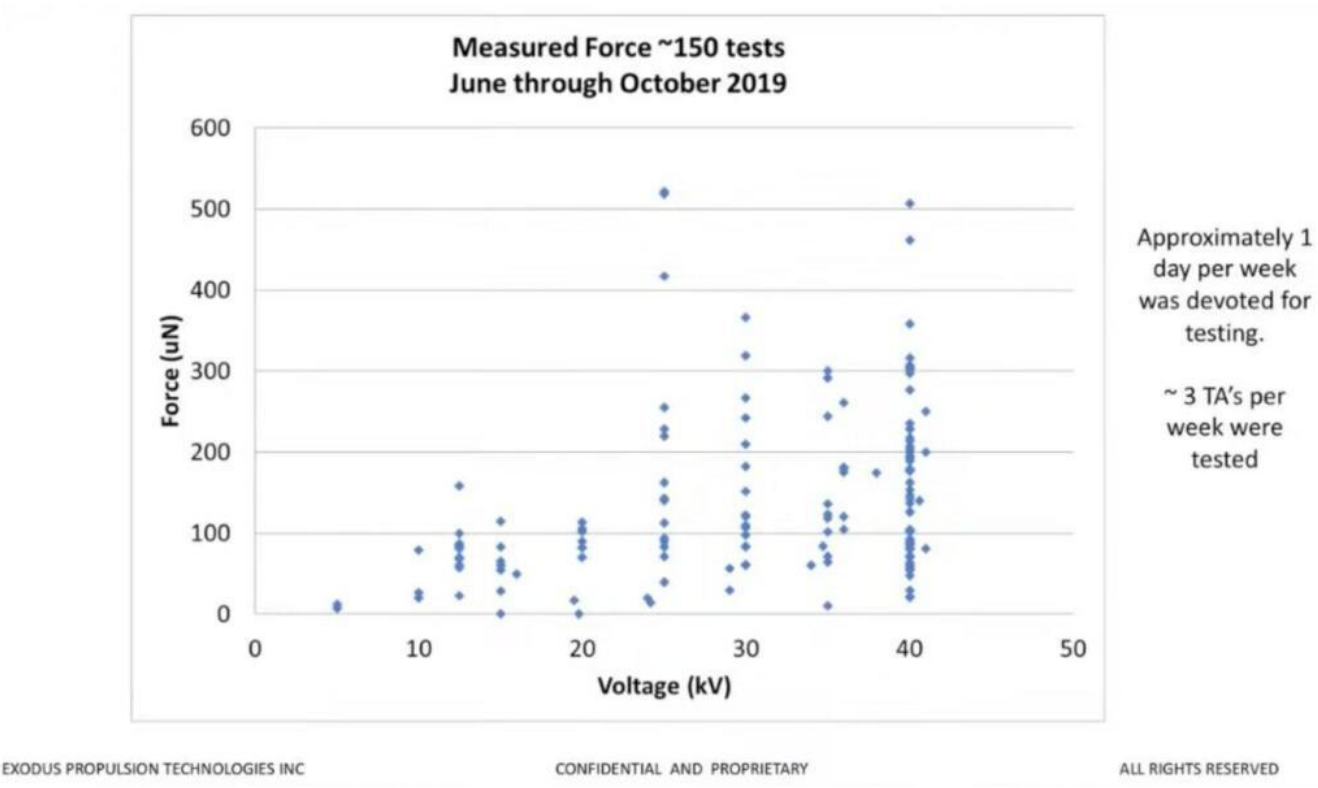
Navigating the Path of Scientific Scrutiny

While the claims of a propellant-less drive powered by a "New Force" are undeniably exciting, the history of such endeavors is littered with unfulfilled promises. The scientific community remains cautious, emphasizing the need for rigorous, third-party research to verify the results. The story of the EmDrive serves

as a cautionary tale, reminding us that subsequent studies can often overturn initial positive results.

Despite the challenges, the pursuit of alternative propulsion methods continues to captivate the imagination of scientists and enthusiasts alike. The potential discovery of an unknown quirk of physics could unlock new frontiers in space exploration. For now, the world watches with bated breath as Buhler and his team seek to prove that their improbable engine is indeed a reality.

As the journey towards propellant-less propulsion unfolds, one can't help but wonder about the future of space travel. Will the discovery of a "New Force" revolutionize our understanding of physics, or will it become another chapter in the annals of scientific curiosity? The possibility of redefining the boundaries of space exploration prompts us to ask: what other mysteries of the universe await our discovery?



NASA veteran's propellantless propulsion drive defies laws of physics

NASA expert Dr. Charles Buhler believes he and his team have discovered a "new force".

Updated: Apr 22, 2024

Dr. Charles Buhler, a seasoned NASA engineer and co-founder of Exodus Propulsion Technologies, claims his company's propellantless propulsion drive defies the laws of physics.

The NASA veteran states the propulsion drive is capable of generating enough thrust to counteract Earth's gravity without expelling mass.

It's a bold claim, and this may end up being filed alongside similar controversial concepts like the propellant-free EmDrive.

However, Buhler's history as NASA's subject matter expert on electrostatics has forced people to take note.

New claims of propellant-free space travel

Buhler and his team set out to explore propellantless propulsion concepts more than two decades ago. Their propulsion drive is based on a novel approach that takes advantage of asymmetry in electrostatic pressure to propel the drive forward.

The team presented their drive concept at a recent Alternative Propulsion Energy Conference (APEC). There, Buhler detailed his team's progress over the years.

From 2016 to 2020, for example, the team's best devices were producing a little over one hundred thousandth of a gravity. Ultimately, though, they set out to achieve "unity," Buhler told The Debrief in a recent interview. Unity refers to the moment the drive produces enough thrust to lift itself in Earth's gravity.

As with similar projects like the EmDrive, Buhler and his team have worked exhaustively to eliminate any alternative explanation for the tiny, though measurable, force they were seeing in experiments.

In 2023, Buhler said the propellantless drive finally reached one full Earth gravity. He and his team claim that their propulsion system has demonstrated the ability to exert a force

equivalent to Earth's gravity without emitting mass via propellant. Essentially, they believe they have discovered a new force that was previously unknown.

"This discovery of a New Force is fundamental in that electric fields alone can generate a sustainable force onto an object and allow center-of-mass translation of said object without expelling mass," Buhler told The Debrief.

"There are rules that include conservation of energy, but if done correctly, one can generate forces unlike anything humankind has done before," he added.

"It will be this force that we will use to propel objects for the next 1,000 years… until the next thing comes."

Are Exodus Propulsion Technologies the real deal?

If Buhler and his team's claims are true, their propulsion experiments would undoubtedly constitute a massive breakthrough. A propellant-free system would massively drive down costs, enable far-reaching missions, and revolutionize spaceflight. So why has the news broken with such little fanfare?

RECOMMENDED ARTICLES

It's because we have been here before. Proponents of the EmDrive and IVO LTD's Quantum Drive have made similar claims in the past. Neither of these has so far provided tangible results in space.

In his interview with The Debrief, Buhler claims that his team's drive is the result of rigorous experimentation and tangible results. Buhler's history also lends credibility to the project – he has worked in programs such as NASA's Space Shuttle, the International Space Station (ISS), and The Hubble Telescope.

Still, Exodus Propulsion Technologies' massive claim will likely be met with skepticism until it is able to demonstrate its technology in spac

NASA SCIENTIST SAYS PATENTED 'EXODUS EFFECT' PROPELLANTLESS PROPULSION DRIVE THAT DEFIES PHYSICS IS READY TO GO TO SPACE

CHRISTOPHER PLAIN·**JULY 19, 2024**

A patented experimental propellantless propulsion drive is finally ready to go to space, according to its inventor, a veteran NASA scientist with decades of expertise in electrostatics.

Dr. Charles Buhler, the technology's creator, says the propulsion system may represent a working version of Quantized Inertia, a theory first proposed by University of Plymouth professor Mike McCulloch. The proposition has been subjected to criticism from mainstream scientists in the past because it seemingly violates Newton's third law of motion.

The controversial technology, which *The Debrief* covered in April, is privately owned by Exodus Propulsion Technologies and is not affiliated with NASA.

After almost a decade of research, design, and testing, Buhler says he and his team are confident they have verified the force, one his team calls the Exodus Effect(TM), in "nearly every way conceivable on Earth." The final step required to officially demonstrate the validity of their discovery is to send the propulsion drive unit into space.

"We've done everything we could have in vacuum chambers here on Earth. We've tested it every which way you can, but the real validation is to have this thing move in space," Buhler told *The Debrief* in a lengthy interview. "That's the bottom line."

PROPELLANTESS PROPULSION DRIVES IN SPACE

After numerous delays, a similar device dubbed the Quantum Drive did successfully make it to space last November. However, a failure in a satellite component unrelated to the drive scuttled that effort. To date, none of the propellantless drive inventions that physicists say shouldn't work have actually been tested in space, including the infamous EMDrive, which Buhler believes his work may help explain.

"The idea not only violates Newton's third law of motion," wrote Rochester Institute of Technology astrophysicist Brian Koberlein in a May 2017 *Forbes* piece that scrutinized the EMDrive, adding that "it violates special relativity, general relativity, and Noether's theorem. Since these are each well-tested theories that form the basis of

countless other theories, their violation would completely overturn all of modern physics."

"There are rules that include conservation of energy," Buhler countered in a statement provided to *The Debrief* in April, "but if done correctly, one can generate forces unlike anything humankind has done before."

"It will be this force that we will use to propel objects for the next 1,000 years," Buhler said.

"Until the next thing comes."

NEW TEST VIDEO SHOWS HOW THE TECHNOLOGY (ALLEGEDLY) WORKS

Along with several test videos that appear on the company's website, the Exodus Propulsion Technologies team recently allowed Tim Ventura, the host and co-founder of the Alternative Propulsion Engineering Conference (an organization *The Debrief* once termed "*The World's Most Exclusive (and Strange) Anti-Gravity Club")* to film a series of live tests in Exodus' laboratory in Lake Merit, Florida.

According to Ventura, the film shows two failed tests, one successful test, and an artificially sped-up version of a pair of previously completed tests used to depict a more dramatic example of the Exodus Effect.

"I wanted to show the failed tests and the successful one, just so people know how hard this is," Ventura told *The Debrief*.

Along with the video, Ventura also conducted numerous interviews with Buhler and his colleagues, all of which are available on the APEC YouTube channel.

When asked by *The Debrief* to explain the construction of the devices shown in the successful test video, Buhler said that his team's test articles utilize basic materials and don't require exotic or expensive

rare earth metals. In fact, one of the most valuable components in the original drive designs is ordinary styrofoam.

“Most of the videos that you will see are Styrofoam thrusters,” Buhler explained. “They have the asymmetrical capacitive plates. We encompass them in Styrofoam.”

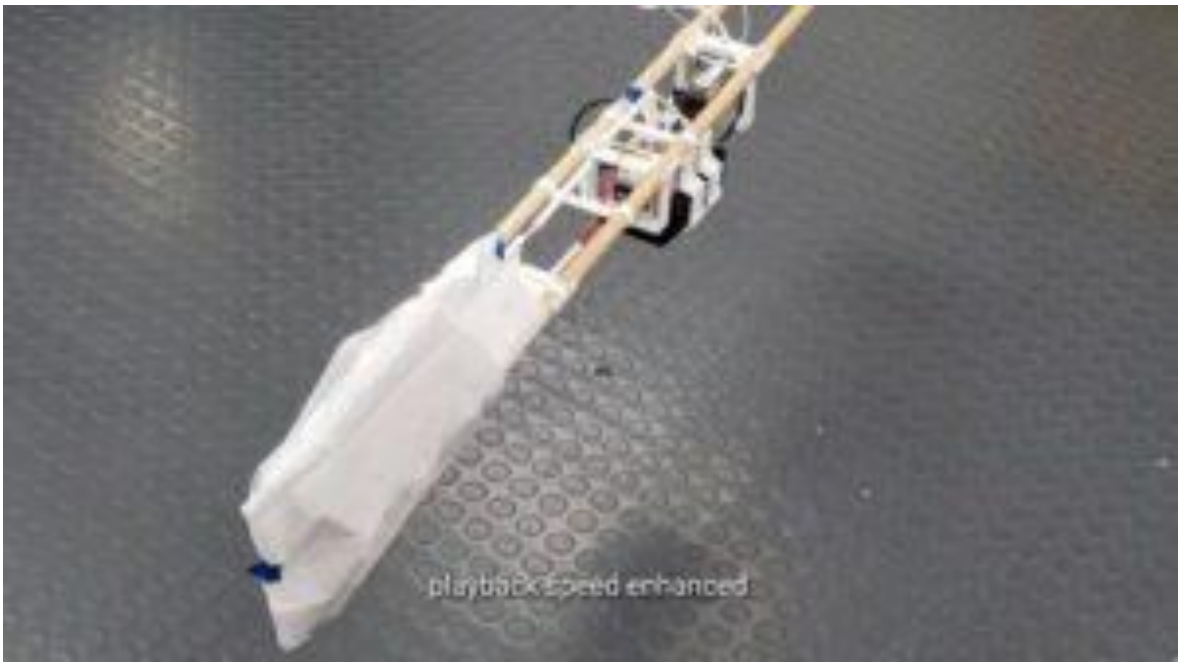
Encompassing the propellant mass in styrofoam not only keeps the ion wind down, but according to Buhler, the versatile and low-cost material can also stand the high voltages that air thrusters require. Other lightweight materials can experience sparking at these high voltages, which can cause an experimental failure and damage to the test article.

Dr. Charles Buhler executes a test of his company’s patented Exodus Effect (TM) in their Merit Island, Florida facility. Image Credit Exodus Propulsion Technologies, Tim Ventura, APEC.

“You’re putting about 30, 40 thousand volts on these guys, and you just don’t want them to spark through,” Buhler told *The Debrief*. “So styrofoam helps to kind of prevent that breakdown. And it also protects the air from breaking down, too, and creating an ion wind. We do not want ion wind. We don’t want to break the gas down, don’t want to cause a spark.”

Buhler said that styrofoam is also very light, which is particularly beneficial in Earth-bound tests.

“When you are trying to do motion, you want as little mass as possible,” he explained.



Test video shows a successful test of an Exodus Effect (TM) “spinner” made of Styrofoam and two conductive plates. Image credit: Exodus Propulsion Technologies.

Notably, Buhler said that the drive configurations they tested in vacuum chambers, which best approximate the environment of outer space, did not contain Styrofoam. That’s because the material is notoriously difficult to use in this environment.

“I think it explodes,” Buhler said with a smirk.

EXODUS PREPARES SCIENTIFIC PAPER FOLLOWING TWO YEAR ‘NATIONAL SECURITY’ PATENT DELAY

In addition to preparing a scientific paper detailing the years of exhaustive research and testing and their recent successes, Buhler

told *The Debrief* that his company has finally received a long-delayed patent for the Exodus Effect.

"After being released from a 2-year national security hold, the first patent describing the Exodus Effect(TM) has finally been issued by the USPTO," the company's website explains. "The process of generating the Exodus Effect(TM) is repeatable, predictable, published and well-understood. Both acceleration and thrust (Newtons) are quantifiable and supported by 3rd-party validations."

With the patent now in hand, which will help them protect the value of their research should it prove to work in space, the Exodus team says they are preparing to write a potentially peer-reviewed paper breaking down their research and the discovery of what Buhler and his colleagues firmly believe is a new force currently unrecognized by science.

However, with over 1,500 test articles and over 3,000 data sets to date, the affable researcher says it will be a monumental task to go through it all for a proper, comprehensive scientific paper.

"My partner [Exodus co-founder Andrew Aurigema] is too good at making these," Buhler quipped. "So there's a lot of data to go through."

BUHLER CLEARS UP CONTROVERSY OVER "ONE GRAVITY OF PROPULSION" CLAIM

In April, *The Debrief* reported that Buhler's team claimed their device was able to counteract the full force of Earth's gravity. As many scientists and journalists rightly pointed out, a test apparatus that weighs "30 to 40 grams," as Buhler specified at that time, would be too heavy for a drive producing a mere 10 millinewtons of thrust to counteract the full force of gravity exerted on it.

When asked to clarify the discrepancy, Buhler told *The Debrief* that his team stands by their claim that their most successful tests produced

enough force to lift the actual propellant mass, hence the "one gravity of thrust" claim. The confusion, he explained, comes from the fact that the test article, rig, and accessories used to show the force acting on a device weigh roughly 30 to 40 grams, whereas the actual propellant mass is much lighter.

"What I meant to say is the thruster itself that generates 10 millinewton forces weighs only about 760 milligrams," Buhler explained. "The framework that we put these things in weighs about 30 to 40 grams."

Buhler says this means that although the entire rig doesn't lift off of the ground, the most powerful results tested using his device show it is exerting enough thrust to counteract the force of Earth's gravity on the apparatus' tiny propellant surface.

"It's just the thrust-making surface itself," said Buhler. "All of the peripherals we don't add into that. That's how we kind of quantify from one test to another to validate our performance. That's the metric that we use. How much thrust does the surface area make? What is the thrust it makes per a given weight? That's where we see the 'one gravity' come in."

Although Buhler and his partner have built and tested hundreds of different designs and configurations, the team says they have found that shape is not important. Instead, the NASA veteran told *The Debrief* that what matters to him and his team is being able to verify the force through good old-fashioned science.

"The configuration is just a different way to test the thrust," Buhler explained. "Some may be more fun to watch—spinners, rotators—but we want to see it on the force meter. As scientists, we can quantify exactly the thrust because we measure the force of these devices within Faraday cages."

For their latest experiments, Buhler says his team used a commercial omega force meter that is accurate down to a resolution of about 100 micronewtons. Notably, the researcher says his team isn't measuring the force of the article. Instead, it is metering the force it is creating

inside the Faraday cage since it is a more reliable form of measurement that helps eliminate other outside electromagnetic fields that could potentially skew the results.

“We measure the force on the actual Faraday cage itself,” said Buhler. “It’s completely encased, so the electric fields can’t escape.”

Next, the Exodus team says they would like to make additional detailed videos on how to build these thrusters.

“They’re very simple to make,” Buhler explained. “The challenge is testing them.

“That’s the challenge. It’s a very small force.”

However, the career electrostatics expert cautioned against casual efforts to build Exodus Effect thrusters due to the incredibly high voltages required.

“[We] don’t want people without high-voltage experience experimenting with this,” he cautioned.

Instead, the founder of NASA’s Electrostatics and Surface Physics Laboratory at Kennedy Space Center said he would recommend colleges and commercial laboratories that have the proper equipment and experience reach out to him for the details so they can build and test their own devices. In fact, Buhler says he hopes his devices can follow the path of easy-to-build ion thrusters that popped up on the internet a couple of decades ago, turning them from a hobbyist toy to a valuable tool for educators looking to teach their students about the effect of ion wind.

“This is the analog to that (ion thruster),” Buhler told *The Debrief*. “This is the same. I would like to see this go through the same process. Where people can build them in their homes and garages or even at universities and then test them and see this new force. Because it’s different than the ion wind.”

EFFORTS TO INCREASE AND STACK THE EXODUS EFFECT

When asked about the possibility of amplifying the force to increase its utility, Buhler says they have likely exhausted the current path to improving its strength. However, he does note that advancements in chemistry could lead to improvements in the thruster's performance.

"Chemistry is a very useful field to help us," he said. "They know all types of electronic properties of different materials, microscopic versions of these forces. We're trying to get bound charges. All kinds of electrostatic processes we could take advantage of."

"The chemists are really very good at understanding charges, charge flow, and all of those things," he added.

When asked about the possibility of increasing the Exodus Effect using newly discovered metamaterials like graphene, Buhler said there are a number of scientific disciplines, including advanced materials, that may help improve the thruster's output. However, he also said that in his experience, the best path forward might be perfecting the generation of the force at a smaller scale and then seeing if you can scale it up to a larger, more practical space drive.

"There's almost endless possibilities when you're talking about making high electric fields," he explained. "So you try to do that on a microscopic scale if you can and try to see if you see the forces."

"Once you get something that is small enough and light enough that you are happy with it, you see if they stack. You see if they add up. You then see if you can compile them together. So instead of worrying about making the force itself stronger, let's just see if we can add 'em all up."

EXTERNAL VALIDATION AND GOING TO SPACE

When asked if anyone has validated his team's experimental results outside of hobbyists, Buhler recounted an odd encounter he had with a fellow scientist at last month's Electrostatic Society of America Conference.

"One of the scientists came up to me, a fellow who does ion wind propulsion, and he told me he was able to see this effect in his vacuum chamber," Buhler told *The Debrief*. "And I said, 'I bet it went in the other direction, of the ion wind.' And he said 'yes, it actually did go in the other direction.' Another thing that's so interesting about this discovery is that it actually moves in the direction of the ion wind. Think about that: rockets are moving in the direction of their propulsion!"

The other scientist in question had been Adrian Ieta, a professor at Oswego State University in New York. Also an electrostatics expert, Ieta was recently awarded a patent for his own ion propulsion technology breakthrough.

"He was very perplexed by the negative mass he was seeing on his scale," Buhler noted with a bemused shrug. He also said that based on their conversation at the conference, the two researchers hoped to collaborate in the future.

"I think we'll work together," Buhler said.

Buhler also says his team would welcome anyone with the proper equipment and experience to try to replicate their results, particularly given their goal of publishing the discovery of the Exodus Effect in a peer-reviewed scientific publication.

"If anyone's willing to validate it in high vacuum systems, that would be helpful," he said. "I think that's worth doing."

Fortunately, Buhler says that more help may be on the way, thanks to the significant recognition his team's work received following

publication of *The Debrief's* April story regarding his work, which he says has opened up a lot of possibilities.

"It's been fantastic!" Buhler said. "We've gotten a lot of interest (from) all around the world. A lot of scientists have reached out to me. A lot of people from all walks of life have reached out, which has been nice."

"I have a lot of emails backed up that need attention," he added.

When asked about any reactions he received from his NASA colleagues based on the previous coverage (a process he described as "making me famous"), Buhler says the response has been overwhelmingly positive.

"A lot of them have reached out. A lot of them are trying to help, to help me get it into space."

As for when his device may finally get the chance to go to space, Buhler remained optimistic that the money would soon become available.

"We have a lot of contacts now to help us down that direction," Buhler said of the often tens of thousands of dollars required to hop a ride aboard a commercial satellite launch.

"So, thank you for that."

An Engineer Says He's Found a Way to Overcome Earth's Gravity

This new propulsion system could rewrite the rules of spaceflight—not to mention completely defy conventional physics.

PUBLISHED: MAR 29, 2025 8

- Discovering a machine that could somehow produce thrust without releasing propellant would be a game-changer for human space travel. There's just one problem—such a device would defy the laws of physics.

- This limitation has not stopped people from investigating the possibility, and the latest addition to the propellant-less club is an electrostatic design developed by a former NASA engineer.
- While the company behind the drive, Exodus Propulsion Technologies, says that the drive can achieve a thrust to counteract Earth's gravity, such a claim still needs independent verification and a healthy dose of skepticism.

In 2001, British Electrical Engineer Roger Shawyer first introduced the "impossible drive," known as the EmDrive. It was called "**impossible**" because its creator purported that the drive was reactionless, meaning no propellant required—in other words, it defied the known laws of physics (specifically, the conservation of momentum).

As with anything that appears to thumb its nose at Newton and Einstein, scientists raised more than a few eyebrows, and two decades of testing eventually boiled down to an inevitable (and somewhat predictable) conclusion in 2021: the **EmDrive was bunk**. But that's the nature of the scientific method—take a seemingly impossible idea, put it through rigorous testing, and hopefully get to an unassailable conclusion (or new discoveries that lead in other directions).

The not-based-in-**physics** dream of a propellant-less machine, however, didn't die with the EmDrive. Instead, a new challenger approaches, and this one has a former NASA scientist backing it up.

While at NASA, Charles Buhler helped establish the **Electrostatics and Surface Physics** Laboratory at Kennedy Space Center in Florida—a *very* important lab that basically ensures rockets don't explode. Now, as co-founder of the **space** company Exodus Propulsion Technologies, Buhler told the website ***The Debrief*** that they've created a drive powered by a "New Force" outside our current known laws of physics, giving the propellant-less drive enough boost to overcome gravity.

"The most important message to convey to the public is that a major discovery occurred," Buhler told *The Debrief*. "This discovery of a New Force is fundamental in that electric fields alone can generate a sustainable force onto an object and allow center-of-mass translation of said object without expelling **mass**."

Buhler stressed that this work is unaffiliated with NASA, and that he recently presented his findings at the **Alternative Propulsion Energy Conference** (APEC), which is a club of engineers and enthusiasts eager to find ways to overcome the

limitations of **gravity** and physics—and not always with the most scientifically sound methods.

In an interview with APEC's co-founder Tim Ventura, Buhler **explained** how his background in electrostatics led to the discovery. He says his team—made up of people from **NASA**, Blue Origin, and the Air Force—investigated propellant-less drives for decades before arriving at electrostatics. For years, their devices produced negligible thrust, but saw increases with each new iteration. This culminated in 2023, when this "New Force"-powered drive generated enough thrust to overcome Earth's gravity.

"Essentially, what we've discovered is that systems that contain an asymmetry in either electrostatic **pressure** or some kind of electrostatic divergent field can give a system of a center of mass a non-zero force component," Buhler told *The Debrief*. "So, what that basically means is that there's some underlying physics that can essentially place force on an object should those two constraints be met."

Obviously Buhler's claims are pretty "woah, if true," but the history of propellant-less drives is filled with seemingly positive results that are eventually dashed upon the rocks of scientific reality. For the EmDrive, hopes for the device skyrocketed after NASA's Eagleworks team, which is dedicated to investigating new forms of **propulsion** (i.e. warp drives), **claimed to measure thrust from the "impossible" drive in 2016**. However, subsequent studies—including an exhaustive (no pun intended) **one at the Dresden University of Technology**—found zero thrust.

Before any alternative propulsion enthusiasts should start popping corks, rigorous, third-party **research** will have to verify the results again and again. While it's not impossible that Buhler et. al stumbled across some unknown quirk of physics, it's an extremely unlikely outcome.

For now, let's call it an "improbable **engine**."