The Artificial Inducement of Space Warp

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Abstract

This paper describes how it is possible for a craft to distort space-time within the framework of general relativity. The authors demonstrate how it is possible to compress space in front of and expand space behind the craft. Laboratory investigations and preliminary findings confirm the hypothesis that the compression of the fabric of space can be accomplished, without exotic energy, through the use of tri-pole electric fields and conventional power.

Keywords: general relativity, space warp

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Alcubierre (1994), Van den Broeck (1999), and Obousy and Cleaver (2007) expound the possibility of faster than light travel using the theoretical concept of space warp. Mathematically hypothesizing space warp Alcubierre (1994) receives credit for popularizing the concept of faster than light travel. While physicists commonly dismiss the idea of space warp because of high-energy requirements, this criticism does not stop researchers from exploring the practical applications including how humans can traverse the vast distances of the cosmos (Van den Broeck, 1999). Laboratory results suggest that local space warp is a naturally occurring phenomenon in strong thunderstorms (Pares, 2010). This paper describes a warp drive motor that artificially induces space warp, demonstrating its existence utilizing a laser and linear displacement data. Newly developed tri-pole fields are used to distort space-time in such a way as to induce a space warp bubble.

Radio frequency (RF) energy transmitted via tri-pole antenna arrays emulate a scaled-down model of the electrical fields found in thunderstorms. A modified interferometer measures the shape of the micro warp field and the red shift of a pen laser pointed at the tri-pole field produced by the arrays. Resulting laser beam compression indicates the presence of a space warp bubble. Compressing the fabric of space is demonstrated by inducing linear displacement of the laser beam over a given distance in a given time. Maintaining the integrity of the frequency/wavelength during testing necessitates measurements within a small physical space. Variable tri-pole phased fractal arrays yield a measurable compression metric of .1 mm / sec at 100 watts of power with a total displacement of 1.2 cm in a 2 minute time frame. This series of experiments demonstrates an ability to artificially induce a sustainable micro-space warp bubble

which compresses the fabric of space. Continuing experiments with increased power should expand the space warp bubble and produce greater linear motion.

Theoretical physicists have long held the belief that space warp could only occur using unfeasibly high levels of exotic energy (Pfenning & Ford, 1997). This paper summarizes evidence demonstrating space warp using less than 100 watts of power. The following section provides background information leading to the discovery of artificially induced sustainable space warp motor drive technology.

Literature Review

Within the confines of special relativity, no object with mass can travel faster than light (Puthoff, 1996). The same rule is present in general relativity, however through particular solutions of general relativity introduced by Alcubierre (1994) it can be shown that an object can travel locally faster than the speed of light through the expansion and contraction of local space. Alcubierre's warp is constructed graphically in Figure 1.1.

The graph shows the expansion of space-time behind and compression of space-time in front of the local space warp bubble. Thus, a craft generating this distortion field is pushed forward by the expansion of space behind and pulled forward by the compression of space in front of the craft. The space-time distortion leaves the ship at rest in the center of the space-warp bubble with respect to locally flat space. There are no relativistic effects present inside of the bubble. The absence of relativistic time dilation and mass increase allows the ship to move through the expansion and contraction of space. This final outcome may allow the craft to move at (or perhaps even greater than) the speed of light. Estimates over 100 times greater than speed of light have been postulated by (Puthoff, 1996) and ("Extending Einstein's theory," 2012).

Space warp has been long considered to be a purely mathematical exercise ("Extending Einstein's theory," 2012). Alcubierre's first prediction of the energy requirement necessitated an enormous amount of exotic energy to produce the space warp field (1994). Over the past two decades estimates of the amount of power needed for space warp have systematically decreased from the amount of energy in the universe, to the amount of energy in the Milky Way galaxy, to the energy equivalent of the mass of the Voyager spacecraft ("Extending Einstein's theory," 2012 and Obousy & Cleaver, 2007).

Another problem associated with the idea of space warp is the kind of device needed to create and sustain a space warp field. Researchers have long held that this is the most problematic part of the space warp concept because an engine that could distort space-time would have to utilize exotic forms of energy such as anti-matter or the theorized "dark energy" ("Extending Einstein's theory," 2012). These two problems have long held research on space warp to a minimum.

Artificial Inducement of Space Warp

In order to alleviate these problems, the authors introduce an artificial inducement of local space warp, based on naturally occurring phenomena, from heretofore unexplained cases in aviation. After researching reports of pilots flying through thunderstorms, several cases indicated that pilots experienced a linear displacement in terrestrial space (MacGregor & Gernon, 2005) and (Pares, 2010). The total linear displacement varied from 100 to 300 miles. Forensic weather studies for these cases indicate that very large thunderstorms produce copious amounts of energy and antimatter which might explain the pilot reports (Pares, 2010).

The authors' study revealed the space and terrestrial conditions necessary to induce a momentary non-sustainable local space warp bubble. The study also concluded that electric

fields generated by a thunderstorm form a tri-pole field pattern potentially capable of compressing the fabric of space. The authors predicted that as two thunderstorms converged, overlapping tri-pole fields may form the necessary elements to induce a momentary non-sustainable local space warp bubble.

The authors decided to reproduce these results in a controlled laboratory environment. Initial experiments used custom built tri-pole antennas that resonated at the 146 MHz range, shown in Figure 1.2.

The antenna arrays replicated frequency data collected while flying in and around some thunderstorms in previous field studies by our team (circa 2008-2010). As the initial experiment proceeded, measurements emerged that outlined the cross section of the fields. A laser was used along with a modified interferometer. Analyzed data indicate a central core pattern that showed the compression of a laser beam. The laser was then moved 3mm either side of center, vertically and horizontally. Diminishing effects of laser compression were observed when the system was activated for each repositioning from center. This experiment was reproduced over 25 times with the same results.

However, this led to a larger concern about the practical applications. Flying an aircraft between two large tri-pole antenna towers to induce a momentary non-sustainable local space warp bubble would only allow for a one-time occurrence. The amount of power needed could be as much as 10^{15} watts of power. This amount of power is not practical. Another concern is how to steer and control the linear displacement in a non-sustainable local space warp bubble.

After several months of research and evaluation, various designs began to emerge. The larger arrays were re-designed to a set of smaller self-contained adjustable arrays. The new design allowed the tri-pole field to have a small physical size that also maintained integrity of the

frequency and wavelength used in the original experiments. The authors hypothesized that the arrays then could be activated in a continuous duty cycle providing additional measurements of the compression of the fabric of space. The dual fractal pattern, shown in Figure 1.3, depicts the fourth iteration that was successfully tested and used in subsequent experiments.

Fractal arrays provided a very small flexible footprint that still allowed for substantial power levels that would be used in testing. The 146 MHz frequency was used as a base design for the fractal arrays. Several fractal iterations were tested successfully. The 4th fractal iteration had the best response and most robust properties.

Another laser compression experiment was designed to see if the results of the first series could be validated using a different method. This next compression experiment consisted of focusing a laser through a Faraday cage that contained the fractal array and a Trifield ™ meter. The laser was aimed one inch from the base of the fractal arrays. The laser beam then passed out of the Faraday cage and through a 12 times magnifying lens and was imaged on a white projection screen. A laser fringe image was recorded using a Microsoft™ Lifecam HD ™, webcam each time the system was turned “ON” and “OFF”.

A total of 140 images were captured during the experiment, which was conducted in a darkened environment. A solar panel was also used to ensure that any stray ambient light would be measured and accounted for during all of the experiments. A constant value of 0.1Volts on the VOM (Volt Ohm Meter) was recorded during all of the experiments.

A series of ten photographs were taken as five sets of two photographs. The set of two photographs consisted of one photograph being taken while the array was not being engaged (OFF) and the other taken after the array had been engaged for 4 seconds (ON). Overall, seventy

sets of pictures were taken. Five sets were taken at 10W and 15W of power. Eighteen sets were taken at 25W of power. Forty four sets were taken using 100W of power.

The statistics of this experiment determined if there was a relationship between the initial (OFF) diameter and how much the fringe was compressed in total. All of the data showed that the (ON) diameter was compressed when compared to the (OFF) diameter of the fringe pattern. However, the R-squared value of the (OFF) to compression relationship was only '0.43'. This showed that there is a relationship between the original diameter and how much compression there was in the laser beam. The compression ratio results can be explained by the limitations of the equipment and oversaturation of the pixels in some of the webcam photographs shown in Figure 1.5.

Measurements were made of the warp motor compression metric red shift. It was unknown if any frequency shift would be found. Confirmation of the existence of a frequency red shift would be a key element in proving that a space warp metric did exist when the warp drive motor was activated. This was confirmed by measurements conducted in the laboratory. Measured red shift:

$$\frac{\Delta\lambda}{\lambda} = \frac{\lambda_0 - \lambda_1}{\lambda_0} = \frac{146.460 - 146.4598}{146.460} = \mathbf{1.4 \times 10^{-6}\ MHz}$$

Figures 1.6 and 1.7 show a sample of the data used to make the calculations and the resultant Sigma 4 value from 140 samples.

A Local Space Warp Bubble

Theoretical work on a space warp bubble has been confined to the sudden production of the phenomenon ("all at once"). Our testing indicates that a larger warp bubble can be created using multiple smaller bubbles. Extreme exterior tidal actions were predicted when generating a

local space warp bubble. While we cannot rule out the possibility of such extreme tidal actions, the low power levels used thus far have produced no measureable exterior tidal actions.

When two smaller warp motors were placed side to side, as shown in Figure 1.8, the total aggregate of the motors pulled in a downward direction. When the same amount of power was applied to both motors no difference in the downward pull was measured. When an increase in power was applied to one of the motors, it turned on its vertical axis. The resultant test indicated that not only can a larger bubble with multiple sources be generated, but a properly equipped craft can be steered using a controlled distortion in the combined field. This exciting discovery would allow full axial control of a craft in any environment.

The next test was conducted to determine if a warp bubble could be controlled by shaping of the fields. The Quad was given 160 watts power and the other 100 watts. The results were very encouraging. The quad unit turned to the right and when power was reversed, it turned to the left. This gave positive proof that warp drive fields can be shaped and used for axial control of a craft.

The current design incorporates a warp field dampener which can vary the resultant warp field shape and output. This will provide maximum flexibility for maneuvering, when utilizing one or more warp motors that have been designed for a craft. Figure 1.9 shows an Unmanned Aerial Vehicle (UAV) test craft designed with three articulating engine pods. These articulating pods can move left/right, up and down. This integrates the best design concept for axial control and shaping of the warp field.

Analysis of Trifield™ Meter Readings

Figure 1.10 shows the test configuration for the following discussion. When powering up the warp motor a negative field is created for several seconds. This is followed by a full scale

deflection on a Trifield™ meter. When power is released the meter deflects slightly and then indicates full positive deflection for 1.5 to 2 seconds before returning to zero. Trifield™ meter data was collected and plotted as shown in Figure 1.11. When in the "ON" state the data shows the field starting a negative deflection on the meter. The next process appears as compression of the fabric of space between the fractal arrays, measured as full deflection. When the power is released, the data indicates a slight deflection of the field and then it pins the meter for one to two seconds before the field zeroes. It is apparent that after power is cut additional energy has been released from the system.

The negative reflection in the Trifield™ meter data collected indicates evidence for the initial compression of the fabric of space. The energy release at the end of each keying cycle suggests the rebounding of the fabric of space. When the unit is active there is a downward pull in the motor test stand. The active linear displacement is visible using the interactive laser measurement equipment and verified by analysis of time and distance data. Motor tests have been run from a few seconds to as long as two minutes in duration. The statistical analysis has shown that the R-squared value for the power to compression ratio is '.998'. This is a statistical measure of how close the data are to the fitted regression line and a value of 1 is considered perfect.

Comparisons with NASA's Dawn Spacecraft

Tables 1 and 2 compare data gathered for the warp drive system in the lab to the functional Dawn ion drive spacecraft. Using the same specifications as NASA ("It's complicated: Dawn spacecraft," 2013), the lab motor's performance is compared to that of the Dawn spacecraft. Based on power levels used in the lab, the authors utilize only 5% of the 2000 watts of total available power on the Dawn Spacecraft. The Dawn engines use 3.25 milligrams

of xenon gas per second (about 10 ounces over 24 hours). Dawn carries 425 kilograms (937 pounds of xenon) and uses 666 watts of power for one engine. This generates 91 milliNewtons of thrust. This amount of power is equivalent to the force required to hold a single piece of notebook paper in your hand. In the Pares/Judah Warp Motor only 100 watts of power is used and zero as fuel. At the 52 minute specific impulse mark, our motor generates 2.24 lbs. which is about the weight of a PC Tablet in your hand.

Linear displacement in a warp motor is cumulative and the next chart illustrates how it can achieve significant equivalent velocities over time. To date it has taken the Dawn Spacecraft 4.87 years to attain a velocity of 26,700 mph ("It's complicated: Dawn spacecraft," 2013). This is a record for pure thrust for a spacecraft without any gravity boost. Given the same time frame at 100 watts of power, data indicates that the lab warp motor would attain an equivalent velocity of 3 million mph.

The Dawn Spacecraft requires thrust to propel it through space. Unlike thrust propulsion the warp drive motor compresses the fabric of space in front of the craft and forms a local space warp bubble around the craft. As the bubble's energy diminishes in the back of the field it expands space behind the craft. This allows the craft to traverse the fabric of space rather than pushing through space with a thrust component. This is a different way of thinking about space or terrestrial means of travel. The future of warp drive engines that have the power and capability to attain a much greater equivalent velocity than the speed of light rests not on theoretical and mathematical speculation but on empirical science. The equivalent of controlled faster than light travel opens a whole new window of opportunity for exploration and a future space-based economy.

Lab Results

Over the last two years several experiments have been conducted. The development and construction of an experimental warp drive motor presented many problems. As each one was solved, the new data presented new information and more problems to resolve. More powerful motor designs are being constructed which will lift our UAV to explore full axial control in a warp bubble environment.

The following is list of some of our findings:

1. The Fractal Arrays which comprise the warp drive motor will move in the direction the opening is pointed. Depending on the power levels the displacement has been as much as 1.2 cm. If pointed up they will take weight off of a triple beam balance scale and add weight when pointed downward. The motion and force is power dependent.

2. A weight displacement at 100 watts was recorded at 0.5 grams using a spring scale. A Compression Metric of 0.1 mm was also recorded at this power level.

3. The red shift detected was 1.4×10^{-6} MHz's

4. Compression of a laser beam was measured and statistically verified using a warp drive motor, laser and interferometer. (Experiment 1)

5. Additional tests were performed using fringe patterns and laser through a warp drive. The same results confirmed the existence of space warp compression between the fractal arrays of the warp drive motor. (Experiment 2) Statistical confirmation of Sigma 4.

6. The warp field metric is controllable and can be varied by the amount of power applied.

7. A warp field can be constructed using smaller warp bubbles. Steering is also possible by shaping the warp field bubble. By increasing the power to a warp bubble configuration, the craft will turn to the strong side.

8. Any tidal actions from inducing the micro space warp bubble are not apparent. As power levels in the lab experiment are increased this could change.

9. When powering up the warp motor a negative field is created for several seconds and then followed by a full scale deflection on a Trifield™ meter. When power is released the meter deflects slightly and then indicates full positive deflection for 1.5 to 2 seconds before returning to zero. The data supports a warp field compression metric.

10. Creating space warp does not require exotic forms of energy. The research that has been conducted successfully created a small experimental warp drive motor that compressed the fabric of space. Laboratory investigations confirmed the existence of space warp. R Squared values of .96 & .998 correlated for Force versus Power for the Tuned Dual and Quad Array motors.

Conclusions

Space warp technology has been on the minds of many for some time. Miguel Alcuberrie gave us a starting point which has led to an evolving proposition of energy requirements and the eventual design and construction of an experiment warp drive motor. The evolution of transportation over the last three hundred years was slow at first but technology has advanced exponentially over the last hundred years. Humankind has ventured into space with great success. Despite the marvels of present technology there is always the need for more. If time is money, then anything that decreases the time required to travel from point A to B is a necessity. The development of warp technology is imperative not only for economic development but also

for the future of human evolution. Research conducted to date suggests the warp technology will be the mechanism used to successfully navigate the solar system in days or hours rather than years. Reducing space travel time will allow mining of raw materials, manufacturing of exotic materials and colonization of the planets, moons and asteroids.

The Dawn Spacecraft comparison is essential to understanding the current experimental warp drive results. It is a different way of thinking about traveling on Earth and in space. Current research suggests practically limitless opportunity including a new way to advance space exploration that is both more efficient and cost effective. Future warp drive engines will have more available power and capability to attain a much greater equivalent velocity than current chemical and ion drive spacecraft.

The small steps reported in this series of investigations and laboratory experiments provide the first stepping stone in the evolution of space warp technologies. Larger and more powerful warp drive engines are being developed for the completion of the autonomous Bluebird II UAV. The full size Bluebird II will be a seven passenger craft. As warp technology evolves, the ultimate goal is to go faster than light utilizing a space warp environment. At that point imagine the possibilities. Will space, then, be the final frontier?

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Appendix A

The Research and Development team has been together for over two years (Figure 1.16). The success of the research has motivated the team to apply for and receive a patent pending from the US Patent Office. Within the last year, the team has formed a company called Space Warp Dynamics, LLC. Reference Pares Space Warp Research website at http://www.paresspacewarpresearch.org/index.htm for additional information.

Tables

Table 1

Thrust Comparison

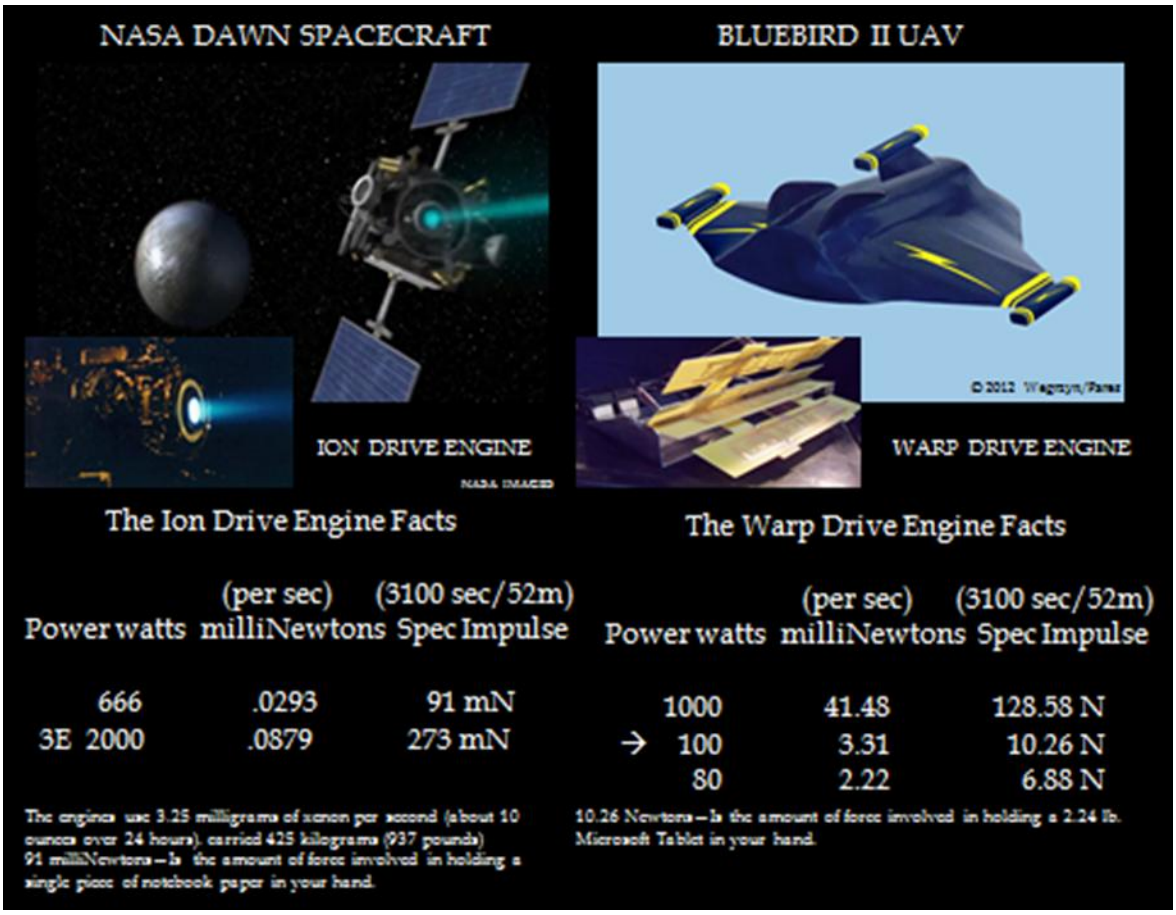
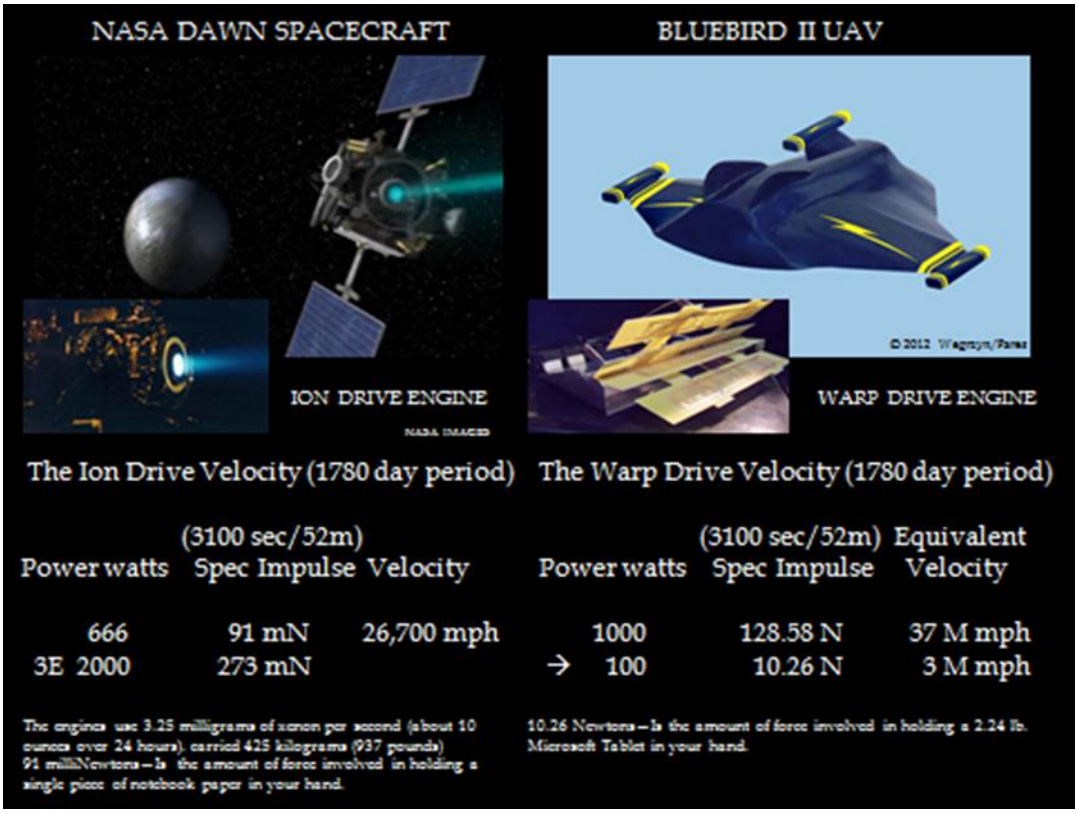


Table 2

Thrust Comparison



Figures

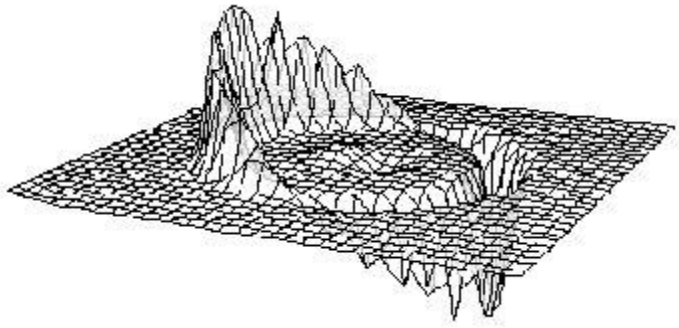


Figure 1.1. NASA depiction of the Alcubierre drive, showing the lattice of space.

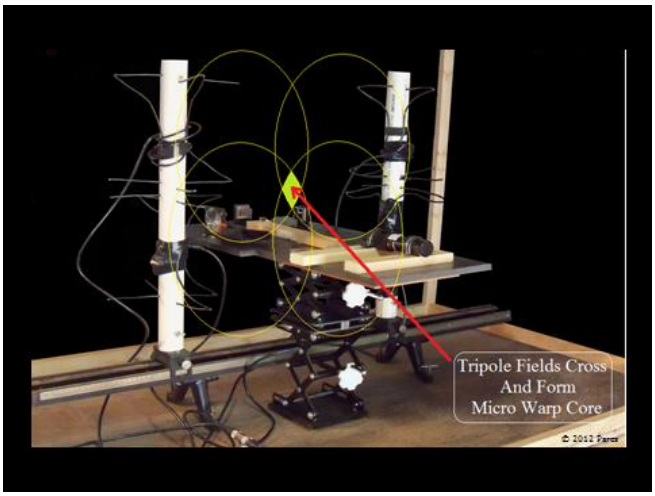


Figure 1.2. Custom built tri-pole antennas.

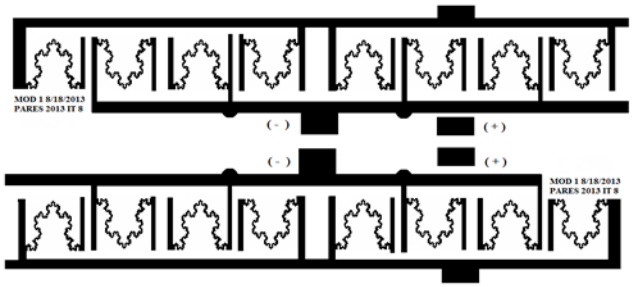


Figure 1.3. Dual fractal pattern of tri-pole arrays.

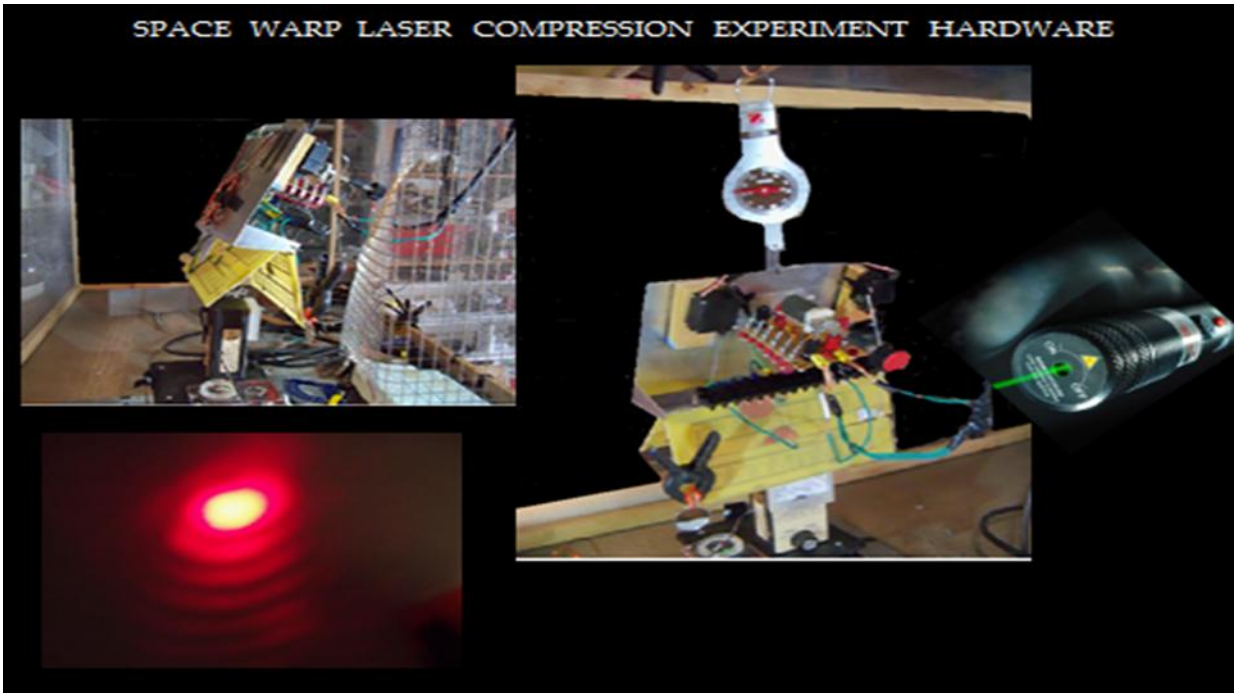


Figure 1.4. Experiment hardware.

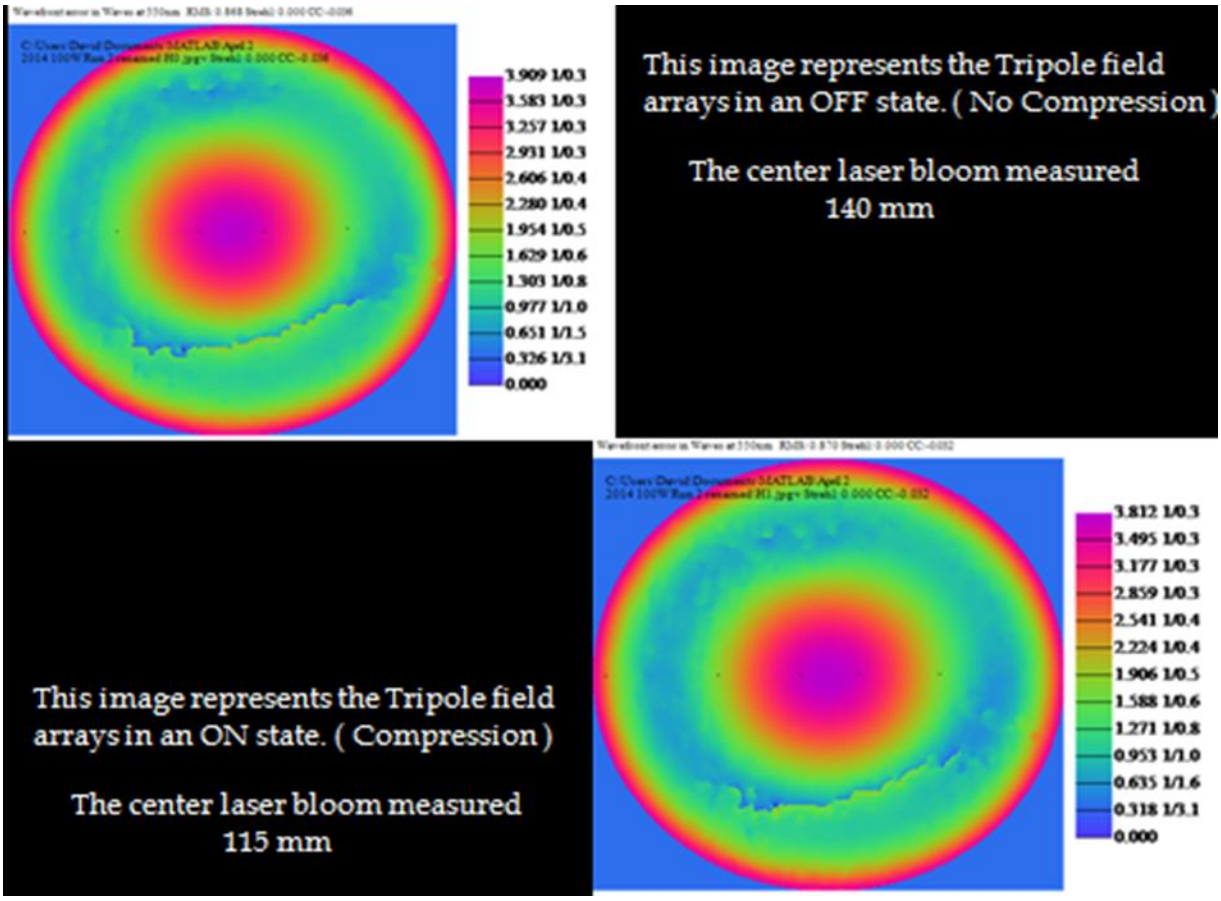


Figure 1.5. Laser bloom measurements.

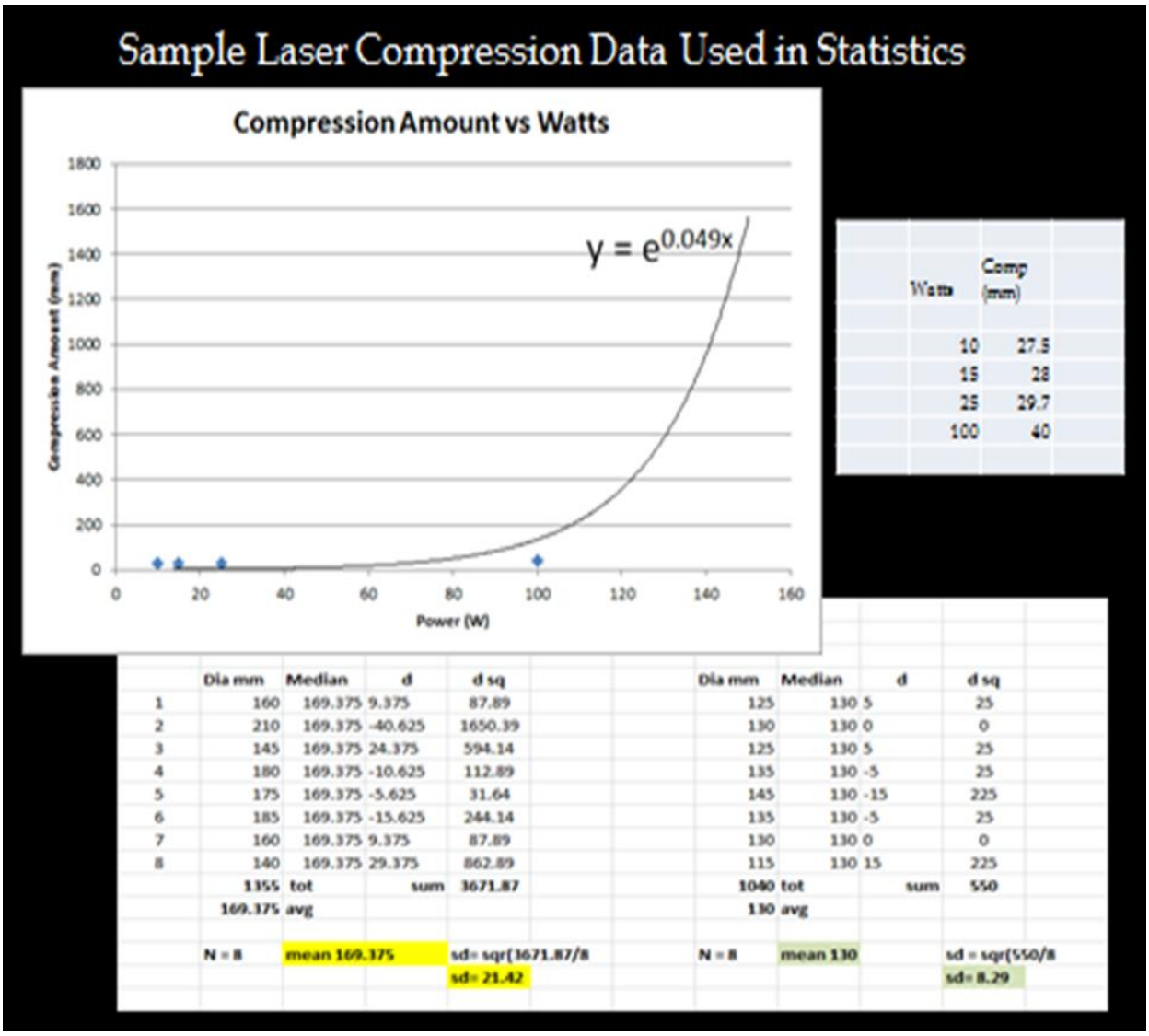


Figure 1.6. Laser compression data.

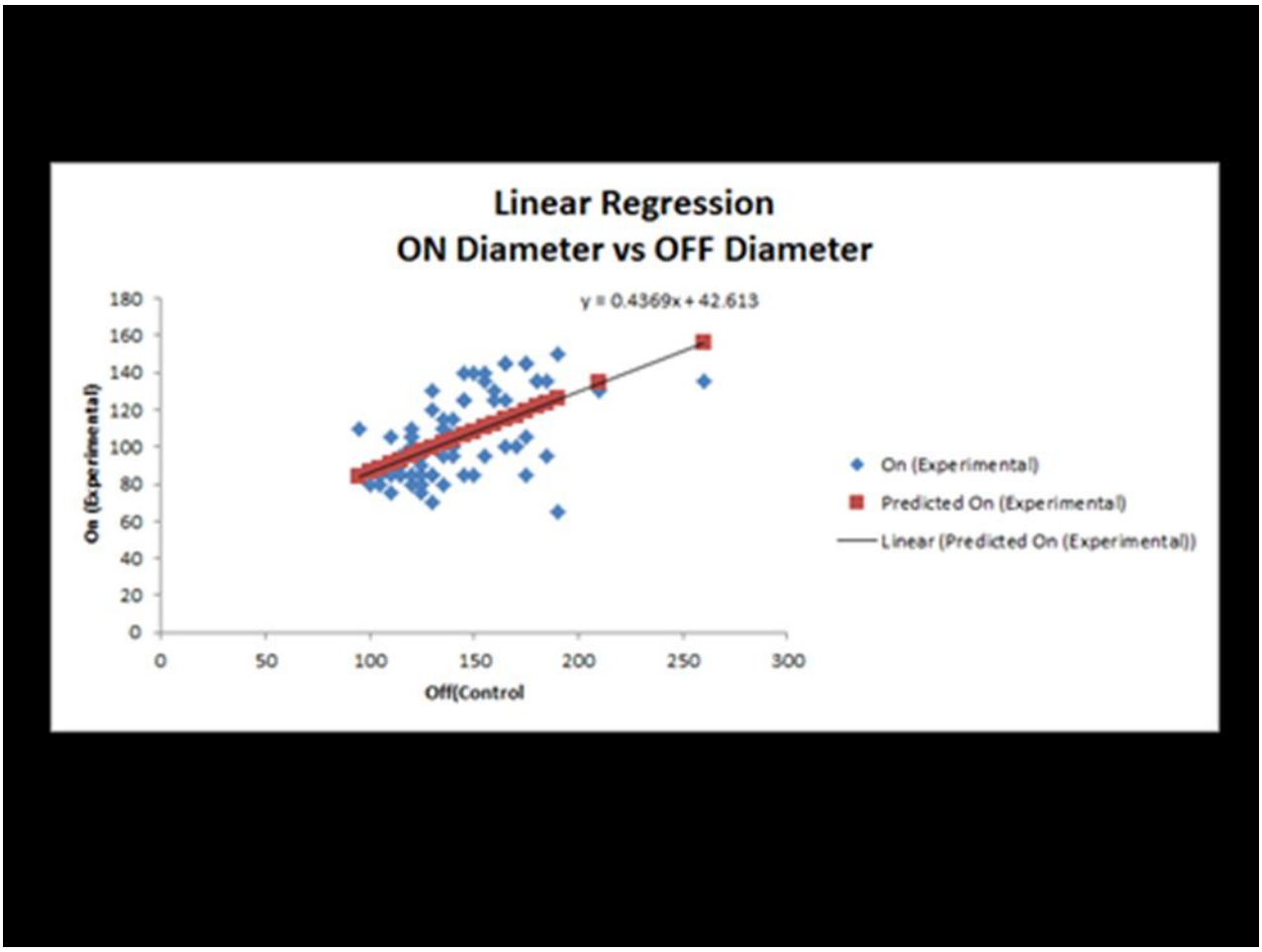


Figure 1.7. Linear regression data.

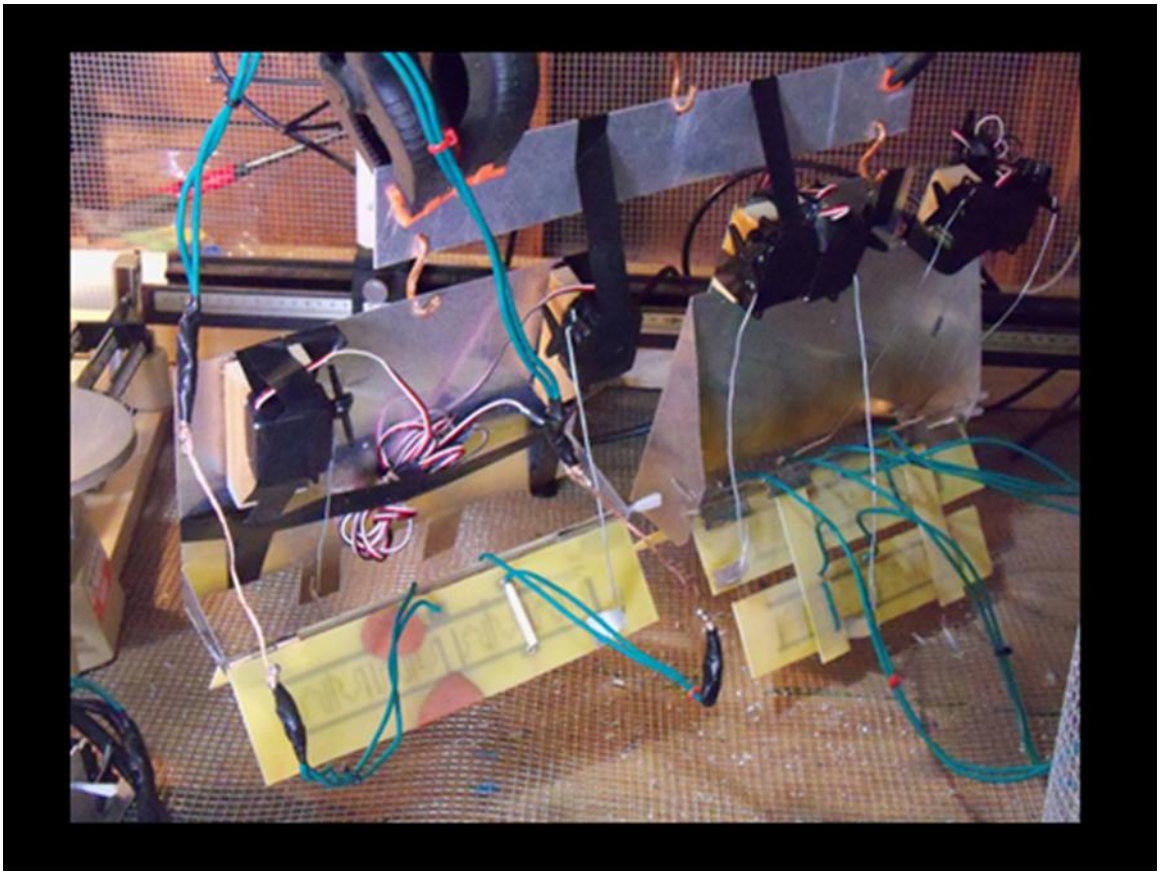


Figure 1.8. Warp drives side by side: one dual array and one quad array.

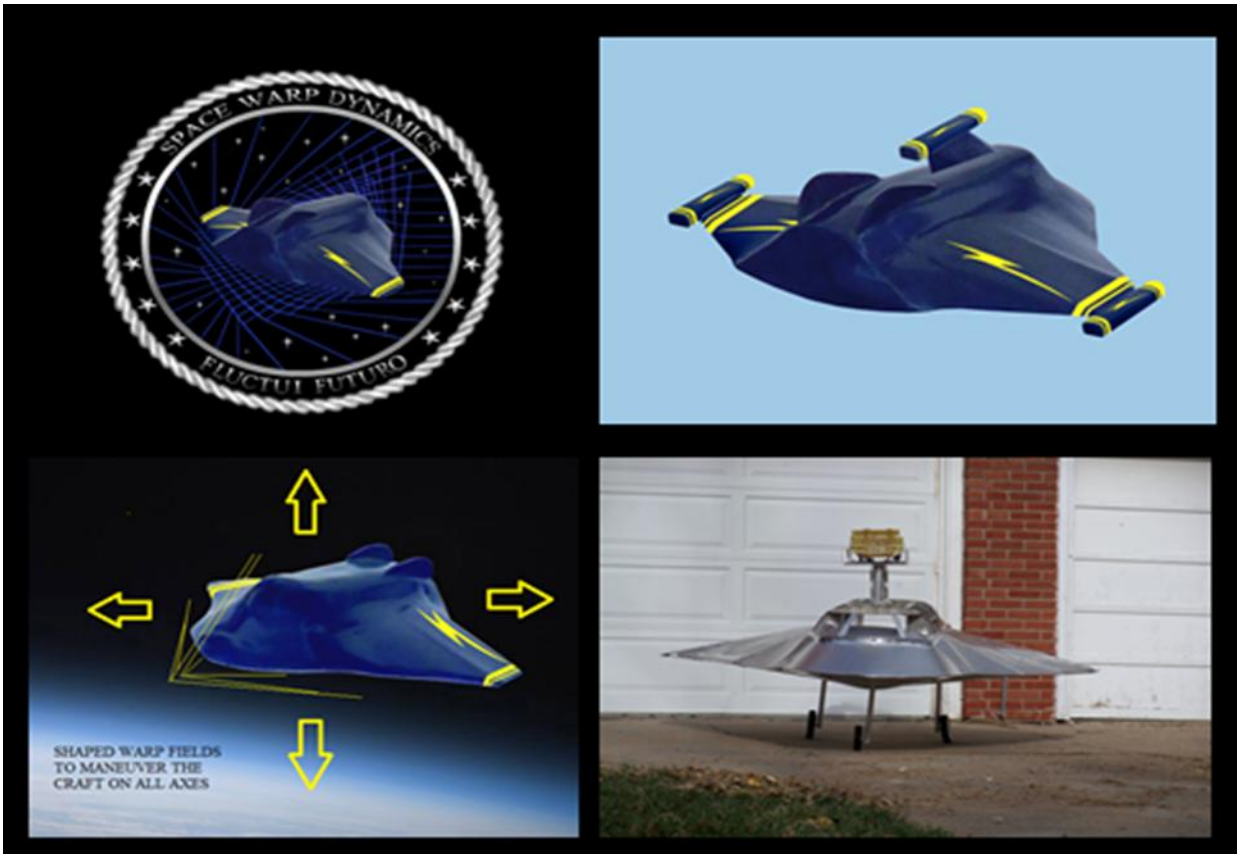


Figure 1.9. UAV Bluebird II.

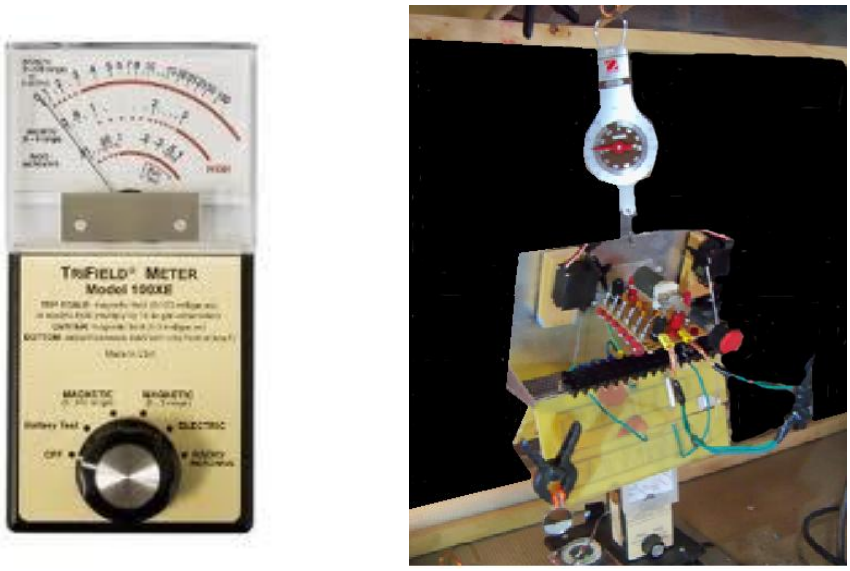


Figure 1.10. Trifield™ meter and tri-pole array.

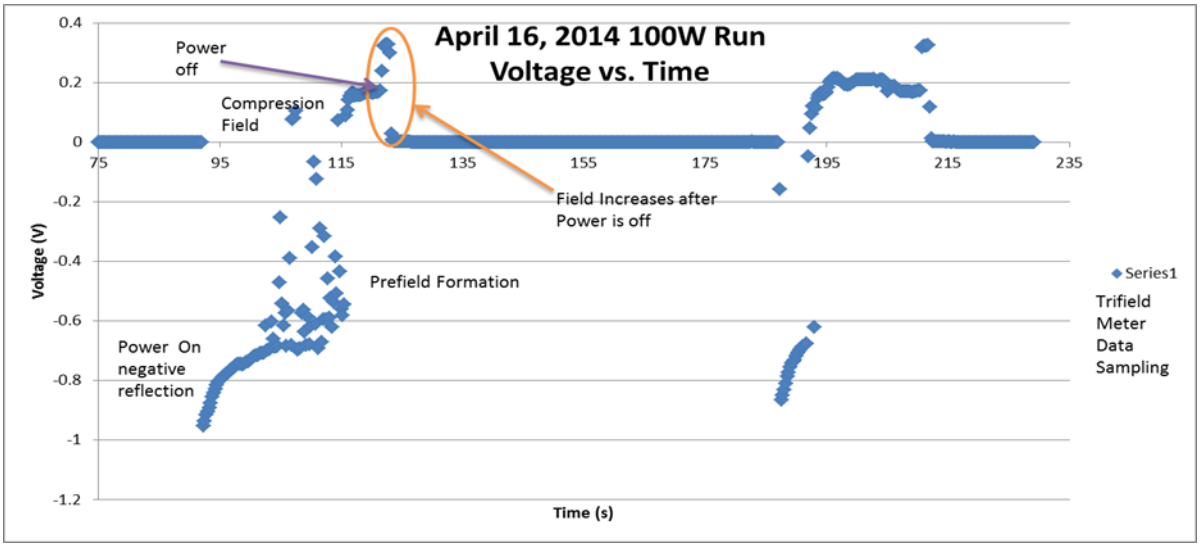


Figure 1.11. Trifield™ meter data.

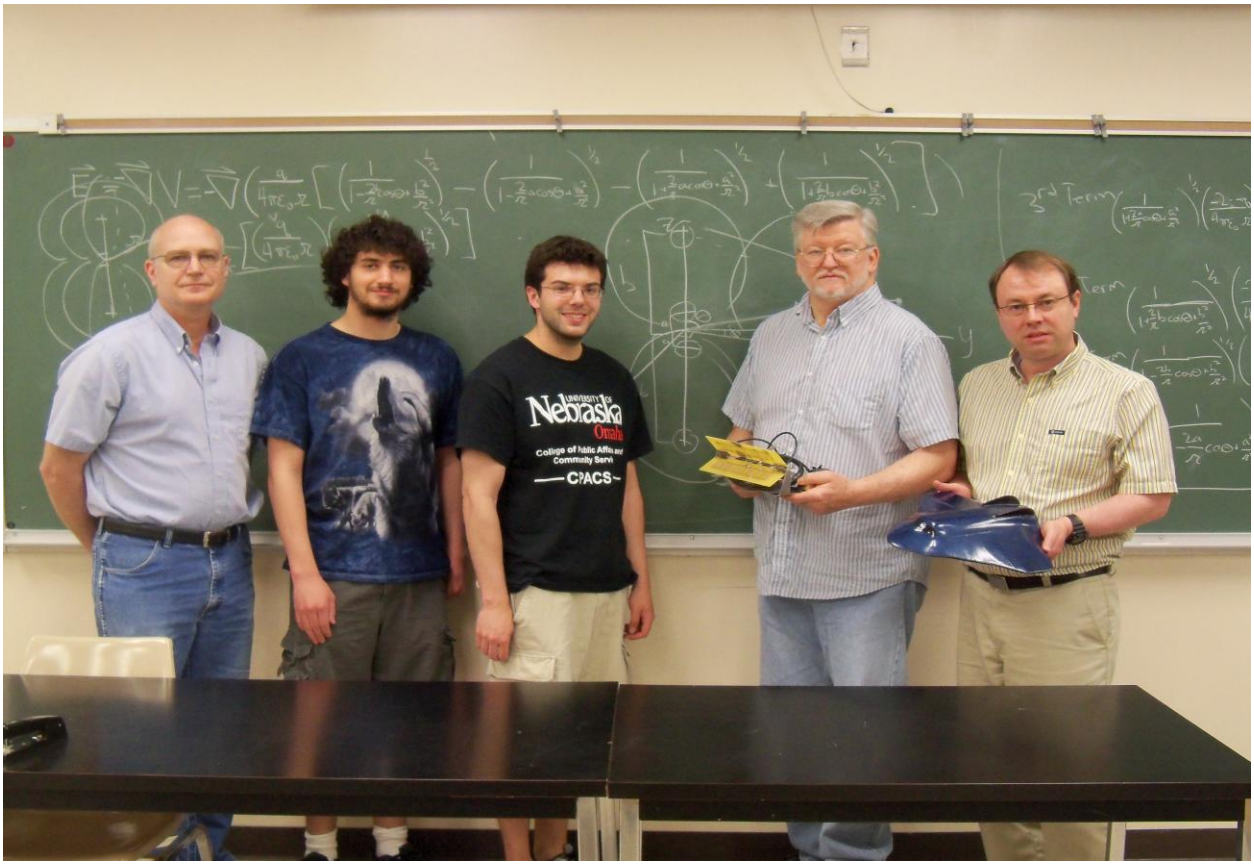


Figure 1.16. The Research and Development Team

The team consists of from left to right: Dr. Keene Tiedemann, Flight Control Systems Engineer; Kyle Finley, IT, Computer Science Major University of Nebraska at Omaha; Matt Judah, Space Warp Researcher, BS Physics University of Nebraska at Omaha, PhD Physics program Colorado State at Fort Collins CO; Professor David P. Pares, Space Warp Investigator, an Adjunct Professor of the University of Nebraska at Omaha and Chris Massin, Software Engineer and Aircraft Systems Designer. Not pictured: Steve Snodgrass, Communications and Technical Support and Jim Chinn, Marketing and Public Relations.