Medium

A Comprehensive Look at UAPx’s Groundbreaking UAP Study

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Introduction to UAPx’s Paper

In July 2021, I along with other members of UAPx embarked on an unprecedented expedition to Catalina Island, California, an area with a notable history of UAP sightings. This expedition was not just a routine field study; it was a well-planned operation involving cutting-edge technology and a multi-disciplinary approach. Our team’s arsenal included high-resolution optical and infrared cameras, radiation detectors, and an array of other sophisticated sensing equipment. Our objective was clear: to capture and analyze UAPs using a scientific framework, thus contributing valuable data and insights to a field that has long remained enigmatic.

From Left to Right: Gary Voorhis, Dr. Kevin Knuth, Jeremy McGowan (myself), Vinney Adams, Caroline Cory, David Mason, Jason Turner, Dr. Matthew Szydagis

On December 3rd, 2023, UAPx pre-published a groundbreaking scientific paper entitled [*"Initial Results From the First Field Expedition of UAPx to Study Unidentified Anomalous Phenomena"*](https://arxiv.org/abs/2312.00558) While I have since left UAPx to pursue other avenues of research into this topic, I want to take a moment and introduce my readers to the paper, its seminal structure and methodology and invite the world at large to provide feedback and comments. For the sake of facilitating my writing, I use "our" throughout the document; for at the time of the expedition and for a year afterward, I served as a member of UAPx and as its Vice President until my resignation to pursue other avenues of UAP research.

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Initial Results From the First Field Expedition of UAPx to Study Unidentified Anomalous Phenomena

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Abstract

In July 2021, faculty from the UAlbany Department of Physics participated in a week-long field expedition with the organization UAPx to collect data on UAPs in Avalon, California, located on Catalina Island, and nearby. This paper reviews both the hardware and software techniques which this collaboration employed, and contains a frank discussion of the successes and failures, with a section about how to apply lessons learned to future expeditions. Both observable-light and infrared cameras were deployed, as well as sensors for other (non-EM) emissions. A pixel-subtraction method was augmented with other similarly simple methods to provide initial identification of objects in the sky and/or the sea crossing the cameras' fields of view. The first results will be presented based upon approximately one hour in total of triggered visible/night-vision-mode video and over 600 hours of untriggered (far) IR video recorded, as well as 55 hours of (background) radiation measurements. Following multiple explanatory resolutions of several ambiguities that were potentially anomalous at first, we focus on the primary remaining ambiguity captured at approximately 4am Pacific Time on Friday, July 16: a dark spot in the visible/near-IR camera possibly coincident with ionizing radiation that has thus far resisted a prosaic explanation. We conclude with quantitative suggestions for serious researchers in this still-nascent field of hard-science-based UAP studies, with an ultimate goal of identifying UAPs without confirmation bias toward either mundane or speculative conclusions.

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In aerospace science and astrophysical research, the study of Unidentified Anomalous Phenomena (UAPs) emerges as an enigmatic and underexplored domain often filled with a stigma that discourages further research. The investigative efforts conducted by the scientists at UAPx, mark a pivotal advancement in our understanding of these phenomena — at least in the processes and procedures needed to conduct further research. The significance of our expedition lies in our systematic approach to an area often shrouded in speculation and anecdotes. This expedition was not just an investigation into the unknown; it was a methodical quest to apply empirical principles, advanced observational technologies, and analytical rigor to phenomena that have long eluded conventional scientific understanding.

At the heart of our methodology was a multi-disciplinary approach that integrated principles from astrophysics, aerospace engineering, and data science. Our strategy involved deploying an array of sophisticated sensing instruments, including optical and infrared cameras, radiation detectors, and other advanced monitoring devices. These tools were strategically employed to capture a comprehensive dataset that spans various spectrums and modalities. This multi-sensor approach allowed for a nuanced analysis of the observed phenomena, surpassing the limitations of traditional single-channel data collection.

Our approach was grounded in the principles of systematic data collection, control, and background data bias mitigation. Our approach was designed to include statistical and systematic uncertainties in the analyses. By doing so, we set a new standard for methodological rigor in UAP research, paving the way for future scientific explorations in this field.

The detailed documentation of our approach, methodologies, and findings offers a blueprint for future scientific endeavors, fostering a new era of empirical investigation into the world of Unidentified Anomalous Phenomena.

Methodology and Approach

Our approach to studying UAPs is a testament to the power of interdisciplinary collaboration and technological innovation. At the core of our methodology lies a diverse array of sensing devices, each designed to capture a different facet of the phenomena under observation. This multi-sensor strategy enabled us to triangulate and estimate various parameters such as distance, size, speed, and acceleration of unidentified objects. Furthermore, our emphasis on coincidence timing across devices streamlined data reduction processes, allowing for more efficient identification of true anomalies. This multi-disciplinary approach exemplifies the cutting-edge strategies required in modern UAP research.

· Interdisciplinary Integration and Scientific Rigor

We chose this multi-disciplinary framework to synch principles from various scientific domains including astrophysics, atmospheric science, optical engineering, and data analysis. This integration enabled a holistic approach to studying UAPs, going beyond traditional observational techniques. Key to this approach was the implementation of the scientific method, characterized by systematic observation, hypothesis formulation, meticulous experimentation, and data-driven conclusions.

· Advanced Sensory Deployment and Data Acquisition

The cornerstone of our methodology was the deployment of an array of advanced sensory equipment. This included:

Optical and Infrared Imaging: High-resolution cameras capable of capturing data in both the visible and infrared spectrums were utilized. These instruments allowed for the analysis of electromagnetic radiation patterns emitted or reflected by UAPs, providing critical data on their physical characteristics and behavior.

Radiation Detection: The expedition incorporated radiation detectors to measure ionizing radiation levels. This aspect was pivotal in assessing the presence of anomalous high-energy events, potentially associated with UAPs. The detectors provided quantifiable data on radiation types and intensities, offering insights into the physical processes possibly at play.

Triangulation and Geospatial Analysis: Multiple sensors were strategically positioned to enable triangulation — a method used to determine the location of an object by measuring angles to it from known points at either end of a fixed baseline. This technique was crucial for estimating the distance, size, speed, and trajectory of observed phenomena with high accuracy.

Data Reduction and Anomaly Detection: The team employed sophisticated data reduction techniques, crucial for sifting through vast amounts of data to identify genuine anomalies. This involved algorithmic processing to distinguish between normal celestial and terrestrial events and potential UAPs.

Infrared Cameras and associated equipment used during the expedition, courtesy of David Mason

In the pursuit of scientifically analyzing UAP the equipment and methodologies used are of extreme importance. Individual researchers using commercial-grade, non-calibrated optical sensors, such as standard cameras, face significant limitations in contributing to this field. These cameras, while accessible, are not designed for the precision and specificity required in scientific studies of UAPs. They lack the advanced capabilities of high-resolution cameras that can capture data across both visible and infrared spectrums, which are essential for analyzing electromagnetic radiation patterns emitted or reflected by UAPs. Such rudimentary equipment is typically not equipped for crucial tasks like radiation detection, which is pivotal in assessing high-energy events potentially associated with UAPs. The ability to provide quantifiable and reliable data on radiation types and intensities is beyond the scope of commercial sensors. Additionally, the lack of triangulation and geospatial analysis capabilities in basic equipment undermines the accuracy of estimating the distance, size, speed, and trajectory of UAPs. Without these advanced techniques, it becomes challenging to conduct the rigorous data reduction and anomaly detection necessary for sifting through and analyzing vast amounts of data. As a result, data collected by individual researchers with non-specialized equipment are often not suitable for the level of scientific analysis required for a comprehensive and accurate understanding of UAP phenomena.

Methodological Innovations

We introduced several innovative approaches to enhance the reliability and efficacy of their research, including:

Bias Mitigation and Control Data: Recognizing the susceptibility of UAP research to various biases, we implemented measures to mitigate data bias. This included the use of control data to differentiate between common atmospheric or celestial phenomena and genuine UAPs.

Statistical and Systematic Uncertainty Analysis: A rigorous analysis of statistical and systematic uncertainties was integral to our methodology. This involved quantifying the degree of uncertainty in measurements and observations, ensuring that conclusions drawn were statistically sound and reliable.

Through this comprehensive and scientifically grounded approach, we established a new paradigm in UAP research. Our methodologies not only allowed for an in-depth exploration of UAPs but also set a benchmark for future scientific investigations in this enigmatic field.

Key Observations and Insights

Among the myriad observations we made, one stands out for its peculiarity and intrigue: the "Tear in the Sky." This observation, captured by the UFODAP system and originally identified by me based on radiological measurements from Dr. Szydagis, presented as a diffuse dark spot in the sky, associated with a high-energy event. This anomaly, elusive in its nature, challenged our analytical capabilities and sparked a series of hypotheses. The detailed description of the conditions, equipment used, and the nature of this anomaly, as detailed in the paper, underscores the complexity and unpredictability inherent in UAP studies.

Detailed Description of the "Tear in the Sky" Phenomenon

The "Tear in the Sky" was observed as an anomalous, diffuse dark spot in the night sky, captured through our multi-sensor detection systems. This phenomenon was characterized by several intriguing features:

o **Optical Signatures**: The dark spot was visible in the optical spectrum. The UFODAP (Unidentified Flying Object Detection and Automated Processing) system, equipped with pan-tilt-zoom (PTZ) and fisheye cameras, played a crucial role in capturing these visual features.

o **Temporal and Spatial Characteristics**: The anomaly was transient, appearing suddenly and exhibiting dynamic changes over time. Its spatial characteristics, including size and movement patterns, were systematically analyzed using triangulation methods and geospatial tracking.

o **High-Energy Event Correlation**: Concurrent with the visual observation, our Cosmic Watch detector, a device designed to measure high-energy cosmic rays, recorded a notable event. This temporal correlation suggested a possible multi-modal nature of the phenomenon, integrating high-energy physics with optical observations.

Sensationalistic artists rendering of the "Tear in the Sky"

Analytical Approach and Data Processing

The scientific examination of the "Tear in the Sky" involved a multi-tiered analytical approach:

o **Image Analysis and Enhancement**: Advanced image processing techniques, including noise reduction, contrast enhancement, and edge detection, were employed to isolate and enhance the features of the anomaly for detailed analysis.

o **Radiometric Analysis**: The radiation data collected concurrently with the optical observation were analyzed to determine the energy spectrum and intensity of the detected high-energy event. This analysis aimed to ascertain whether there was a causal link between the optical and radiation phenomena.

o **Environmental and Atmospheric Conditions Assessment**: We conducted a thorough assessment of environmental and atmospheric conditions at the time of the observation. This included evaluating meteorological data to rule out atmospheric phenomena like cloud formations or optical distortions as potential explanations.

o **Data Correlation and Cross-Referencing**: The observed data were cross-referenced with astronomical databases and satellite tracking systems to ensure that the phenomenon was not a known celestial object or artificial satellite.

Scientific Significance and Implications

The "Tear in the Sky" observation stands as a significant case study in UAP research for several reasons:

o **Interdisciplinary Nature of Analysis**: The phenomenon was analyzed through the lens of various scientific disciplines, showcasing the necessity of an interdisciplinary approach in understanding complex UAP events.

o **Challenges in Identification and Classification**: This case highlighted the challenges in classifying and identifying UAPs, given the range of potential natural, atmospheric, and artificial factors that can contribute to such observations.

o **Contribution to Methodological Development:** The analysis of this particular observation has contributed to the development of more refined methodologies for UAP research, emphasizing the importance of multi-modal data integration and comprehensive environmental assessment.

Analyzing Hypotheses

In our quest to decipher the "Tear in the Sky," we rigorously evaluated a spectrum of ten hypotheses, ranging from natural phenomena like fall-streak holes and star fields to technological artifacts and speculative ideas such as military testing. This comprehensive analysis, rooted in scientific rigor and an open-minded approach, highlights the multifaceted nature of UAP research. Our commitment to considering a wide array of possibilities reflects an objective and thorough scientific method crucial for advancements in this field.

1. **Fall-Streak Hole Hypothesis**: This hypothesis posited that the dark spot was a fall-streak hole, a meteorological phenomenon occurring when part of a cloud layer forms ice crystals that fall, leaving a hole. We examined local meteorological data and atmospheric conditions, such as temperature and humidity profiles, to evaluate this hypothesis. However, the lack of corresponding aircraft activity and the atmospheric conditions not conducive to supercooled water droplets weakened this hypothesis.

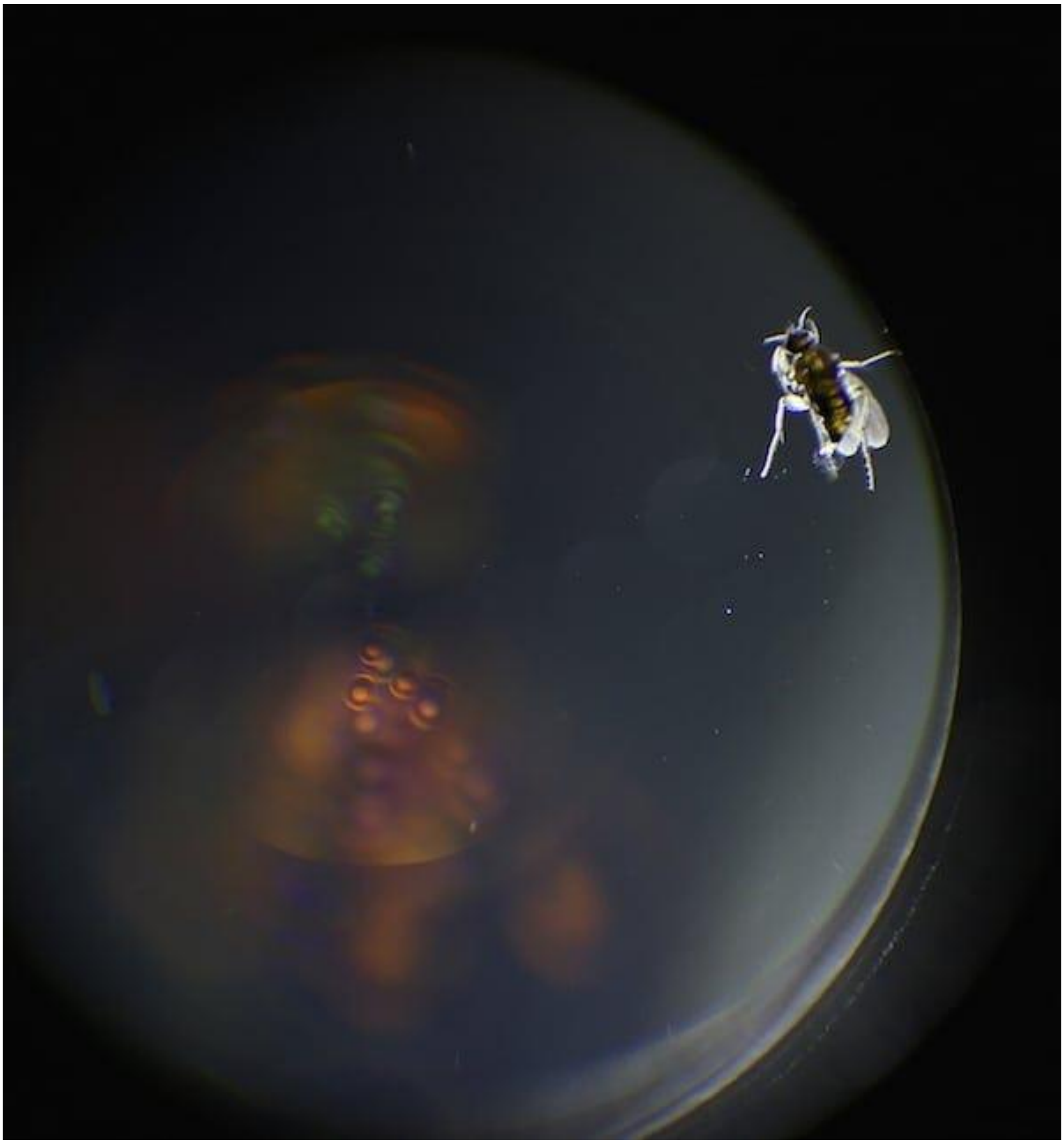
Image Courtesy of the National Weather Service

2. **Star Field or Seagull Flock Hypothesis**: This hypothesis considered whether the observation was a star field seen through a gap in the clouds or a flock of high-altitude seagulls. Astronomical data were cross-referenced to match the observed pattern with known star constellations, and ornithological patterns were considered. However, the brightness and density of the observed dots did not correlate with expected star patterns or bird flocking behavior, given the ambient light pollution and biological characteristics of seagulls.

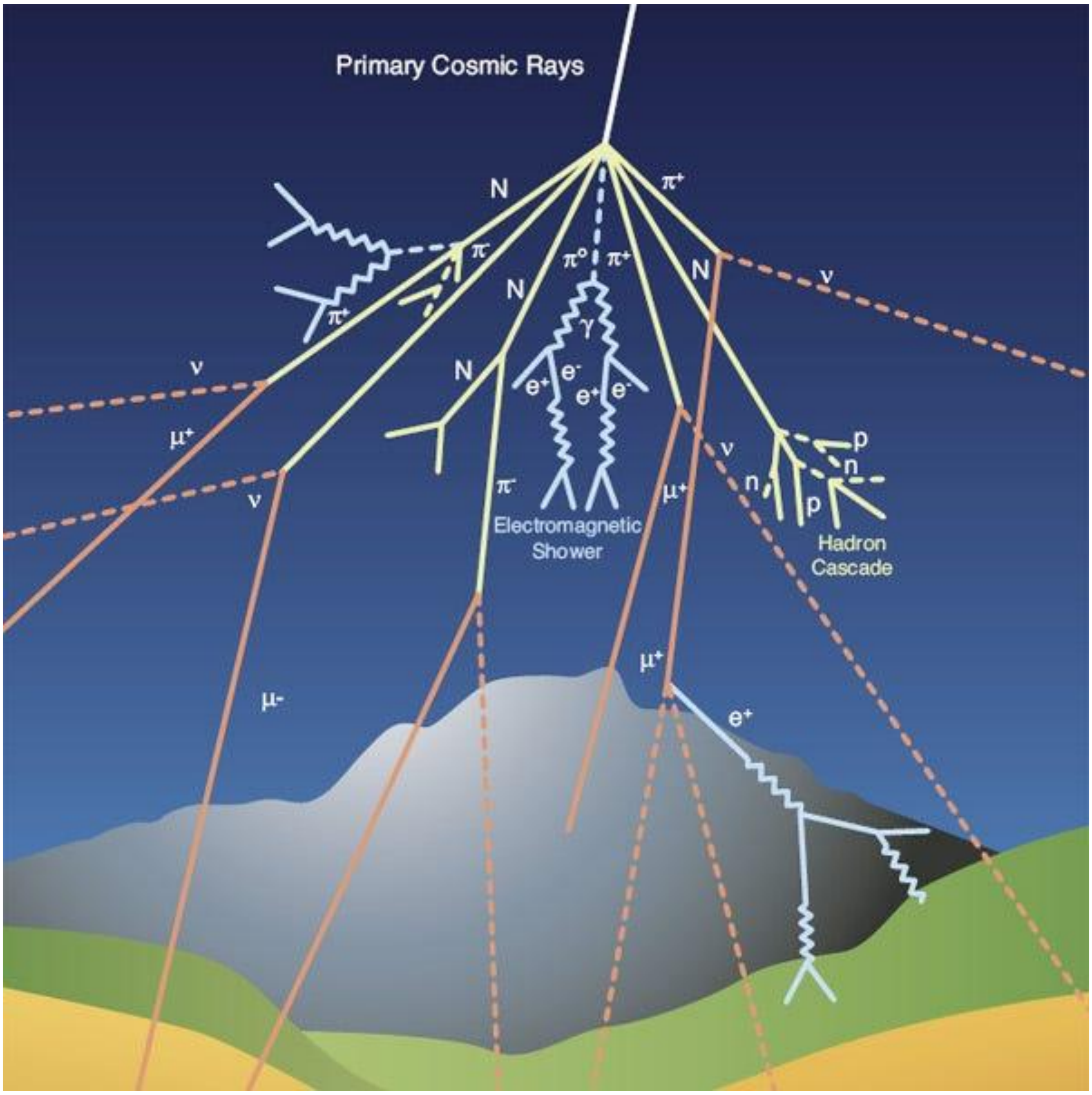

After an unauthorized leak of images captured by the team was sent to a prominent Harvard professor engaged in the study of UFOs, that professor brushed off the efforts of UAPx and the data analysis claiming the image represented a flock of seagulls.

3. **Water Droplet Evaporation Hypothesis**: This hypothesis suggested that the anomaly could be a water droplet on the camera lens, evaporating over time. Close examination of the camera's protective dome and environmental conditions were undertaken to assess this possibility, including temperature fluctuations and humidity levels.

4. **Fly on the Dome Hypothesis**: A simple yet plausible explanation was a fly or small insect on the camera dome. This was investigated by analyzing the movement pattern and opacity changes of the observed spot, and comparing it with typical insect behavior and visual signatures.



5. **Cosmic-Ray Shower Hypothesis**: Given the concurrent high-energy event detected, a cosmic-ray shower was considered. This involved analyzing the energy spectrum and temporal characteristics of the detected radiation event and comparing it with known profiles of cosmic-ray showers.

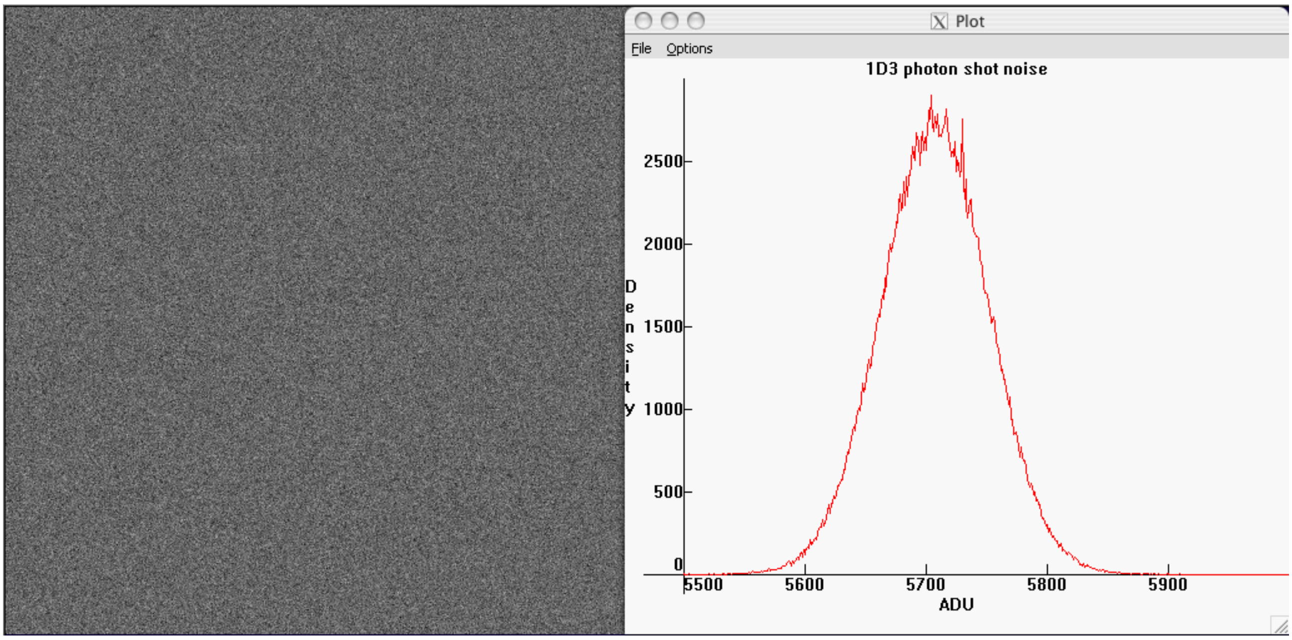


https://home.cern/science/physics/cosmic-rays-particles-outer-space

6. **Meteor Breakup Hypothesis**: The possibility of a meteor breaking up in the Earth's atmosphere was examined. This included assessing the trajectory, speed, and luminosity changes of the phenomenon against typical meteoric entry patterns.

https://aerospace.org/node/44081/printable/print

7. **Camera Noise and Environmental Interference Hypotheses**: These hypotheses addressed potential technological and environmental factors, such as camera noise in low-light conditions and interference from nearby electronic devices. We conducted a thorough examination of the camera's operational parameters and reviewed electromagnetic interference records.



Photon shot noise in an image of the sky from a Canon 1D3 (in the green channel). In the histogram at right, the horizontal coordinate is the raw level (raw units are sometimes called analog-to-digital units ADU or data numbers DN), the vertical axis plots the number of pixels in the sample having that raw level. The photon noise was isolated by taking the difference of two successive images; the raw values for any one pixel then differ only by the fluctuations in the photon count due to Poisson statistics (apart from a much smaller contribution from read noise). https://photonstophotos.net/Emil%20Martinec/noise.html#shotnoise

8. **Military Testing Hypothesis**: Given the proximity to military installations, the possibility of a military exercise or testing causing the observation was considered. This involved reviewing military activity logs and cross-referencing with known testing schedules.

9. **Resetting of Camera Levels**: Suggested that the resetting of camera levels for a lightening sky could explain the observation.
10. **Reflection of Lights in the Camera Dome**: Proposed that the observed phenomenon could be a reflection of lights in the camera dome

In testing these hypotheses, we employed a range of scientific principles:

Empirical Evidence Collection: For each hypothesis, relevant empirical data were collected and analyzed. This included meteorological records, astronomical data, radiation measurements, and environmental monitoring data.

Theoretical Framework Application: Each hypothesis was evaluated within its respective theoretical framework, whether meteorological, astronomical, or physical.

Analytical Rigor and Objectivity: We maintained a high degree of analytical rigor and objectivity, ensuring that each hypothesis was given a fair and unbiased evaluation based on the available data.

Interdisciplinary Collaboration: The evaluation process exemplified the importance of interdisciplinary collaboration, drawing on expertise from various scientific fields to comprehensively analyze each hypothesis.

Through this exhaustive and scientifically grounded process, we demonstrated the complexity and multifaceted nature of analyzing UAP phenomena. Our approach underscores the need for a comprehensive, data-driven, and interdisciplinary methodology in unraveling the mysteries of these enigmatic observations.

Conclusions and Future Directions

The expedition culminates in a set of conclusions that not only shed light on the specific phenomena observed but also pave the way for future research in this domain. The paper emphasizes the need for continuous refinement in methodologies, urging the scientific community to approach UAP studies without bias. This call to action underscores the potential for discoveries and breakthroughs in the study of UAPs, given the right combination of scientific rigor and open-minded exploration.

Our initial results from the analysis of the "Tear in the Sky" and other observations led to several key scientific conclusions:

Complexity and Multidimensionality of UAPs: The study underscored the inherent complexity and multidimensionality of UAP phenomena. It highlighted the need for a comprehensive approach that integrates various scientific disciplines, including atmospheric physics, optical engineering, high-energy astrophysics, and environmental science.

Importance of Advanced Data Analysis Techniques: The expedition demonstrated the crucial role of sophisticated data analysis techniques, such as machine learning algorithms for pattern recognition and advanced statistical methods for anomaly detection, in distinguishing UAPs from conventional aerial or atmospheric phenomena.

Need for Enhanced Sensory and Detection Technologies: The findings emphasized the necessity for continued development and refinement of sensory and detection technologies. This includes the advancement of high-resolution imaging systems, the integration of multi-spectral sensors, and the enhancement of real-time data processing capabilities.

Significance of Systematic and Controlled Methodologies: The research highlighted the importance of systematic and controlled methodologies in UAP studies. This involves establishing standardized protocols for data collection, implementing rigorous control measures to mitigate biases, and ensuring the reproducibility of findings.

Future Directions in UAP Research

Building on the insights and lessons learned from the expedition, the following future directions are proposed for the scientific study of UAPs:

Interdisciplinary Research Collaborations: Encourage and foster interdisciplinary collaborations among scientists from diverse fields such as astrophysics, atmospheric science, engineering, and computer science. Such collaborations can lead to the development of more holistic and integrated research methodologies.

Development of Comprehensive Databases: Create and maintain comprehensive databases that compile UAP observations, sensor data, and environmental conditions. This would facilitate cross-referencing and comparative analysis, enhancing the ability to identify patterns and correlations.

Advancement in Sensor Technology and Data Fusion: Invest in the development of advanced sensor technologies capable of capturing a wider range of data (e.g., electromagnetic, acoustic, gravitational). Additionally, focus on data fusion techniques to integrate and analyze data from multiple sensors effectively.

Implementation of Automated Detection and Analysis Systems: Develop and implement automated detection and analysis systems that utilize artificial intelligence and machine learning. These systems can significantly improve the efficiency and accuracy of identifying and analyzing UAP events.

Public and Scientific Community Engagement: Engage both the scientific community and the public in UAP research. Encourage open sharing of data and findings, and foster a culture of scientific inquiry and discourse around UAPs.

Policy and Funding Support for UAP Research: Advocate for policy support and funding for UAP research within the scientific community and government agencies. This support is essential for the long-term sustainability and advancement of UAP studies.

Invitation for Review and Feedback

In the spirit of collaborative scientific discovery, I personally am extending an open invitation to the readers of this article to review the UAPx paper in detail. I invite researchers, scientists, and academics from various disciplines to provide review and scholarly analysis of our methodologies, findings, and conclusions. This includes experts in astrophysics, atmospheric science, optical engineering, high-energy physics, data science, and other relevant fields. Your insights, comments, and feedback are invaluable in enriching the discourse surrounding UAP studies. I encourage a robust and constructive discussion on the methodologies and findings presented in the paper, fostering a community-driven approach to unraveling the mysteries of UAPs.

This invitation represents more than a request for feedback; it is a call to join a pioneering scientific endeavor that challenges the boundaries of our understanding of the natural world. Through collaborative efforts, open dialogue, and the integration of diverse scientific expertise, we can collectively advance the study of UAPs, turning what was once an enigma into a domain of rich scientific inquiry and discovery. I look forward to your contributions and the vibrant scientific discussions that will ensue, propelling the field of UAP research into new frontiers.

I encourage you all to provide your feedback as a comment to this article. I look forward to reading your input and will respond as I can. In the mean time, keep your eyes to the skies but your head grounded in science.