INVESTIGATING UAP SCIENTIFICALLY – LECTURE PLAN

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This course does not claim to teach established facts such as physics or mathematics: this is not currently possible in the field of unidentified anomalous phenomena (UAP). The purpose of this sequence of lectures is instead to stimulate discussion on a series of very important factors, starting with the survey methodology. Scientific rigor does not rhyme with rigidity. In the case of the study of UAPs, if we really want to expand our scientific knowledge, it is inevitable to marry Galilean rigor with a healthy and balanced mental openness. Otherwise, important aspects may escape us. In this field we all have only to learn, and no one, starting with myself, has the right to take the chair.

With this approach in mind, I will discuss what in my opinion are the most important aspects of UAP research, seen from the point of view of a physical scientist, and the most crucial actions that scientists should take in order to obtain concrete results, not focusing on a particular theory but exclusively on the methodology to obtain data of an acceptable level using well-calibrated measuring instruments. Regardless of this, no theory or hypothesis with its own internal consistency should be arbitrarily neglected. Only data that can be turned into numbers can tell what we are dealing with.

This seminar will be split in eight parts, of university introductory level, of which I mention here the main points in broad terms. Many of the listed references (some descriptive and some technical) can be found online.

This is a rough syllabus of what will really happen, but it may be expanded at class time. This is the list of the subjects that will be discussed:

- WEEK ONE – Methodology and Strategy – 1
- WEEK TWO – Methodology and Strategy – 2
- WEEK THREE – Results of Past Measurements and Photographic Reports
- WEEK FOUR – Theories and Established Facts
- WEEK FIVE – Testing the ETH Hypothesis using Astrophysics
- WEEK SIX – Identification of Propulsion Mechanisms
- WEEK SEVEN – Alternative Hypotheses, Quantum Effects and Consciousness
- WEEK EIGHT – Scientific Sky Watching

WEEK ONE – Methodology and Strategy – 1

1) *High Strangeness in the Sky* – Categorization of anomalous atmospheric phenomena – including UAP, the so called "earthlights" and ball lightning – compared with prosaically natural or manmade identifiable phenomena. Importance of the use of Artificial Intelligence for a quick discernment.

2) *Astronomy-like* – Scientific research methodology of the astrophysical kind applied to the study of anomalous atmospheric luminous phenomena that occur at low height inside the Earth's atmosphere. Physical variables at play.

3) *Time Variability* – The importance of studying the time variability of the phenomenon in order to try to understand the (natural or not) physical mechanism generating it. Conceptual analogy with non-stationary astrophysical phenomena.

4) *Strategy and Tactics* – Strategies and procedures for a dedicated multi-instrument and multi-frequency UAP observatory.

5) *The Galileo Project and Project Hessdalen* – The present measurement instrumentation of the Galileo Project. The incremental steps of a new "Project Hessdalen". Introduction of new observational techniques.

6) *Sensors* – Specific measurement techniques such as photography, video, infrared imaging, low and medium resolution spectroscopy, high-speed photometry, magnetometry, VLF/ELF, VHF and UHF spectrometry. Some examples of recorded anomalies.

7) *Low-Resolution Spectroscopy* – Technique using diffraction gratings, calibration procedures, thermal and non-thermal continuum spectra, line identification, spectral energy distribution, wrong spectrochemistry to avoid.

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"Variable Star", Wikipedia: https://en.wikipedia.org/wiki/Variable_star

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WEEK TWO – Methodology and Strategy – 2

1) *Medium and High-Resolution Spectroscopy* – Wavelength ranges, line identification and analysis, line broadening, Doppler effects and Zeeman effect, calculations for obtaining spectra with a good S/N ratio, optimum integration times, the importance of medium resolution.

2) *VLF/ELF Spectrometry* – Ionospheric and manmade signals, true anomalous signals, construction of databases.

3) *High-Speed Photography/Video/Photometry* – Fast kinematics, light and color variability, morphologic variability; wide angle and zoom modes.

4) *Magnetometry* – Inverse of distance's cube law, limit magnitudes and minimum distances for magnetic field strength measurement.

5) *Relativistic Tests* – Check for Laser beam deflection and/or for field stars displacement and light amplification.

6) *Statistics* – UAP phenomena in the past and historical flaps. Statistical methods based on witness database for selecting the locations where to place measurement instruments.

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WEEK THREE – Results of Past Measurements and Photographic Reports

1) *Measurements* – Some scientific results – based on measurement instruments and on statistics – obtained in the past in some parts of the world where the phenomenon is more common, with a particular attention on the Hessdalen phenomenon in Norway.

2) *Monitoring Hot Areas* – Current monitoring projects in different locations around the world.

3) *Earthlight Photo Show* – Manifestations of the luminous phenomenon in many locations of the world, and common characteristics. Are "earthlights" (EL) related with the UAP phenomenon?

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WEEK FOUR – Theories and Established Facts

1) *Theories on Earthlights (EL)* – Theories and hypotheses proposed so far to explain the observed Earthlight (Hessdalen-like) phenomenon. The following ones will be discussed: mirages, buoyant plasma, electroball, piezoelectricity, natural battery,

earthquake light, dusty plasmas triggered by Radon, electrochemical confinement, solar activity, magnetic monopoles, mini-black holes, wormholes from the Sun and from the Earth, quantum vacuum fluctuations, plasma life forms, extraterrestrial visitation.

2) *Lesson Learnt* – What did we learn so far from research on "earthlights"?

3) *UAP: What We Know So Far* – Discussion on the scientifically ascertained physical characteristics of unidentified anomalous phenomena. Are there common points between UAP and EL?

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WEEK FIVE – Testing the ETH Hypothesis using Astrophysics

1) *Astrophysical Research and Basic SETI Research* – Radio SETI and Optical SETI.

2) *Astrophysical Research and the Search for ET technosignatures in other stars* – Detailed description of expected technological manifestations of extraterrestrial nature in deep space, in form of infrared excess and of anomalous light curves from suspected artificial objects occulting their mother star. Hunting for Dyson Spheres. Parallel research with standard SETI research ("viewfinder strategy").

3) *Astrophysical Research and the Search for ET inside the Solar System*. Search for anomalous objects (Dyson Arcs) inside the Solar System and their possible interaction with our planet, in form of infrared excess and very high proper motion.

4) *Search for possible ET artifacts on Earth* – Relation with the theory of Von Neumann probes. Suspect videos and remnants.

5) *The VASCO and ExoProbe Projects* – The mystery of the "vanishing stars", and some strange temporal coincidences. Hunting strategies.

6) *Transient Lunar Phenomena (TLP)* – Are they natural phenomena or artificial ones? Research strategy using little telescopes.

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WEEK SIX – Identification of Propulsion Mechanisms

1) *Possible Propulsion* – Research inside the Earth's atmosphere: importance of the search for correlations between measured physical parameters in order to understand the physical mechanism with which unidentified flying objects move in the sky and change their luminosity, including a possible propulsion, without excluding a possible natural origin.

2) *Measurements* – What should we measure and what could we find if we are really dealing with flying machines? Which are the crucial physical questions that we should ask?

3) *Magnetic Field* – The importance of measuring magnetic field strength of UAP phenomena using both magnetometry and medium/high-resolution optical spectroscopy, in order to deduce a possible propulsion mechanism.

4) *Relativistic Issues* – Wormholes, teleportation and warpdrive. What are the observables?

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WEEK SEVEN – Alternative Hypotheses, Quantum Effects and Consciousness

1) *Plasma Life Hypothesis* – Anomalous behavior of certain plasmas in the so called "earthlight phenomenon" (EL), and the hypothesis of "plasma life forms" and the possibility of some form of non-biological intelligence.

2) *Intelligent EL Hypothesis* – Possible quantum effects in EL phenomenology. Introduction to Bohmian quantum mechanics and to the Penrose-Hameroff quantum theory of the emergence of consciousness in the brain. Discussion of the hypothesis that some plasmas could behave like the brain.

3) *Controlled Interaction* – A scientific experiment to test a possible interaction between a EL/UAP phenomenon and the human brain.

4) *Consciousness* – How can human consciousness influence the occurrence of certain phenomena and vice versa? Persinger's theory and the importance to know how EM fields are able to affect human consciousness at the same time in which strange phenomena are seen. The role of the witness.

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Week 8 – Scientific Sky Watching

1) *Sources of Noise simulating a UAP* – Optical aberrations from cameras, manmade devices with strange manifestations, faked photos, “orbs” due to insects, snowflakes and dust, lens flare, shape of camera diaphragm, natural effects seen on FLIR, weather balloons.

2) *Field Measurements* – How to carry out elementary but analytic measurements of anomalous atmospheric phenomena using off-the-shelf measurement instruments, with particular interest for photography, video, low-resolution spectroscopy, magnetometry, VLF and UHF electromagnetic recording: acquisition and software techniques.

3) *Monitoring the Sky* – Using the Sky360 and UFODAP portable stations. Which useful information can be obtained for scientific goals?

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"Trifield": https://www.trifield.com/

UFO Camera Tracking Network, website: https://www.facebook.com/profile.php?id=100064249230121&paipv=0&eav=AfZaJxvb6gY1r54IPk40K2HcO00R-dyQ98sK5_C8fnIDOX6P3sTcgCL6pBhkKmGc8aI

UFODAP, website: https://ufodap.com/

"Weather Balloon Sightings": https://sky-lights.org/2008/03/08/weather-balloon-sighting/