

**Technical Commission  
3AF - SIGMA2**



**SIGMA2 Work progress summary  
2021**



**« Because it is more difficult to break down a prejudice than an atom »**

**Albert Einstein**

Theoretical physicist, inventor of the theory of Relativity (20th century)

**« And the Astronomers, who, by measuring the size of the stars, find them much larger than the Earth, also confirm it: for if, from the indefinite extent of the world, we infer that there must be inhabitants elsewhere than 'in the Earth, it can also be inferred from the extent that all the Astronomers attribute to it; because there is no one who does not judge that the Earth is smaller in the eyes of all Heaven, than n 'is a grain of sand in the face of a mountain. » (Letter to Chanut of June 6, 1647)**

**René Descartes**

French mathematician, physicist and philosopher (17th century)

**« Science has the good fortune and the modesty to know that it is in the provisional, to move the frontiers of the unknown and to move forward »**

**Marc Augé**

French ethnologist and anthropologist (20th-21st century)



## Acknowledgments

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We would like to add our thanks to Mr. Alain Boudier (chairman of the PAN Commission then SIGMA) and to Dr. Khoa Dang Tran who left a number of technical notes which also contribute to the richness of this report.

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## Summary Work progress Report SIGMA 2

### Introduction

Dr Paul Kuentzmann summarized in two quotes made at the beginning (Albert Einstein and Marc Augé) the principles of exploration of new, unknown subjects, such as UAP by combining audacity and prudence, perseverance and modesty in the face of the difficulties encountered in terms of Scientific procedure. Indeed, prejudices or incredulity, skepticism oppose curiosity in the face of the unknown, and the absence of sufficient data is also one of the difficulties in moving from simple observation to knowledge, transforming **Facts**, in **Hypotheses**, then in **Laws** and finally in **Theories**.

As a preamble to our work, Dr Paul Kuentzmann recalled its definition, which is a good introduction to the subject. We will leave it to each reader to assess the state of the art of the subject UAP as seen from SIGMA2 on the knowledge scale. We will express our vision for today in the conclusion.

**FACT:** Observation repeatedly confirmed and considered "true"; however, scientific truth is never "final".

**HYPOTHESIS:** Assertion test leading to deductions that can be tested; the more the deductions are verified, the more "correct" the hypothesis becomes.

**LAW:** Descriptive generalization of how a certain aspect of the natural world behaves under given circumstances.

**THEORY:** Sustained explanation regarding a certain aspect of the natural world, which may incorporate facts, laws and tested hypotheses.

### Mandate

The role of the SIGMA2 commission is to modestly follow this logic by bringing together factual elements, by comparing hypotheses to try to characterize these phenomena, by confronting them with the laws of physics and the theories of standard science, while questioning themselves on new theories, a subject barely sketched out.

SIGMA 2 Commission has been mandated in 2013 to conduct technical and scientific investigation on UAP cases and adopted the following approach

1. Undertake desk research and the creation of a database for investigation of data and documents whose authenticity has been established and quality assessed.
2. Build a scientific and technical network with first, building links with recognized institutions in the field of UAP, starting with CNES-GEIPAN<sup>1</sup>.
3. Establish a selection of case studies from available databases to conduct technical investigations.
4. Initiate a reflection on the physical manifestations of these phenomena and their

<sup>1</sup> The Group for Study and Information on Unidentified Aerospace Phenomena of the *Centre National d'Etudes Spatiales* (National Centre for Spatial Studies)



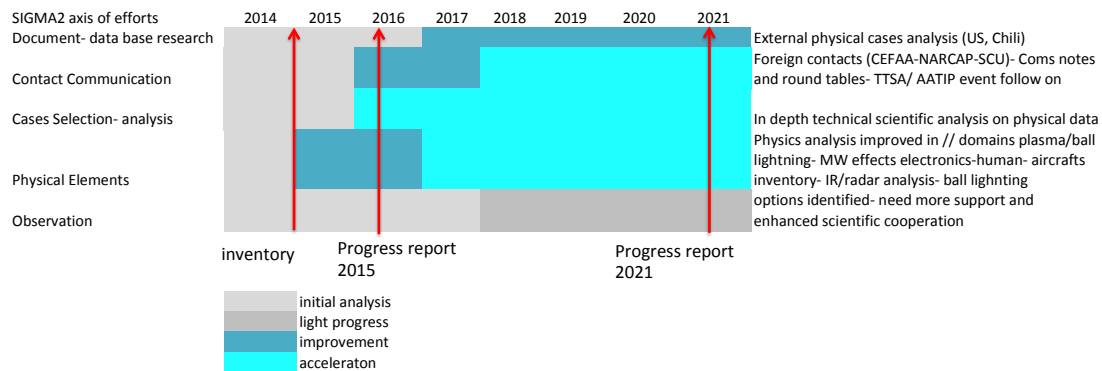
links with the physical sciences.

5. Establish an inventory of the means and techniques of observation and, starting from a physical analysis, make recommendations on the improvement of observation techniques.

SIGMA2 worked on these five axes on the UAP in France and outside France following an initial two-year schedule (2014-2015) which resulted in a first progress report issued in early 2016. It had the first exchanges of analyzes technical, in particular with the Chilean CEFAA, but also with the NARCAP US and the SCU US<sup>2</sup>.

Work continued over the 2016-2021 period with the drafting of specific reports, one in 2017 on the Cougar Chilean case, the other in early 2018 in the form of a note concerning the disclosure of the American AATIP (Advanced Air Threat Investigation Program) and infrared videos taken by US Navy F18s. These two documents have been made freely available on the 3AF CT SIGMA2 site.

This progress report builds on the 2015 report with a particular focus on contact development, data and report research, in-depth case study (especially data from Chile, or the USA , as well as the cross-checking of old cases with electromagnetic effects), and the study of physical phenomena.



### Methodology for a documentation and database

An inventory of the databases, French and foreign, has been established as well as a document assessment methodology relating to cases of UAP but also to research in this area, particularly in the USA, Great Britain and in Eastern Europe countries.

Researches has also been carried out on official documents tracing contacts on the UAP subject at the UN in the late 60's, and then in 1978 with the decision 33/426 for international cooperation and data sharing, that have never been materialized. This decision was actually neutralized and turned into an incentive to nations to conduct their own research and to inform the General Secretary of the collected data.

The publication of archives previously classified by many countries in the course of the 2000s might answer this incentive.

<sup>2</sup> Scientific Coalition for UFO



A methodology has been established to provide a systematic classification with an assessment of the reference documents used in our work. A computerized documentary basis for its transfer to 3AF was drafted. It is being enriched not only from the GEIPAN archives but also from some official document databases available. In particular, the research on old cases is very useful, especially exploring the Blue Book US report, but also the UK MoD (Ministry Of Defense) report on UAPs, such as the Russian case and research account.

Regarding French data, SIGMA2 identified the origin of the surveys on UAP in France. They date back to 1951 with the opening of the MOC (Mysterious Celestial Objects) file by the Air Force Scientific Research Office, followed in 1954 by Ministerial Directive 267 / EMFA / A / BS / DR on MOCs. . The study of the archives of the Historical Service of Defense (Gendarmerie archive fund on the NAPs) also presents a means of researching information on past cases.

On the American side, the UAP subject has been evolving since 2017, even since 2016 if we take into account the dissemination of CIA archives. These also demonstrate a follow-up of the UAP subject long after the closure of the US Air Force's Blue Book files in 1969, as we had already recalled in the 2015 progress report.

This is a hot topic that may portend a much wider impact on research after the Pentagon's UAP report is delivered to Congress, due in June 2021. The full SIGMA2 2021 progress report is scheduled for the same period.

The revelations made at the end of 2017 by former Pentagon officials on the AATIP (Advanced Air Threat Investigation Program) research program carried out by the DIA (Defense Intelligence Agency) and the USDI (Under Secretariat for Defense and Intelligence)<sup>3</sup>, have been confirmed by the Pentagon. In 2019, this recognizes the existence of AATIP research by the DIA on exotic technologies (meta-materials, invisibility, magneto-hydrodynamics, warp-drive, EM effects of UAPs on humans, etc.). It also attests to the authenticity of the UAP IR videos broadcast in 2017 and 2018<sup>4</sup> but also to recent testimonies from US Navy pilots who have made repeated observations since 2014, with supporting photos (see Figures 1 to 4 below).

A Task Force on UAPs (UAPTF) was created by the Pentagon at the request of the Congress Intelligence Committee in August 2020. Its objective is to gather all the available elements on the UAP, then to submit a report to Congress in June. 2021.

The communication policy of the USA on the UAPs therefore knows a strong inflection<sup>5</sup> and could lead to revelations on the nature of the UAP or UFO which escape current scientific knowledge, according to the statements even of former directors of the American intelligence, like R. James Woolsey<sup>6</sup> ex director of the CIA. We hope that new databases will eventually be made available, the possibility of scientific cooperation having been mentioned. For the moment photos are leaking on the internet, and the Pentagon confirms their authenticity<sup>7</sup> without comment.

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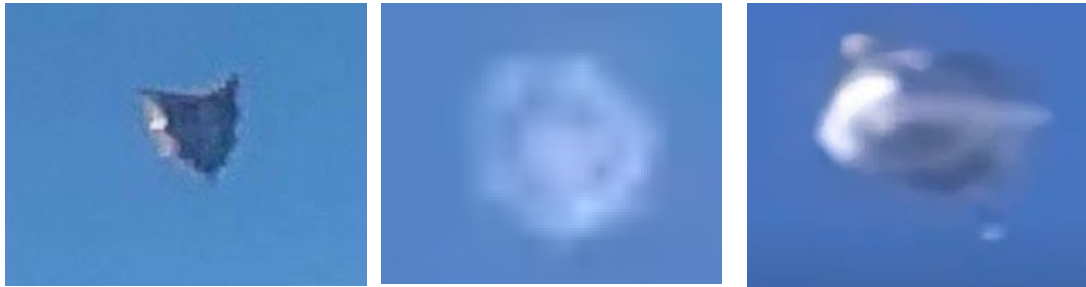
3 Organizations attached to the Secretary of US Department of Defense

4 <https://www.defense.gov/Newsroom/Releases/Release/Article/2165713/statement-by-the-department-of-defense-on-the-release-of-historical-navy-videos/>

5 <https://www.newyorker.com/magazine/2021/05/10/how-the-pentagon-started-taking-ufos-seriously>

6 [https://nypost.com/2021/04/06/former-cia-director-says-he-believes-ufos-could-exist-report/amp/?\\_twitter\\_impession=true](https://nypost.com/2021/04/06/former-cia-director-says-he-believes-ufos-could-exist-report/amp/?_twitter_impession=true)

7 <https://www.theblackvault.com/documentarchive/pentagon-confirms-recent-uap-ufo-leaks-as-genuine/>



«acorn»

«sphere»

«metal blimp»

Figures 1-2-3

Photos taken by F/A-18 Hornet (US Navy) pilots off shore Oceana (04/03/2019)



Figure 4 «pyramid »

These photos show various shapes which confirm the diversity of shapes observed and even the change in shape of UAP (called polymorphism), reported by American observations as well as British, Russian or French research (see Figures 5, 6 and 7).

However, at the end of 2017<sup>8</sup>, SIGMA2 questioned itself on the 3AF / SIGMA2 site about this shift in American communication policy and its purpose. Was it the work of private groups? What was the position of the US administration? It arises in a complex international strategic environment, where we observe a rivalry evoked in the United States with Russia and China, for example in the field of hypersonic missiles and other technologies.

The subject posed is that of incursions into American skies, an asserted security subject which has been a sensitive subject since 9/11, with regard to what? Are these completely unknown phenomena, are they foreign incursions? Is the aim pursued to bring to light the data and realities on the UAP? Is it a question of reinforcing defense credits on certain themes? Is it to consider information sharing (database) and wider cooperation on UAP, which would be new in the current climate.

On June 3, 2021, the NY Times published an article<sup>9</sup> after reading the UAPTF report to Congress, titled: "U.S. Finds No Evidence of Alien Technology in Flying Objects, but Can't Rule It Out, Either." In other words: cases of UAP or unidentified objects are cited, 120 cases over the last two years.

No evidence is given of technologies of "extra-terrestrial" origin, ie confirming the Extra-Terrestrial Hypothesis (ETH); but we cannot rule out this "ETH" hypothesis because of the abnormal behavior of these objects. No further mention is made at this stage,

<sup>8</sup> <https://www.3af.fr/news/3af-sigma2-comments-on-aatip-vf2-eng-1577>

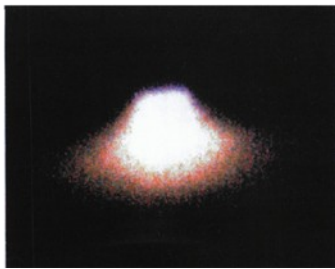
<sup>9</sup> <https://www.nytimes.com/2021/06/03/us/politics/ufos-sighting-alien-spacecraft-pentagon>



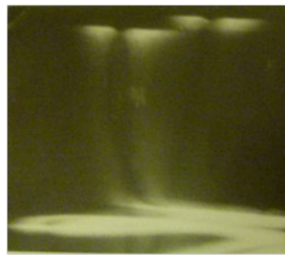
acknowledging that classified, therefore undisclosed, data exists in appendices to the report.

The questions about incursions by Chinese or Russian devices are still being asked. But at the same time, the observation is drawn up of a kinematic behavior (brutal speeds and accelerations) inexplicable by known technologies, as well as the change of air-sea environment without interaction with the environment (absence of aerodynamic and acoustic effects. , ..).

We can therefore conclude, after three years of questioning US communication, to a new fact. The report doubly contradicts the conclusions of the Condon report of 1969. The security of airspace is questioned by unexplained incursions and beyond the technologies mastered by the United States. The origin of phenomena does not refer to natural phenomena.

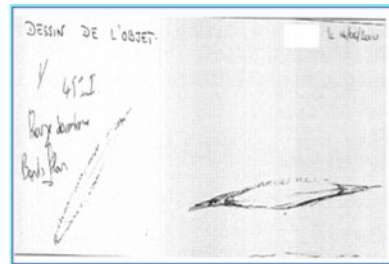


**Figure 5 - Photo of a disk shape from MOD UK Report on UAP**



**Figure 6- 1975- North of France –Revigny**

Two red-orange objects are photographed, first static for 20 to 30 seconds then in motion, following an S-shaped trajectory before disappearing.



**Figure 7 – Observation and drawing of an UAP by an Air France crew (Flight AF3532 Nice-London) in 1994**

Our work also focused on the UK MoD report on UAP's presence in UK airspace. This remarkable report, summarizing 20 years of research on UAP, confirms their existence without any doubt, their polymorphism and their astonishing kinematics: hovering, instantaneous accelerations, apparent absence of inertia. The work concludes that there are no proven risks, particularly for air traffic and defense, by emphasizing the possible origin of these phenomena in connection with atmospheric plasmas of natural origin. Artificial origin linked either to confidential devices or to a "HET" origin is considered unlikely. Physiological effects associated with close encounters with UAP are also described. Some interesting cases are discussed in the report and are described, including the observation of a craft surrounded by blue radiation, from RAF Tornados planes flying over the Channel, as numerous and diverse observations were recorded over French territory on November 5, 1990.

Russian studies over the period 1950-1990 show a peak in research in the period 1970-1986 with a civilian program (SETKA-AN) for the study of phenomena called "anomalies" and a military program (SETKA-MO) for defense work concerning the



sensitivity of defense systems to these phenomena or the use of research for the purpose of military technological fallout. Among the military works, the role of the Soviet navy seems to have been important in view of the very numerous observations of flying or aquatic objects (nicknamed Quakers) brought together by their reinforced observation network between 1977 and 1980. Cases of material collection with particular properties are also mentioned on certain sites such as Dalnegorsk. This work seems to have stopped or to have been greatly slowed down after 1990. What about today?

We have not investigated Chinese work so far, but we have noted in the archives published by the American CIA, meetings between Russian and Chinese experts in the early 1990s and the holding of symposia with the research environment around 1994. In addition, the Chinese research sector publishes numerous publications on related subjects such as ball lightning, meta-materials, etc. China is also developing technologies for space vehicles, missiles and efficient drones.

As a response to American questions, the People's Republic of China (PRC) responds to the Pentagon's report on UAPs, with a statement<sup>10</sup> relating a similar observation of regular incursions into Chinese airspace, acknowledging that this poses a security problem. The same observation is made of extraordinary kinematics for these "abnormal" atmospheric phenomena. The work carried out by a similar UAP Task Force, bringing together the academic research community with the armed forces of the PRC, refers to studies of UAP event recovery from analyzes of "weak signals" type Bigdata assisted by Artificial intelligence. It is also an important factor of change. The observation is therefore shared.

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<sup>10</sup> <https://thedebrief.org/china-confirms-it-has-its-own-ufo-task-force/>



## Contacts and Communication

Many contacts have been established to, firstly, collect data on UAP's cases and, secondly, to build a scientific and technical network.

These contacts have been primarily made with CNES / GEIPAN, with which a cooperation started since late 2013 to deepen unexplained French cases (cases D category), and to investigate new cases. The complementarity of roles between CNES / GEIPAN – French official in charge of the UAPs– and SIGMA2 – technical commission of 3AF – has been clarified.

Furthermore, SIGMA2 took further contacts in France, particularly with the French Air and Space Force (CDAOA<sup>11</sup>), which led to a visit at the CNOA Air Operation and Cosmos Centers<sup>12</sup> in Lyon Mont Verdun French Air Force base in July 2015. It allowed to a better understanding of the missions and resources of CNOA and moreover to discuss the principles of cooperation with GEIPAN. These steps will be refined in the future as UAP's cases arise. Furthermore preliminary contacts were made with the Service Historique de la Défense (SHD), as part of a joint approach with the GEIPAN concerning research on defense archives before GEIPAN foundation.

In terms of means of observations, SIGMA2 recently contacted the IMCCE (Institute of Celestial Mechanics and Ephemeris Calculation of the Paris Observatory). The IMCCE is in charge of the deployment of FRIPON<sup>13</sup> network (over hundred dedicated cameras networked with HF receivers) and interesting SIGMA2 and GEIPAN as an additional means for observing UAPs to complement the conventional Air Traffic Control (ATC) and Air Defence capabilities. Initiatives will be taken for data gathering from scientific networks. Initiatives have been taken with the IMCCE to study a project (Trillian) aiming to improve the use of data from scientific networks of the Fripon type, by establishing detection classes distinguishing, for example, meteorites from TLE (Transient Luminous Event) phenomena. ), ball lightning or UAP. Efforts should be made to develop such treatments with the help of researchers.

Concerning abroad contacts, a technical cooperation agreement has been concluded with the Chilean CEFAA<sup>14</sup> in 2013, followed by a meeting in Paris at the end of 2014, then a study of the Cougar case (between 2015 and 2017 - see Figures 8 to 11). Another agreement was prepared with the American NARCAP in 2015. These two organizations, one official, the other associative, bring together technical capacities and carry out scientific case studies. SIGMA2 was also contacted by another American scientific group, the SCU (Scientific Coalition for UFO), for a case study (Aguadilla case - see Figures 12 to 15). SIGMA2 met during a meeting at CNES in 2017, the CEFAE (Center for the Study of Aerospace Phenomena), an institutional body dependent on the Argentine Air Force. The CEFAE became in 2019 the CIAE (Aerospace Identification Center), attached to a higher level within the General Staff of the Argentine Air Force. The CIAE is equipped with the IPACO image analysis software, provided by the IPACO team of Dr F. Louange.

<sup>11</sup> Air Defence and Air Operations Command

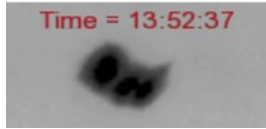
<sup>12</sup> Center dedicated to Space Operations for the CDAOA (Command for Air Defence and Air Operations)

<sup>13</sup> Fireball Recovery and InterPlanetary Observation Network

<sup>14</sup> Studies of Anomalous Aerial Phenomena Committee (*Comité de Estudios de Fenómenos Aéreos Anómalos*)



Communications were published in the 3AF Letter<sup>15</sup> as well as position papers on the 3AF / SIGMA2 website. This includes a situation update on the disclosure of the AATIP program and IR videos by TTSA (early 2018)<sup>16</sup>, the analysis of the Cougar case (2017) for which 3AF / SIGMA2 contributed to the identification of the Airbus A340 of Iberia in 2017<sup>17</sup>, not to be confused with a UFO. The techniques for radar and IR analysis of UAP were explained in the 3AF Letter article titled IR and Radar Cross-views on UAP<sup>18</sup>.



**Figure 8: Cougar case- IR ¾ rear view of the plane in turn – 3 hot spots**



**Figure 9: Cougar case- IR full rear sector view- 2 hot spots seen**



**Figure 10: Cougar case- Rear sector IR view- exhaust condensation trail (altitude 9000 m)**



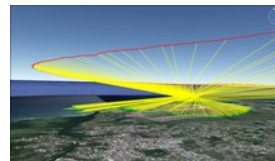
**Figure 11: Cougar case- Regional ATC radar picture**



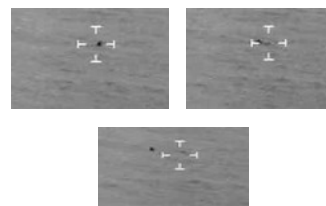
**Figure 12: Aguadilla case: IR FLIR tracking of UAP from Boarder surveillance aircraft**



**Figure 13: Aguadilla case: radar plots- yellow area is the swept from the IR camera Line Of Sight (LOS) in time**



**Figure 14: Aguadilla case- rebuilt possible UAP trajectories cross checked with the LOS**



**Figure 15: Aguadillacase: IR images- flight on sea background- possible ripple of object on the sea waves- apparent immersion and unwinding of objects**

- 15 <http://www.3af.fr/article/en-direct-de-3af/sigma-2>  
<http://www.3af.fr/article/en-direct-de-3af/sigma2-un-mandat-une-structure-un-plan-de-travail-et-d-action>  
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 16 <https://www.3af.fr/news/commentaires-3af-sigma2-sur-le-programme-aatip-vf2-1576>  
 17 <https://www.3af.fr/news/analyse-du-cas-pan-video-ir-gougar-cefaa-mars-2017-travail-collectif-1485>  
 18 [https://www.3af.fr/global/gene/link.php?doc\\_id=4234&fg](https://www.3af.fr/global/gene/link.php?doc_id=4234&fg)



Direct interventions took place: at the symposium on aeronautical mysteries organized by 3AF and Alumni ONERA on the theme “IR-radar cross-views on UAP” (November 2020<sup>19</sup>), during a presentation at INHEST on UAP (November 2019) and during participation in films or televised debates related to the subject UFO / UAP (CNEWS “vent positif” in 2018, UFO: state case, in April 2020<sup>20</sup>, followed by a debate on MaybePlanet; UFO in the « éclairage » show of AGORANEWS Sécurité March 2021<sup>21</sup>).

A round table with GEIPAN (R. Baldacchino) -SIGMA2 (L. Dini) was organized in May 2021 at the initiative of Pascal Fechner on Maybeplanet to explain the complementarity between the GEIPAN (survey, information on the cases of French PAN ) and 3AF / SIGMA2, association for the study of PAN, French and foreign.

SIGMA2 has contacted some protagonists of the US AATIP program and is awaiting the release of the UAP Task Force report while remaining cautious about the meaning of the videos on which we lack information. We are nevertheless impatient and very interested to know the technical details of the preliminary conclusions and the possibility of a US initiative on data sharing and scientific cooperation.

The NY Times press release dated June 3, 2021 reveals the main conclusions of the report and therefore establishes the presence of unknown devices, with behavior beyond known technologies. This observation is supported by data which is not communicated. China has also acknowledged similar findings.

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19 <https://www.youtube.com/watch?v=LoDhtK6UCPA&t=6115s>

20 <https://www.youtube.com/watch?v=-8dIYR0XQgg>

<https://www.amazon.com/Flying-Objects-Senator-Harry-Reid/dp/B08TQM2T4K>

21 <https://www.agoranews-securite.fr/eclairages-les-ovni-phenomenes-aerospatiaux-non-identifies/>



## Case Selection

The SIGMA2 approach established the criteria for finding cases based on the existence of physical data associated with reliable and unexplained UAP observations. Cases were selected from the GEIPAN database but also from the British Ministry of Defense files published since 2008, as from other American archives. Likewise, contacts were made directly with organizations that witnessed UAP phenomena, such as Jersey air traffic control, whose testimonies and radar data were collected for analysis. SIGMA2 was also contacted in 2015 by the SCU to study data from a case of PAN that occurred near the Puerto Rico airport in 2013. Although the cases with physical records available are not very numerous, SIGMA2 tries to concentrate its resources on a few cases with such data. One of the challenges faced by SIGMA2, in addition to accessing physical data, is the ability to render and use computer data for in-depth analysis.

The latter (SCU) provided us with information on the Aguadilla case (Puerto Rico) as well as on a case of EM interference on equipment (smartphone, camera) that occurred in the State of Ontario near the US-Canada border during a close encounter with a UAP. It is analyzed in the SIGMA2 progress report among cases that have occurred with EME effects.

The work of SIGMA2 also details the analyzes of IR and radar cases such as that of the Chilean Cougar, the Aguadilla case of Puerto Rico, and the US Nimitz case. SIGMA2 is, to our knowledge, the only organization to have submitted to the Chilean CEFAA a complete report of radar and IR crossed analyzes in 2017<sup>22</sup> identifying an Airbus A340, thanks to the data made available by the CEFAA ... This does not mean that unidentified UAP do not exist, as the objective of SIGMA2 is not to demystify cases of UAP. On the contrary, we believe that the available data attest to the existence of phenomena that are totally unexplained by their kinematics and their EM radiation. However, we also have objective and rigorous analysis methods with experts that allow the identification of known aircraft.

Regarding the US Nimitz case, we were unable to conduct a study due to lack of data, as an IR video was insufficient without context data or distance measurement. We have made an inventory of technologies studied by the US Navy known to explain, according to some, the IR and radar video recordings of objects moving at high speed. These are, for example, filament plasma lasers or UAVs carrying jammers. According to the available data and our analyzes, these advanced technologies cannot explain the abnormal nature of the kinematics and radiation observed at great distances.

## Physical elements

The work carried out on physical elements first aimed to establish an inventory of physical observations, ie the physical manifestations of phenomena including observations by radar, electromagnetic (interference), optical, acoustic, magnetic, gravitational ... but also on living organisms.

With enhanced skills (naval aeronautics, plasmas, fusion, quantum physics, missiles, drones, biochemistry, acoustic propagation, astrophysics, lightning, directed energy weapons, etc.), in addition to those already present (air defense, optical signatures, IR,

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<sup>22</sup> <https://www.youtube.com/watch?v=LoDhtK6UCPA&t=6115s>



space, medicine, etc.), this report takes stock of physics studies and case analysis abroad (USA, UK, Russia).

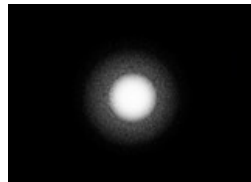
In particular, an analysis was carried out to try to establish a profile of "observables" to characterize the UAPs and to seek, when possible, a correlation between different observations. This approach is currently being applied to the cases identified, in particular the cases with electromagnetic effects (EME) which are discussed below.

Likewise, a summary was drawn up by a doctor part the SIGMA2 commission in order to establish a parallel between certain cases of UAP identified and knowledge on the effects of ionizing radiation or not on living beings. The inventory includes, for example, the effects of microwaves on tissue, heart rate, memory, etc. depending on the types and levels of radiation.

We have also started an inventory of natural phenomena that may explain certain UAP such as plasma phenomena (link with Hessdalen type observations, ball lightning or related phenomena (see Figures 17 to 20), the studies listed in the reports of British Ministry of Defense studies on UAP) but also with reentry phenomena (meteors, reentry of artificial objects) or meteorological phenomena such as lenticular clouds.



**Figure 17: PLOT (Transient Stormy Light Phenomenon happening in the troposphere-ball lightning family)**



**Figure 18: PLOT (Transient Stormy Light Phenomenon happening in the troposphere-ball lightning family)**



**Figure 19: PLOT (Transient Stormy Light Phenomenon happening in the troposphere-ball lightning family)**



**Figure 20: PLOT (Transient Stormy Light Phenomenon happening in the troposphere-ball lightning family)**

The studies also focused on an inventory of cases of UAP (on the ground, aerial) characterized by electromagnetic effects in the USA, Russia and Iran between 1959 and the 1980s. The preliminary results show invariants such as disturbance effects. control electronics, radio communications, or else the emission of bluish-white radiation comparable to plasmas which could also be identified in the inventory of aeronautical cases drawn up by NARCAP US.

These radiating plasmas could be linked to microwave ionization frequencies around 3 GHz, themselves recorded by US ELINT<sup>23</sup> planes on irrefutable UAP cases. These frequencies also are similar to those of microwave weapons and overlap with observed effects on humans. The work also focused not only on the radiation emitted by plasmas but also on their kinematics as well as on technologies such as Magneto Hydro Dynamics (MHD). An inventory has been drawn up to identify IR and acoustic signatures and flying objects that can be confused with UAP, because their advanced technologies equipment: this can be the case with certain micro-drones equipped with micro-turbines or hypersonic missiles. Finally, the report issued by the British MoD on UAP was analyzed and its conclusions compared with those of SIGMA2, in particular on buoying plasmas.

<sup>23</sup> ELINT : ELectronic INTelligence



We also conclude to the possibility of buoying plasmas that exist in the atmosphere, similar to certain types of ball lightning or Earthlights related to seismic activity. However, according to our analyzes, the displacement of these plasmas cannot explain the cases of UAP endowed with high speeds and accelerations, because they cannot a priori exceed the speed of sound, nor follow changes of trajectories at 90 ° or cusps. Only the plasmas accompanying a hypersonic and hyper-maneuvering physical vehicle could explain the supersonic and erratic luminous phenomena, as well as the limited interaction effects with the environment (aerodynamic, hydro-dynamic) if however the machine was capable of it. However, there is no known one capable of going from zero speed to Mach 10 almost instantly.

At the same time, an inventory of the theories of standard physics was carried out as well as an inventory of the exotic propulsion theories which are sometimes mentioned to explain the kinematic and electromagnetic behaviors of UAP likely to be of artificial origin. These theories include in particular MHD, electro-gravitation...

A particular study was carried out on the possible link between the theory of electromagnetism and the general theory of relativity, a link which could lead to imagine a local control of gravity. Indeed, such a theory, if it were demonstrated, could explain certain cases of observation where the gravitational field seems to have been modified and explain an unusual kinematics observed which seems to defy the laws of known physics (inertia, aerodynamics). To date no conclusion can be drawn, except that some observations of UAP are difficult to explain by known natural phenomena. They could be linked to artificial devices whose behavior does not relate to known technologies, even in the case of confidential military devices program, except assuming that these relate to a very advanced physics, unknown, which would be very surprising. These artificial UAP could use unknown propulsion technologies, possibly using a nuclear power source, capable of developing great powers and very high electromagnetic fields. But this is only a hypothesis to explain physical behaviors that do not respect the laws of known physics, nor conventional propulsion technologies.

The first studies by SIGMA2 on the documents identifying the analysis of supposedly recovered materials raise several questions: what are the ejecta of metals in the liquid state? What would their function be? Would they play a role in a propulsion system using nuclear energy? What is the origin and function of complex metallic materials: Mention is made of multilayer materials with amazing properties concerning the reflection of electromagnetic waves, unusual gravitational behavior, high mechanical resistance combined with lightness. These reputed materials discovered decades ago would resemble the meta-materials studied today. These are known to have properties of useful electromagnetic waveguides at very high frequencies or even sensitivity to gravitational waves.





## Observation

We conducted an inventory of aeronautical observation means, civilian and military, that monitor air traffic but also space. Conventional monitoring means offer excellent performance but have limitations inheriting to observation missions of vehicles evolving from very low altitude to high altitude (i.e approximately 100,000ft), except specialized means such as tracking radars or space surveillance; but these are designed for satellites observation that follow Keplerian orbits.

At low altitudes, the increase in air traffic, the emergence of objects such as mini-drones also complicate the task of observing UAP among many objects flying at low altitude and at low speed. In addition, civilian radar resources are increasingly means operating on the principle of secondary radars to follow cooperative objects equipped with a radar transponder. The proliferation of infrared data collection with FLIR-type cameras on PAN cases has in some cases revealed their usefulness, by identifying planes or drones, but also other phenomena. But to be useful, these IR data must be crossed with radar data, unless 3D measurements are instantly available with laser rangefinders, which have proved to be unreliable at a long distance. Observation of UAP is not a taboo for the French Air and Space Force, which has procedures to identify cases and provide the data to GEIPAN, when saved. But the data retention time is limited in time, which requires responsiveness on the part of investigators and possibly an optimization of the feedback loop. The Air and Space Force is open to provide data but many missions to complete and case UAP observed are almost non-existent, so non-priority with respect to numerous air operations daily.

However, additional technologies such as passive radars, but also the observation of meteors networks, as the already mentioned FRIPON network – which implements optical cameras and HF passive receivers networks – suggests that new cases could be identified and recorded, this time with exploitable physical data.

It will be interesting to hear the American experience feedback on observations made by radar and IR cameras since 2004.



## Conclusion and way ahead

The work of the SIGMA2 Commission has progressed on several axes such as the inventory and the case study, the follow-up of international activities, the work on physics, the inventory of advanced machine technologies... Many contacts have been made. Interesting documents have been identified, including work carried out abroad, but cases with indisputable physical data recorded are rare. The use of old cases, in particular EME from data of international but also French origin, allowed interesting comparisons.

However, as explained above, new technologies and means of observation are gradually being deployed and giving rise to hope for new data collection. If unexplained cases with physical data are already identified, no comprehensive explanation has yet been provided by SIGMA2, apart from the identification of certain physical theories, which have yet to be demonstrated.

Nevertheless, SIGMA2 tried to make a preliminary cross-checking between the electromagnetic observables of different phenomena. We compared the radiation emitted by plasmas (bluish radiation from atmospheric nitrogen plasmas) with recordings of electromagnetic signals at 3 GHz (US records). We were also able to observe electromagnetic disturbances on electronic equipment (on the ground or in flight) or even observed the effects induced by microwaves on the natural environment (soil, vegetation) or on humans. These overlaps raise many questions about their origin. Regarding the kinematic behavior of UAPs, brutal accelerations, passage from a stationary position to very high speeds, we conclude that they cannot be explained by plasmas of natural origin, whose speed and accelerations are a priori limited in particular to the speed of sound. The speed of hypersonic movement and its accelerations can be explained if they accompany either a hypersonic mobile, performing brutal accelerations (according to an unknown technology), or by the projection of energy at a distance (like plasma lasers), but whose technological advances do not allow, a priori, the formation of plasmas at distances of several tens or hundreds of km. These findings are only partial and preliminary but constitute a common thread that could intersect with other research, for example on materials and their interactions with high frequency EM radiation.

Far from demonstrating the inconsistency of the cases identified or giving peremptory explanations, this militates in favor of further studies, of intensifying the collection of in situ data, on condition of having an organization capable of storing and to analyze such computer data without which it is illusory to claim to carry out serious analyzes of cases.

The implementation of a documentary database and computer skills tool has been carried out: this is one of the key points for building the documentary base but also for the use of the technical data collected on the cases. Both documentary research and archiving will then have to be intensified.

Likewise, it is necessary to involve physicists in order to compare the analyzed data and the physical hypotheses. The skills of CT SIGMA2 are evolving with the contribution of researchers (plasma, quantum physics, biochemistry, etc.) who have joined it.



Data sharing is an important topic. We can consider two factors of progress:

- on the one hand, the progressive contribution of scientists interested in the study of UAP and associated physics, starting with their interaction with the local environment. This requires data collection. These studies could cross-reference quantum physics, the link with gravitation...
- on the other hand, the evolution of American communication could have a leverage effect on the awareness of the phenomena and the sharing of data unlike the previous situation, local and national research without sharing of information. This remains to be proven.

Assuming increased scientific interest and a willingness to share data, holding an international scientific workshop on type D PAN cases would be desirable. It would allow an exchange of views between scientists, in a limited number, on serious cases identified and studied with physical data, as well as on their interpretation or on observation techniques. This could allow the construction of a real scientific network likely to arouse the interest of a few physicists in the published data and those to come.

3AF and SIGMA2 could contribute to such a workshop in the spirit of the Pocantico UFO evidence seminar organized by Peter Sturrock in 1998.

SIGMA2 reached conclusions in the 2015 report similar to those in the US UAPTF report regarding the unusual kinematics of the objects observed, such as those of the Army of the People's Republic of China. This observation on kinematics has since been reinforced by other characteristics such as electromagnetic emissions at certain frequencies, of artificial origin, which we are discussing. They have been noted in the past by the Americans as well as by the Russians, in their respective reports. But we have not yet noted any recall of these effects, nor knowledge of any intention to share the data. But the shared observation remains a first step.

What would be the information communicated by the USA on the UAPs? Which databases? Would there also be a communication of the same nature from Russia on these phenomena, but also from China? From Israel? Other countries? Would there be a ripple effect? The reaction to the US UAPTF report have started.

To conclude by returning to the questions at the beginning: where are we on knowledge?

We may be past the stage of prejudice or disbelief.  
Are we talking about Facts, Hypotheses, Laws or Theories?

Skepticism could give way to scientific curiosity in the face of the unknown supported from now on established Facts and inventoried Hypotheses.

Do known Laws explain everything? It seems that some cases are beyond known science and may prompt research into extensions of known laws or lead to other discoveries, confirming alternative theories, now qualified as speculative.

To the question do the UAP exist? We leave it to the reader to judge, but the answer is yes, in multiple and even changing forms during observations.

Progress will come from the collection and sharing of data as well as the interest of scientists in confronting the Laws and Theories under study.