

## COVER

First of all, I would like to thank all of you for the amazing work you are doing to a greater understanding of the universe in which we live.

Secondly I have to thank Luca Latronico for inviting me to the Fermi- LAT Spring Collaboration Meeting.

My presence here demonstrates the openness and generosity of your community towards those who do research in other fields.

Being in this auditorium, where the most important scientific discoveries of recent years have been sent to the world is already a great emotion.

I must add to this the moral importance that this event represents: the need to create a bridge between two disciplines and two mindsets apparently distant from each other in a historical period characterized by religious conflicts and geopolitical speculative interests.

I think that our work focuses on the need to transcend the commonplaces, the economic contingencies and the imaginative limits.

I feel We share a healthy attitude that reveals an awareness accustomed to doubt and adaptation, rather than inflexibility and self-celebration.

This important attitude feeds intuition and curiosity, and allows to imagine new connections, to study and experience them with the most suitable “language” at our disposal, or, if necessary, mixing together different grammars.

## DRAGON

The language that I learned about is kind of a Dragon with a head made of quantum gravity,

the claws of Medardo Rosso's sculptures,

the long tail from Lucio Fontana spatialist paintings of the 60s,

the heart of particle physics,

the eyes of multi-messenger cosmology

and the wings inspired by the angels of “la Madonna del parto” by Piero della Francesca.

That’s why I struggle to call myself just visual artist, my research is not only mine and the “grammar” I’m using won’t probably exist forever as I know it today.

Reality does not end with my convictions and with our conventions, is not made only of what I can directly experience, but of much more.

Sensing what is this added value is what prompted me to deepen and diversify my language, to connect the visions of extraordinary people and different research fields.

## STATEMENT

I started by looking at reality through the preferred filter of art, but one day I came across by chance in one of Paul Dirac's phrase that has profoundly changed the way I see things.

The sentence that I'm referring to was actually a Dirac's answer to a question, and the question was: "how do you discover new laws of nature?" and Dirac argued: "playing with equations... Different ways of writing the same equation can suggest a lot of different things even though they are logically equivalent."

I was a student, at that time, at the Academy of Fine Arts of Brera in Milan and I felt that the reflection of a mathematician on his research and his process was perfectly in line with an attitude for a more extensive mood and applicable to different fields of knowledge or, at least, to mine.

Obviously Not being fluent in Math myself , I was not able to see the beauty of Dirac's "formal" work, but I perfectly understood the feeling of having to deal with a wonderful grammar that, at one side has rules, and on the other invites the "player" to transcend them with style, beauty, originality and elegance in order to discover new possibilities implicit in the language itself and, more in general, in our reality.

Dirac was ordering to fight dogmatism with creativity.

He was suggesting that although you get the same result, the process, the form of the equation it might be different.

Even though dissimilar methods are logically equivalent, just by playing with them (and influence them) you might be surprised by new emerging patterns and by new laws of nature. From that moment, I stopped looking at contemporary art such as a closed container.

I became interested in theoretical and experimental physics and I started to think that the concept of “equation” was something that could exceed the limit of mathematics.

A simple drawing realized with a basic tool like a pencil on a sheet of paper can “be” more than just graphite on cellulose, there are many layers of information hidden and overlapped.

I started to see connections between things like “Feynman diagrams” and the ancient practice of drawings based on the idea that everything is a network of nodes, whether it’s shaped by human communities,  
graphite on papers,  
bosons and fermions,  
or all other kinds of unknown interactions.

There is no difference, because at a fundamental level there are no objects in the universe, only relations conditions and degrees of freedom.

When those things change, the “object” decays into another and so on.

It is easy to believe that even a discipline can, in principle, decay into another one and might be happening constantly.

New questions would stimulate new responses and different ways to play with the equation would have unveiled new creative laws.

Basically, from 1865 until 1923 the streams of thought would have probably focused on the following problematics:

What is a field of forces?

How should I describe the dynamics of events with colours and canvases, with wax and bronze?

How a fixed support can describe the velocity of reality?

How should I decide which point of view of my representation is the right one if every of them is relative to his space-time frame of reference?

What's the hierarchical illusion between figure and background?

Is it solvable in painting the impossibility of simultaneity?

How can I transcend the exhausting limit of “dimensionality” related to the obsolete Euclidean conception of a static grid?

During the late-nineteenth century and the early twentieth century the challenge was cogenerated by the discovery of Electromagnetism, Special and General Relativity and Quantum Mechanics.

## DUCHAMP

Considering how Marcel Duchamp's Ready-Made practice might be helpful to see what I mean.

Duchamp's work is incredibly sophisticated but his popular “urinal” it has totally misguided criticism from the real reading and continues to do so today.

Titled “Fountain” and signed by R. Mut was presented in 1917 on “the Blind man review” with the following notation:

“Whether Mr. Mut with his own hands made the fountain or not has no importance.

He chose it.

He took an ordinary article of life, placed it so that its useful significance disappeared under the new title and point of view — created a new thought for that object”.

It was fully exploited by media.

In the eyes of most, it was just a provocative and eccentric artistic act.

With “Fountain” Duchamp is saying that if you change the frame of reference, the object decays and turns into something different.

There’s more, he also worked on another inconceivable idea at the time.

The logic was the following:

If by changing the spatial context I’m able to transform an object, what happens if I change its time coordinates by applying a velocity?

The experiment of this conjecture was his first ready-made, the legendary “Bicycle Wheel” (1913).

Turning the wheel the inherent speed of the spinning but also “stationary” object, changes its size and its appearance from an external point of view.

With this work, Duchamp demonstrates the inseparability of space-time thanks to the phenomenological existence of a new category of “space-time-objects” called “ready-made”.

Works such as “Rotary Demisphere” (1925) and “Rotoreliefs” (1936) are all confirmations and experiments and they turned the conjecture in a precise and mature aesthetic theory .

Moreover “Le Grand Verre”, realized between 1917 and 1923, represents a sort of artistic phase transition between General Relativity and Quantum Mechanics.

It is one of those rare cases where artistic and scientific intuitions are perfectly aligned.

The incubation period of this work, in fact, slightly anticipates Quantum mechanics:

from Niels Bohr “Old quantum theory” (1913)  
via the epochal insight of Max Planck’s quantization of the photon (1925)  
passing through the Schrijdinger equation (1926)  
to Heisenberg’s uncertainty principle (1927),  
everything was roughly presented by Duchamp in 1923.

## ART-PHYSICS - 950

Art and Physics during the twentieth century have attempted to describe how things behave on the macro and micro scale.

To do so they forced our imagination limits.

Incredibly exemplifying the point, General Relativity, along with art related to it, offers the opportunity to connect us with the world of planets and galaxies, with the idea of car trips and space missions, with a new range of phenomena where simultaneity is not allowed and therefore the concept of size and shape loses any kind of absolute reference.

While quantum mechanics, along with art related to it, is able to teleport us in a totally different world, where it is impossible to know at the same time the speed and the position of an object, where everything that happens is probabilistic and where the mere fact of observing reality provokes an inevitable loss of information.

In 2017, we face equally valid and surprising questions as happened in the past.

From the era of the internet and social networks, which aggregate and share our "local" information, we come out with a new ambitious and revolutionary Messaging: Gamma rays, neutrinos, dark matter and gravitational waves will transform our world, such as electromagnetism shocked that one of our grandparents fathers.

Thanks to Multi-messenger astrophysics, probably in a not too distant future, we will be able to expand the understanding of our universe from the current 4% possibly to 100%.

New messengers, new tools, new imaginative challenges and new questions:

Will it be possible to shape dark matter as in the past we have modeled clay?

Will it be possible to work with gravitational waves, as in the past we did with radio waves?

Will the artists of the future be able to apply non-intuitive methods -such as the entanglement - to share information in a creative process?

How it will change the perception of space-time a new possible theory of quantum gravity in the next future?



## BACCHUS

### BACCHUS AND ARIADNE BY TITIAN

I will take a step back and I will try to analyze an artwork by Titian painted between 1520 and 1523.

It's really amazing how this medium sized art-work of the past is able to store a very high quantity of information, activating and updating the various sources contained in the system to this day.

The "Bacchus and Ariadne" is an oil on canvas (176,5 x 191 cm).

The chromatic play between the golden frame and the intense blue of the sky is perhaps the first thing that attracts the eye and invites to a closer analysis.

The second thing is Bacchus himself, depicted in mid-air at the center of the painting, caught in the act of leaping from a chariot drawn by cheetahs, and covered by a red fluttering drape.

We see him jumping fast, with his right foot entirely in the air, while the left one is still leaning on the coach.

He is suspended, but we can feel at the same time his impulse towards Ariadne and the opposed force of gravity that pulls him down.

The opposition of these two powers is very strong and is another attractive factor of the artwork along with the chromatic aspect.

The main character is represented by Titian in accelerated motion.

halfway between heaven and earth.

The time of the scene is frozen, like a movie frame that offers the viewer a distorted temporal parenthesis in which his considerations can BE DEVELOPPED freely as long as he wants.

The time of the two-dimensional space of representation does not coincide with the three-dimensional one of the observer.

On the left side of the scene there is Ariadne, moving as well.

Her right foot almost taken off the ground like Bacchus'.

She turns her back toward us, her chest caught in a rotation, at the same time energetic and delicate.

With her left hand, she holds a red cloth, red as Bacchus'one, while her right hand indicates something far away.

Looking carefully in the direction of her gesture, we can see a boat leaving the harbour in the background, while, on the same trajectory, but much higher in the sky between the clouds, there is a strange elliptical constellation made of nine stars.

On the right side of the painting other characters accompany the deities, forming the procession of the Bacchae: a satyr, a big man wrapped in snakes, a little dog, two graceful women, a faun clutching a cow shin in his right hand, the head of the same cow severed at his feet.

In the background, other characters move in a forest of pine trees.

The geographical location of the meeting is confirmed by the myth survived through the writings of Ovid, Catullus and Philostratus from which we learn that the scene takes place on the Greek island of Naxos.

From the study of these texts, we discover a new complexification of time.

Titian, in fact, overlaps in a single instant two different moments.

The Myth says that Bacchus meets Ariadne twice, the first time just after the departure of Theseus from the island (of whom we see the tiny boat taking off)

and the second time when Bacchus, returning from a trip to India, meets Ariadne again and transforms her crown with nine gems in the nine-star constellation painted over their heads.

From this expedient, we can understand how Titian, representing simultaneously the boat and the constellation, overlaps two different times increasing by an incalculable factor the number of possible interactions between the artwork-device and the active-observer.

Less than two centimeter of pictorial surface tells us about Theseus, without even portraying him. Theseus is there without being seen, thanks to the knowledge of the myth, activated by the sight of a small boat on the horizon, between the clouds of the sky and the waves of the sea.

## Meta-Event 1

The detail of the boat represents a space-time expansion of the system-artwork and establishes the first clear point of the rolling-up of information within the principal event “I”, consisting of the active analysis of Bacchus and Ariadne by Titian from the perspective of an active viewer in the National Gallery in London.

The boat reveals the origin of a parallel narration, Theseus’ story, that the observer is invited to connect to the main scene.

It's up to him to decide whether to follow it or not.

Assuming he is doing that, this is the potential chasm that would open under his feet.

Theseus is the son of Aethra and Egeo (King of Athens).

After spending his youth away from the city with her mother, Theseus had to return to Athens to reclaim his throne.

To do so he would have to be strong enough to lift a huge rock, under which his father Egeus buried for him his sandals, his sword and his shield.

It’s meaningful that Theseus’ travel to Athens had to pass through three manifestations of strength:

1-The victory on gravity (lifting the rock)

2-Winning back the ability to move in space (the sandals)

3-The ability to take a clear direction beyond the probabilistic system (the sword and the shield).

Two directions lead to Athens, one simple and fast (by sea) and one long and dangerous (by land).

Demonstrating full awareness and maturity, the hero decides to go by land along the Saronic Gulf.

We don't see any of this reference in the painting, but everything is in the activated viewer's mind.

The manifestation of a crossroads is exactly what Theseus' boat painted by Titian represents, an alternative direction to the main story (Bacchus and Ariadne's)

which opens towards scenarios distant in space and time and which leads to the story of a man - or a demigod - who found himself at a crossroads as well,

and demonstrated its ability to overcome gravity, to move freely in space, and his willingness to go through the most dangerous roads, in spite of everything, toward fundamental initiation trials.

Before being reconnected to his royal origins and reaching Athens, (not by chance the city of Athena, daughter of Zeus, goddess of wisdom and the Arts), Theseus will then face six other roads, six gates to the underworld.

At each gate, he will have to defeat a demon in the form of a thief or bandit who will teach him

the correct point of view,

the good performance,

the right fit,

the wise objectivity,

the essential confidence,

Eventually leading HIM to a full understanding of the world phenomena.

\_Here Titian appears to identify himself with Theseus, asserting that, just like the hero, he travelled the most dangerous road to reach the full knowledge of the arts.

## Meta-Event 2

To exemplify the way of observation of Theseus' trials I will describe the first one only.

The first antagonist of Theseus is Perifete, a crooked bandit that struggles to walk.

He carries a bronze club that he uses both as a weapon and a crutch.

Perifetes usually attacks his victims at the back when they are already sure of their superiority.

What is this trial about?

Why is it so insidious?

Because it tests the Hero's ability to deal with the illusory nature of reality and the shallow tendency of his mind to follow the usual logic thoughts, prompted by arrogance, superficiality and laziness.

Once again, the work of Titian, introduced by the detail of Theseus' boat, leads the active viewer to another recursive junction, the one experienced by the hero within his cognitive process.

Just like Theseus demonstrates HIS ability to divert his mind and notice the trap, Titian seems to hope that the viewer in front the painting will overcome the same enterprise, noticing that there is more than a simple painting.

This expedient shows how Titian, is using mythology as meta-narration to create a system of hyper-linked analogies.

In fact, the painting becomes further a testbed for the active viewer, who is challenged to look beyond the myth through the myth.

Titian acts in the same way as the active viewer which in turn acts like Theseus, that is to say, a liberator from the illusory processes of the mind, a proactive operator who does not stop at the conventional surface and is moved by doubt and carefulness.

THAT ARE THE basic virtues for the creation of a new judgement that are fundamental to the this vision as the root is for the tree.

Once again, I would like to stress that all this information related to the myth are not visible in the painting, rather, they are all compressed into a small area of 2 cm.

Theseus reaches Athens, where the king his father sees the Sword, the Sandals and the Shield and recognizes him as his firstborn.

Then huge parties are organized throughout the city during which Aegeus kills Androgeus son of King Minos.

This accident creates a fracture of symmetry.

The crime leads to a war that ends with a bloody peace agreement, based on the annual sacrifice of seven Athenians forced to face the trial of the labyrinth and to die killed by the Minotaur.

It is significant that to restore the lost symmetry Theseus goes through a labyrinthine system inhabited by a hybrid being, born from Pasiphaë's deception (wife of Minos) that disguised by Daedalus as a cow, grants the white bull of Poseidon.

Theseus, aware of the state of imbalance, offers himself as a volunteer and ventures into the labyrinth to WIN the Minotaur.

BACK TO EVENT 1

Finally, we are back to what we can see in the painting.

The graceful woman wrapped in the legendary red cloth symbolizing the thread that allowed the hero to escape from labyrinth victorious.

The first clash has occurred and the balance has been restored. At this point, Titian accomplished a narrative jump, and landed on a different orbit facing a new duality.

Ariadne turns her role from restorer of balance to antagonist, she became a clear symbol for determinism —opposed to Bacchus, who instead symbolizes the mysterious world of chaos.



On one side, Ariadne represents the safe route road and the familiar Western world.

On the other side, Bacchus represents the endless dangerous unknown and the exotic lands of the East.

The woman who helped Theseus to exit the labyrinth, now finds herself in the same situation of the Athenian hero — facing another maze of a different kind.

With this recursive trick, Titian transforms the quantic Bacchus into a labyrinth and the Relativist Ariadne into Theseus.

Both updated to another level of complexity, extremely more sophisticated than the previous one.

This time there is no imminent danger, no clear trial to overcome, at this stage of the narration the knowledge is fed by the unknown.

We get the impression that Bacchus is coming from the farthest regions of the deep universe, riding at full speed on his chariot driven by a pair of cheethas on a collision course with Ariadne, coming from her hard knocks.

The point where the interaction will take place is a remote island in the Egean Sea.

Titian seems to state that, suddenly, reality as we know it could disappear before the eye of the active viewer, because the opposite charges of these two characters are about to collide.

### Meta-Event 3

To further explain this, I think there is another very important detail to talk about, related to the act of observing, knowing and recognizing.

Titian depicts another important character: the Laocoon, making a reference to the Eneid by Vergilius.

The poem describes a Seer, high priest of Apollo, in the act of protecting the city of Troy from the deceit of the infamous horse.

Sparking upon himself the wrath of Poseidon who punished him and his sons, killing them with two enormous sea serpents Porcete and Caribea.

I must emphasize that this choice of Titian of placing the sculptural Laocoon Group inside the procession of the Bacchae, isn't obvious at all.

Based on what I said earlier this layered anachronistic process strengthens the warning message about the limited appearance of reality.

Just like the first fake-crooked bandit facing Theseus, or like the deception of Parsife, mother of the Minotaur, the presence of the Laocoon tells about invisibility as a central issue.

The painting's creator (Titian), addressing to the viewer, shifts the focus on what is not seen, as if the vision we are used to was only the beginning.

The artists depict the Laocoon at the age of thirty-nine, and in this way, he speaks of the intellectual and philosophical clamour in Rome in 1506, arose from the discovery of the sculpture of the second Century before Christ.

At that time, the artist Michelangelo and the architect Giuliano da San Gallo were present at the discovery on the Oppian Hill according to the request of Pope Julius; at the moment Titian was only sixteen, a student in the atelier of Bellini in Venice, ready to sustain the powerful revival of Neo-Platonism that such a discovery would fuel all over Europe.

In this detail is probably hidden the very motivation of the artist, triggered by the astonishing event of the discovery of the Laocoon in Rome, which occurred when he was young and still in his most important formative period.

With the depiction of the Laocoon then, Titian is performing the first time-travel in his own personal timeline, evoking memories and moments of his youth in relation to epoch-making events that changed the course of history.

With this reference to the Laocoon, Titian connects his work to Neo-Platonism and recalls the great philosophers of the past like Parmenides and Plotinus, that reformulated the moral guiding principles, based on a formal logic of non-contradiction,

according to which a thought avoids inconsistency when recognizes in itself the truth of being pure.

It is significant that Titian, through this expedient, creates solid similarities between his own identity crisis and the historical crisis of the Roman Empire, even getting to predict the crisis generated by the fracture of the Protestant church that will lead to the Counter-Reformation a few decades later.

Now, Meta Event 4:

Pay attention to the cheetahs that carried Bacchus to meet Ariadne.

The amazing thing is that despite they standing still, Titian depicts the animals caught in the act of doing something else, something that speaks of an extraordinary speed although moving again to another dimension.

Titian represents the cheetahs looking at each other in the eyes, their heads in a slight rotation which create an intense spatiality, although, once again, condensed to a few millimeters.

The same tension can be traced down between the sights of Bacchus and Ariadne in an indefinite region of focus inaccessible to us.

Even if they are still, the cheetahs reach their maximum speed caught in some kind of instantaneous telepathy.

As if they were in a trance, generating and supplying the whole narrative through all its layers.

The sparkle in their eyes is the same as the active viewer's, the same as the hero's in the maze, the same as Ariadne's pointing at the constellation high in the sky above their heads, the same as the Laocoon's who understands, discovers the deceit and tries to break free from the grip of snakes.

This is the central point:

This tension towards the discovery, is the same fundamental principle of the universe, everything is driven by the need to communicate and interact through all layers, with all media, in all times.

This need come straight to the present and is renewed at every active viewer's interaction with the painting.

We start to realize that the 176.5 cm in height and 191 cm wide area of the picture is not only a two-dimensional surface.

This area looks like a multi-dimensional field contained in the holographic system - artwork.

The drifts of these possible interactions are isotropic because they really move in all directions.

Meta-Event 5

Last but not least.

There is one direction that leads to Pentheus, that means literally "He who hides on a pine".

His history is recalled in the painting in two small details, almost invisible and really difficult to relate: a tall pine, whose foliage follow the shapes of the clouds, and a severed cow's head under the same tree.

With some audacity, we can read in this two elements, apparently unrelated, the story found in the tragedy "The Bacchae", written by Euripides around 4 centuries before Christ at the court of the king of Macedonia.

The story says that Pentheus, king of Thebes, after having inherited the throne from his father Cadmus, opposed the introduction in the city of the cult of Bacchus, his cousin, considered completely devoid of rationality.

Once again, the system of forces of the artwork is transformed and further layered, offering to the active viewer an expanded overview of possible interactions, to which a new clash is added.

The clash between Pentheus and Bacchus, where the first doubts of the divine nature of the later.

Bacchus in revenge, with great acuity and forethought, inebriates a group of women, including the mother of Pentheus herself, Agave, and leads them on Mount CITERONE, that with a strange “poli-location” trick, Tiziano materializes on the island of Naxos.

Bacchus then convinces Pentheus to follow and observe the ritual hidden on top of a pine tree, in order to get to know what it was about with his own eyes before judging.

The women find him and cut down the tree on which he was hiding.

Then Agave, the mother, under an uncontrollable excitement, kills him cutting off his head.

In Titian’s painting, it is not clear whether this scene has already taken place or not, if Pentheus is still hidden observing Bacchus that meets Ariadne, or if the tragedy is already fulfilled.

There is no cut down tree, but the harbinger of decapitation can be found in the severed cow head on the ground and from the violent attire of the faun, with his gaze focused straight on the tree branches.

Titian once again seems to increase the tension leaving many possibilities, but above seems to place new questions based on the profound meaning of the act of viewing:

Are we really sure of what we are seeing?

What is rational and what is irrational?

What is the position of the active viewer before the world? Is he within the scene or is observing it from the top of a pine?

These ideas suggest that the very act of viewing and understanding is never neutral. The observation profoundly change the nature of reality.

The latent presence of Pentheus, who can be already dead or still watching the scene, does not change the substance of the matter.

The death of Pentheus is implicit in the act of observing: because in order to see and understand, the information is always consumed or transformed.

So, Titian not only sets the stage in the painting for a profound consideration, but enlarges this stage to reach the active viewer, that like Pentheus, thinks he can observe the scene, protected by the invisible barrier of the golden frame of the picture.

BACK TO EVENT 1

The full analysis of Bacchus and Ariadne by Titian is still far from complete, but it is clear now that the painting is like some sort of balloon that expands and contracts depending on how much breath the active viewer blows inside.

The artwork is composed using multiple sources located in different times and places, each one with its own specificity

and interpretation that remains open.

Somehow, instead of depicting a message, the painting conveys the profound nature of a process transcending the pictorial surface and expands up to the deepest and fundamental universal levels.

In this sense, the picture is not very different from a detector: the artwork does not create the process, but reveals it by breaking it down into narrative, emotional and cultural by-products, emerging naturally in the viewer's consciousness.

In front of this emerging there are only two possible reactions, as Enrico Fermi stated: if the result confirms the hypothesis, then the viewer has just made a measuring; if the result is contrary to the hypothesis, then he is in front of a discovery.