

Faith of Fundamental Science



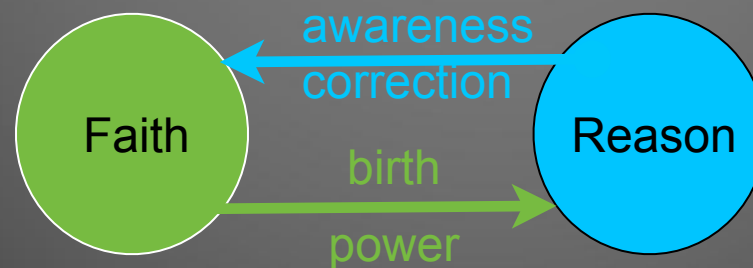
ALEXEY BUROV

Fermilab Society of Philosophy, Feb-Mar 2014

Faith and Reason

- Three approaches to the problem:
 - Reason => Faith ? (Platonism, Natural Theology, Scientific Atheism)
 - Reason || Faith (Complete separation)
 - Reason and faith are vital for each other. Einstein: Faith without reason is blind; reason without faith is lame.

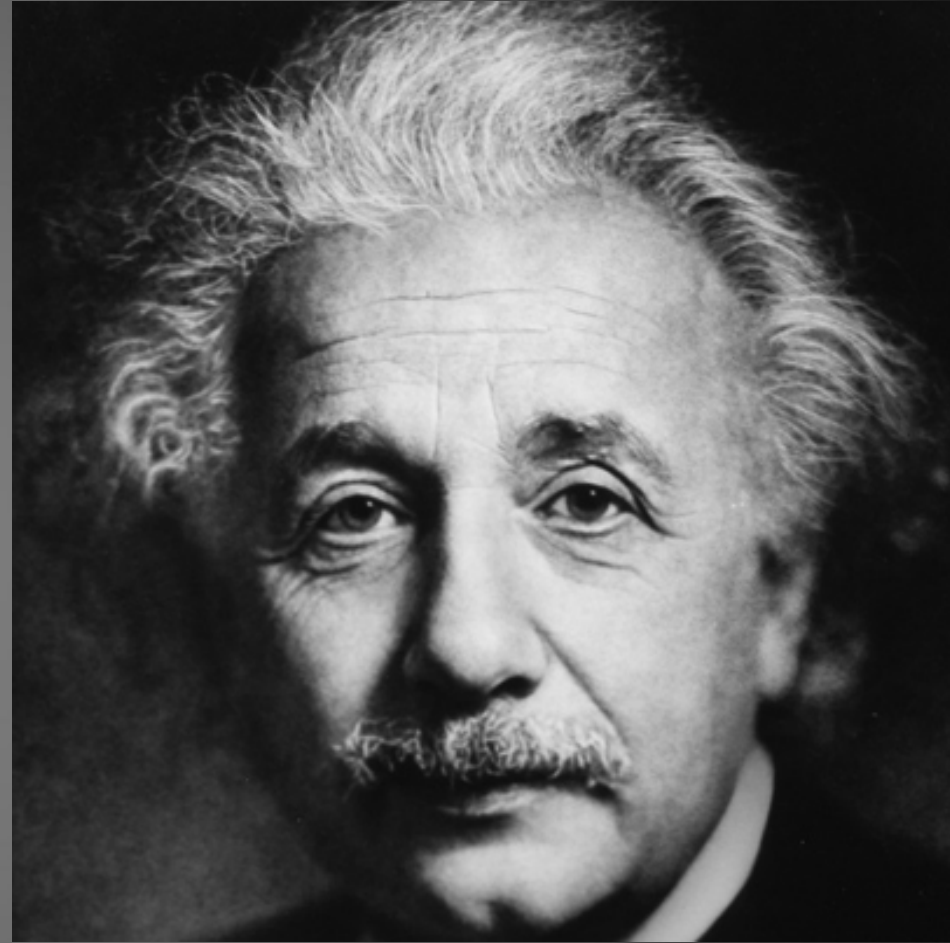
- Thus, according to Einstein, reason is empowered by faith, while faith has to be seen and tested by reason:



- Let's see how does it work for fundamental science. What faith empowered it? Is anything to be corrected in that faith?

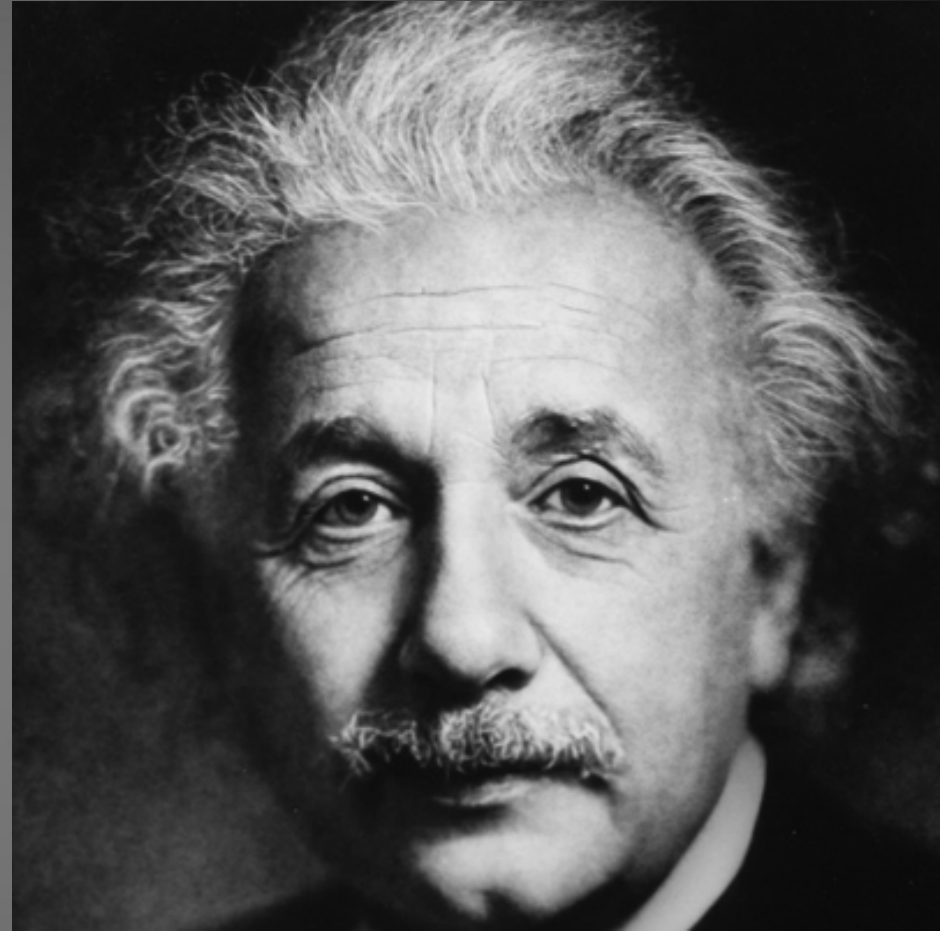
Cosmic Religious Feeling

“I maintain that the cosmic religious feeling is the strongest and noblest motive for scientific research. Only those who realize the immense efforts and, above all, the devotion without which pioneer work in theoretical science cannot be achieved, are able to grasp the strength of the emotion out of which alone such work, remote as it is from the immediate realities of life, can issue. What a deep conviction of the rationality of the universe and what a yearning to understand, were it but a feeble reflection of the mind revealed in this world, Kepler and Newton must have had to enable them to spend years of solitary labor in disentangling the principles of celestial mechanics!



Cosmic Religious Feeling

Those whose acquaintance with scientific research is derived chiefly from its practical results easily develop a completely false notion of the mentality of the men who, surrounded by a skeptical world, have shown the way to kindred spirits scattered wide through the world and through the centuries. Only one who has devoted his life to similar ends can have a vivid realization of what has inspired these men and given them the strength to remain true to their purpose in spite of countless failures. It is **cosmic religious feeling that gives a man such strength**. A contemporary has said, not unjustly, that in this materialistic age of ours the serious scientific workers are the only profoundly religious people.”

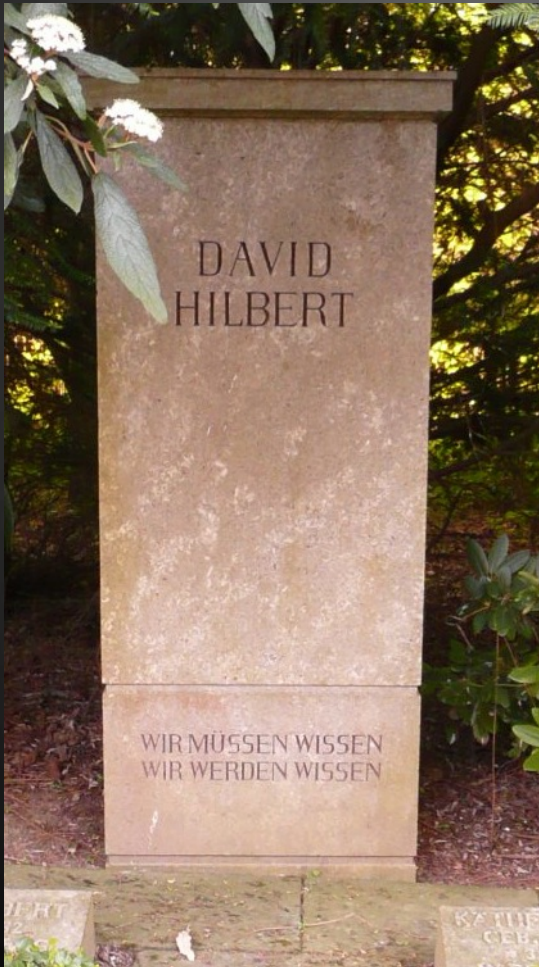
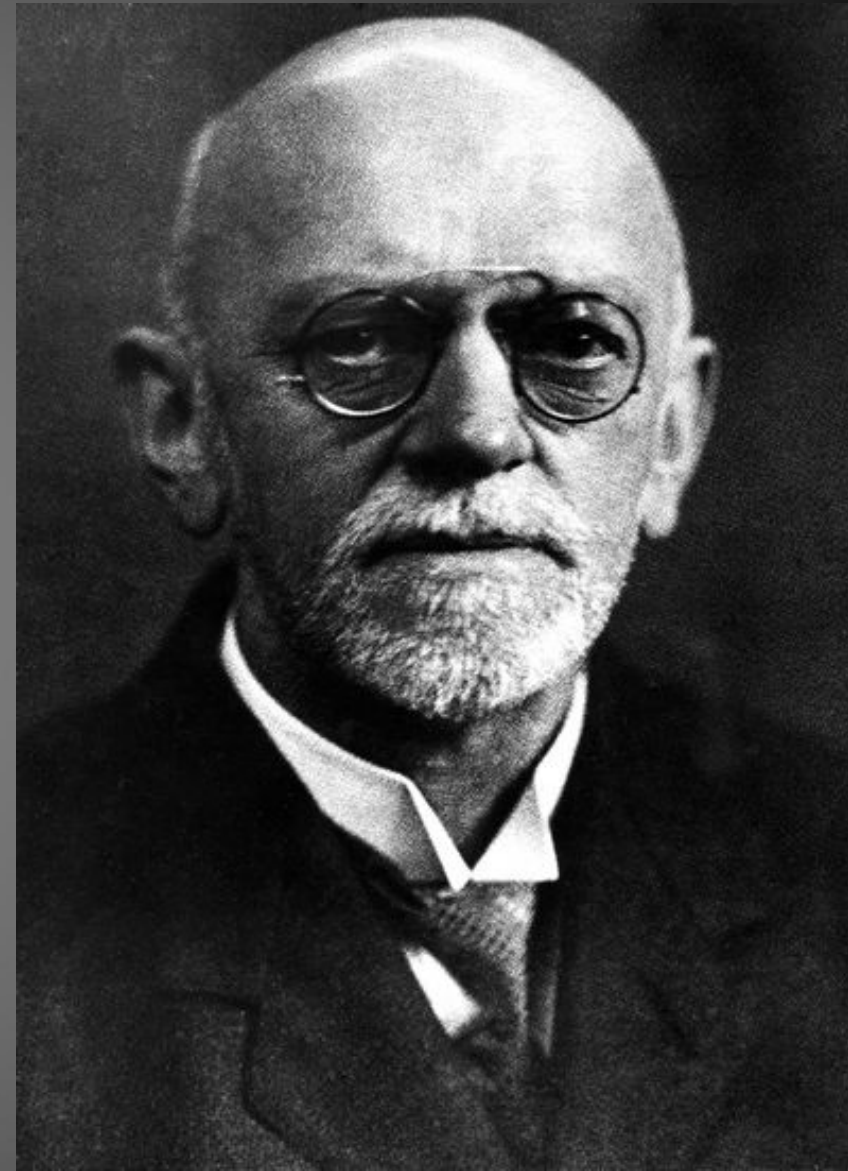


A. Einstein, *Religion and Science*, 1930.

Duty and Prophecy

We must know.
We will know.

D. Hilbert,
Retirement Address, 1930



Martyrdom

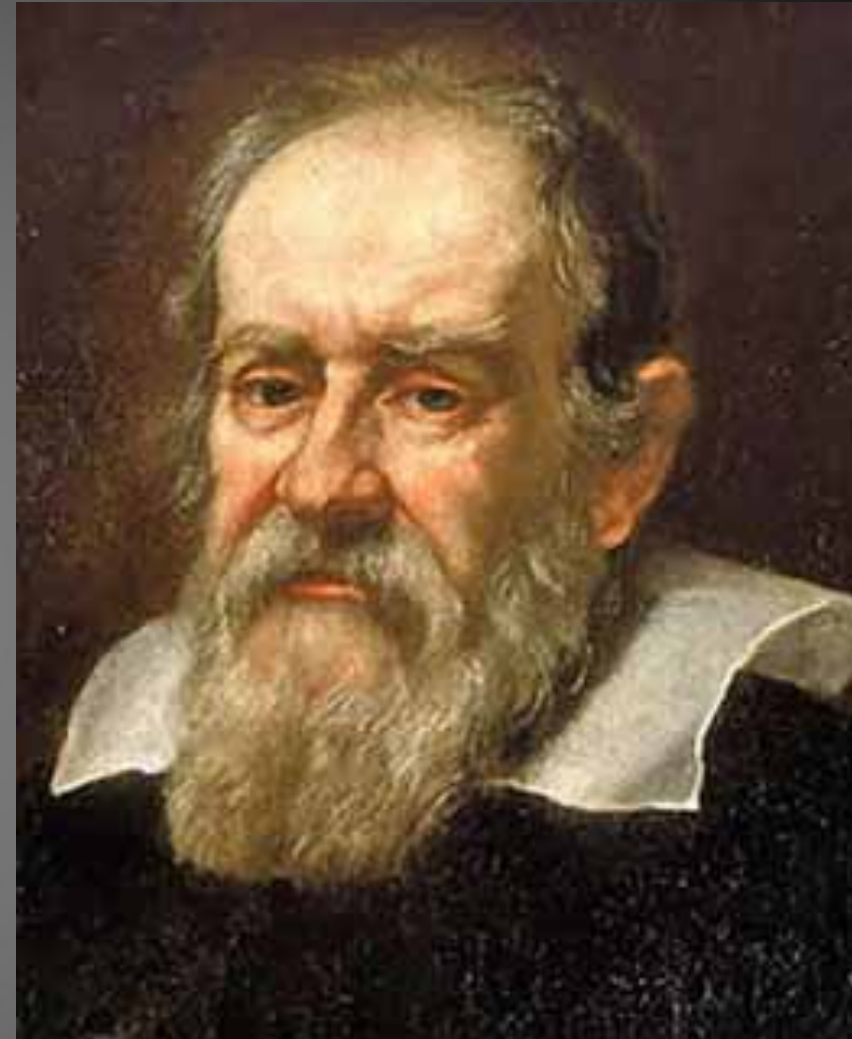
1633:

For his “Dialogue”, Inquisition sentenced Galileo to home arrest, continued until the end of his life, 9 years. All his writings were banned from publication. He lived in his villa in Arcetri, near Florence. Visiting Florence was strictly forbidden for him. He starts working on a book which became his main masterpiece: “Two New Sciences”.

1638:

His health was getting worse; he became completely blind. A permission to travel Florence for medical advises was given. Meanwhile, “Two New Sciences” was published in Holland. As a result, the permission to visit Florence was revoked just after a few months after it was given.

Until his death at 1642: Complete home arrest.

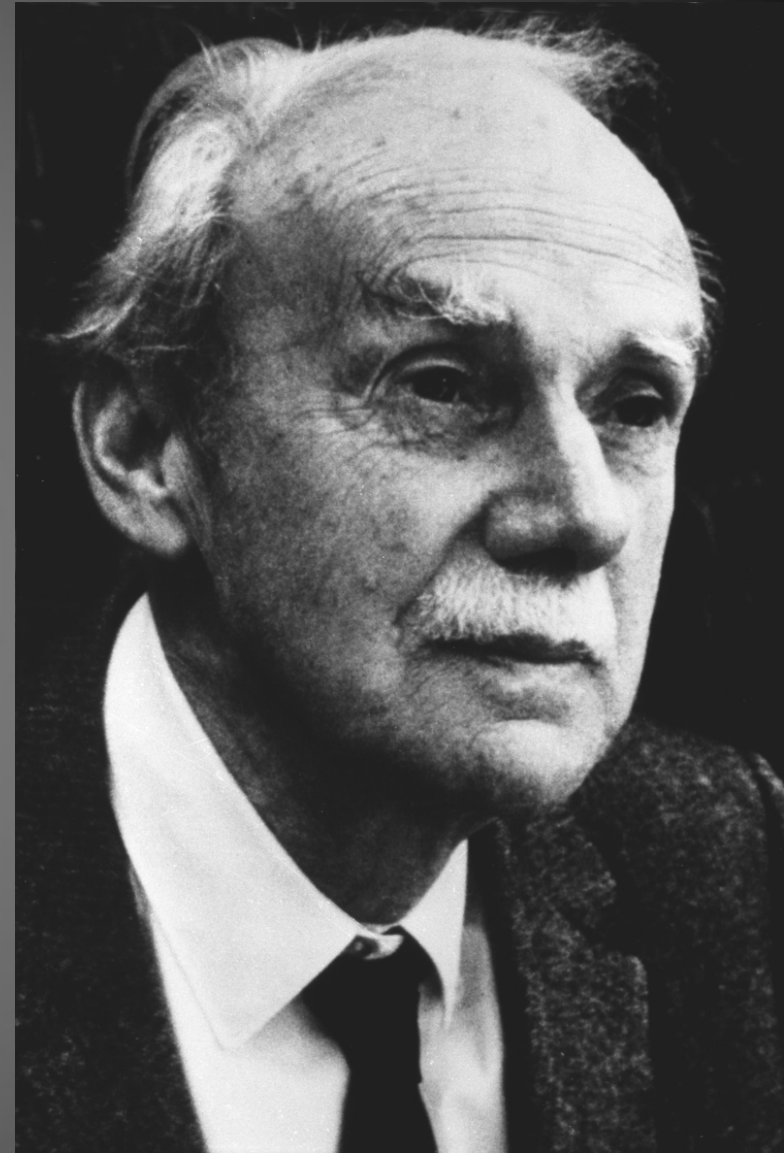


Galilei (1564-1642)

Mystic Experience

“If you are receptive and humble, mathematics will lead you by the hand. Again and again, when I have been at a loss how to proceed, I have just had to wait until I have felt the mathematics lead me by the hand. It has lead me along an unexpected path, a path where new vistas open up, a path leading to new territory, where one can set up a base of operations, from which one can survey the surroundings and plan future progress.”

P.A.M. Dirac, *unpublished note*, 1975.



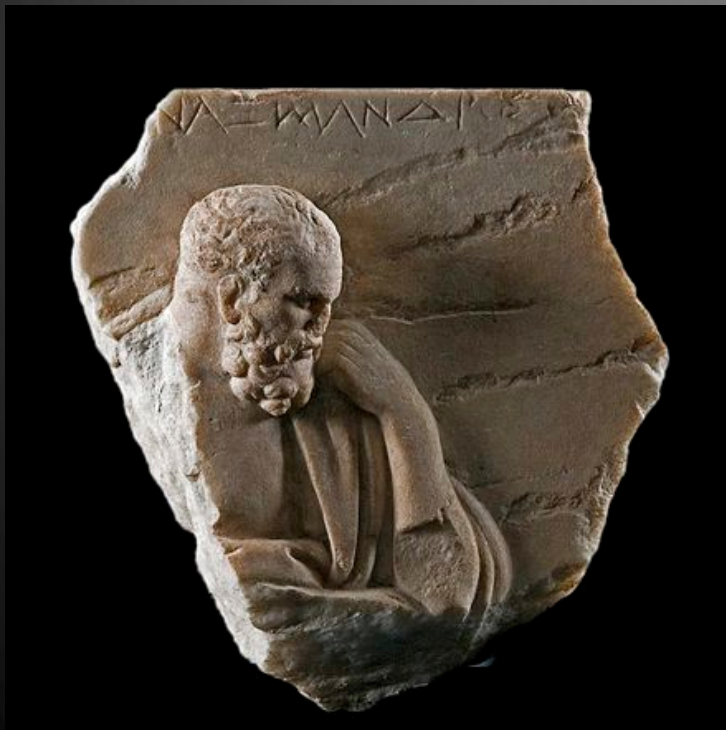
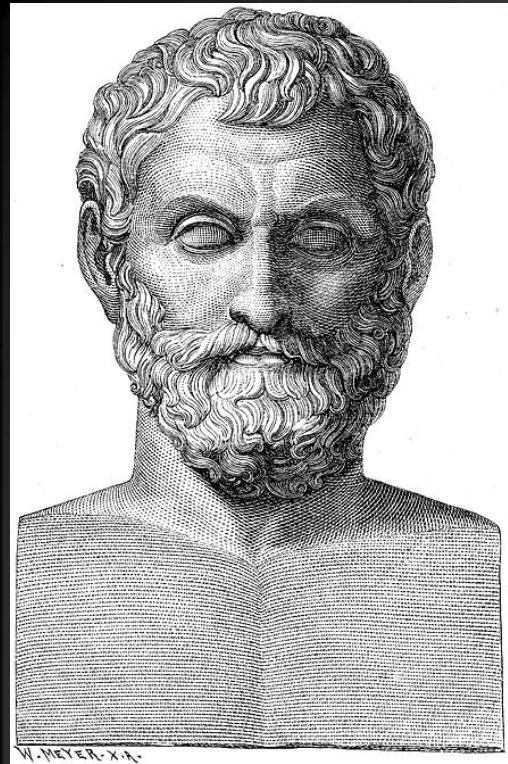
What is a Creed of this faith?

- **Fundamental Physics (FP)** is a long-term human enterprise; starting from **Pythagoras**, a father of theory, it is about **2500** years old.
- Fathers of science of various epochs expressed their faith. Let's hear them, try to understand them and see a source of their inspiration and power of their devotion.
- Let's think and try to formulate universal metaphysical premises of this faith.
- Thus, in our research of the scientific faith we will proceed both historically and logically.

Thales (c.624-546), Anaximander (c.610-546)

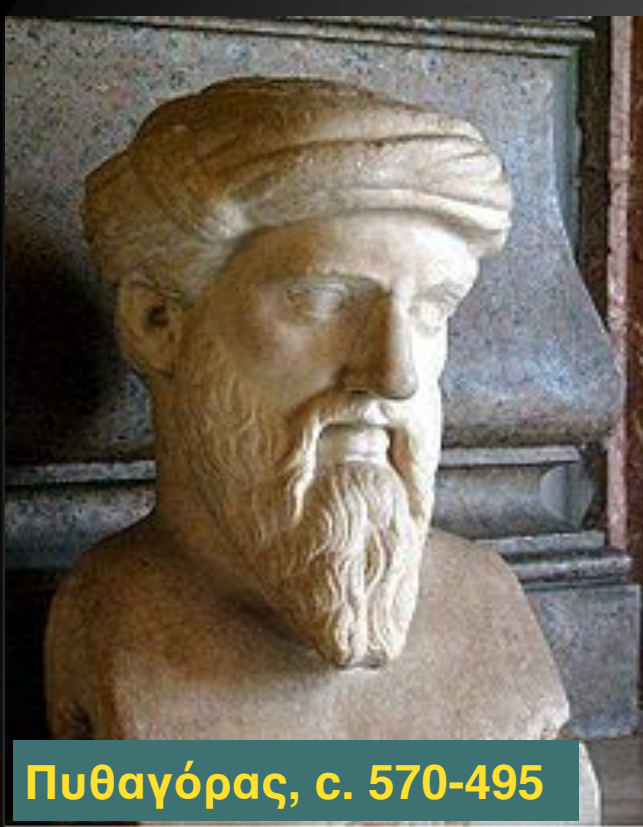
There is a unity of everything existing

Water



Apeiron (unbounded)

Pythagoras



Πυθαγόρας, c. 570-495

- Legendary figure. “The teacher said so”.
- *Stobaeus*: “Things that were alike and of the same kind had no need of **harmony**, but those that were unlike and not of the same kind and of unequal order – it was necessary for such things to have been locked together by harmony, if they are to be held together in an ordered universe.”

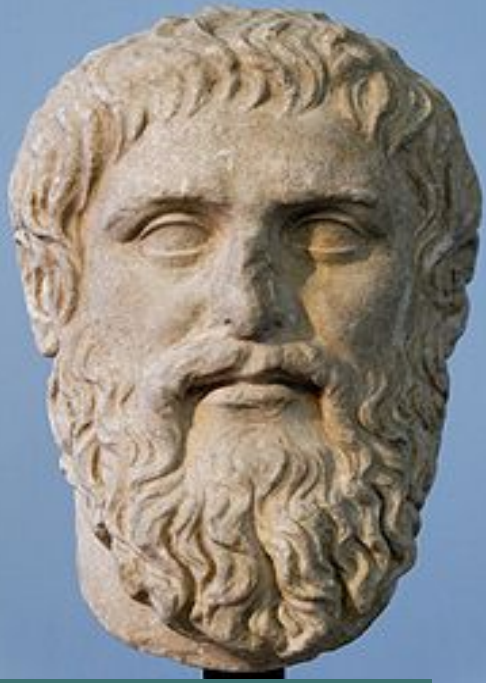
P. introduced: “Harmony”, “Cosmos” (ordered by harmony), “Theory” (theorein, contemplate), “philosophy”, “mathematics” (learning).

Theory as the way of salvation from the wheel of life.

B. Russel on Pythagoras

The combination of mathematics and theology, which began with Pythagoras, characterized religious philosophy in Greece, in the Middle Ages, and in modern times down to Kant. Orphism before Pythagoras was analogous to Asiatic mystery religions. But in Plato, St Augustine, Thomas Aquinas, Descartes, Spinoza, and Leibniz there is an intimate blending of religion and reasoning, of moral aspiration with logical admiration of what is timeless, which comes from Pythagoras, and distinguishes the intellectualized theology of Europe from the more straightforward mysticism of Asia... I do not know of any other man who has been as influential as he was in the sphere of thought. I say this because what appears as Platonism is, when analysed, found to be in essence Pythagoreanism. The whole conception of an eternal world, revealed to the intellect but not to the senses, is derived from him. But for him, Christians would not have thought of Christ as the Word; but for him, theologians would not have sought logical proofs of God and immortality.

Plato, Euclid



Plato teachings on forms and salvation follow Pythagorean philosophy.

Platonic myth about creation of World and Man (“Timaeus”) is close to the Book of Genesis in several essential aspects:

- Monotheism
- Void as a substance of World
- Humans are created in God similarity

Πλάτων, 428-348

● **Euclidian** geometry had nothing to do with practical needs; it was neither motivated by them nor added a single practically important result to what was well-known already for centuries in Egypt and Babylon.

● The goal of **Euclid** was purely spiritual: to see the divine reality of **Logos/Harmony/forms**, hidden under a veil of phenomena.

● “Give him three obols and let go”



Εὐκλείδης, c. 300 BC
(Florence, Bell Tower, XIVc.)

Aristotle (384-322)

World=forms+matter

World is rational and purposeful, led by Mind (Nous) to Good

Human nous is an only part of the souls coming directly from God, not from parents; it is a specific human gift, turning humans to be similar to God.

Since the specific purpose for humans is to think, the best human life is a thinker, philosopher.



Platonism: religion, ethics and science

- **Albinus**, “Schoolbook on Platonic Philosophy”, c. 145 AD:

- “The soul, when it contemplates (*theorein*) the divine and the thoughts of the divine, is said to experience bliss, and this experience is called wisdom, which one could say is nothing else but **assimilation to the divine**.”

And later: “Geometry is also very valuable for knowledge of the **Good**, provided one does not study it for practical ends but uses it to ascend towards what always is, not wasting time with what comes to be and passes away.”

- Ancient fundamental science was contemplative (theoretical). It was assumed that there is a single reasonable way for things to be; hence, the philosopher is able to see truth by pure *theorein* - following contemplation of his divine soul.

- **Platonic science, ethics and religion combined a single entity.**

Summary on ancient rationalism

- The visible world is underpinned by perfect structure of divine Thought (Harmony, Logos, Forms), atemporal and absolute, as integer numbers. This is the true Being, thoughts of the absolute Mind (Nous).
- Everything nebulous and ambiguous is due to non-being (me-on), or chaos, or matter or nothingness which enters as a “second parent” of the world, or “the receptacle, and as it were the nurse, of all Becoming” (Plato, “Timaeus”). The physical world is then a fluctuating shadow, or rough copy of the true being, the world of forms.
- Humans are divine souls/minds inside physical bodies. Thanks to our divinity, we are able to dis-cover the truth (αλήθεια) and to contemplate it (theorein), which is our destiny or the way of salvation.
- Platonism, mathematics and experiments.
- Aristoteles vs Plato

Summary on ancient rationalism

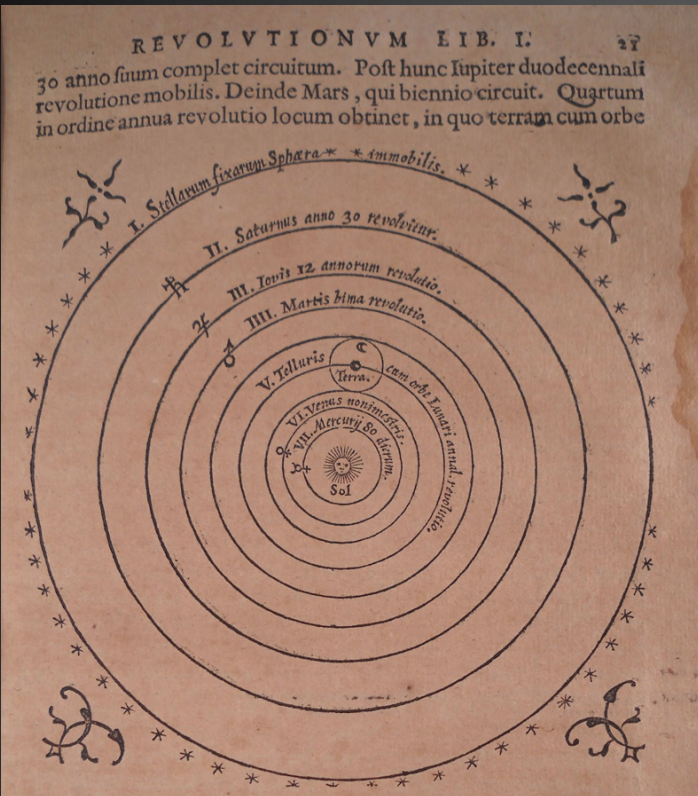
- Platonism, a cult of mathematics “Let no man ignorant of geometry enter here.” (engraved at the Academy door, also the epigraph of “On the Revolutions of the Celestial Spheres”).
- Aristoteles vs Plato: Does the world of forms exist by itself?
- Why greeks did not care about experiments?



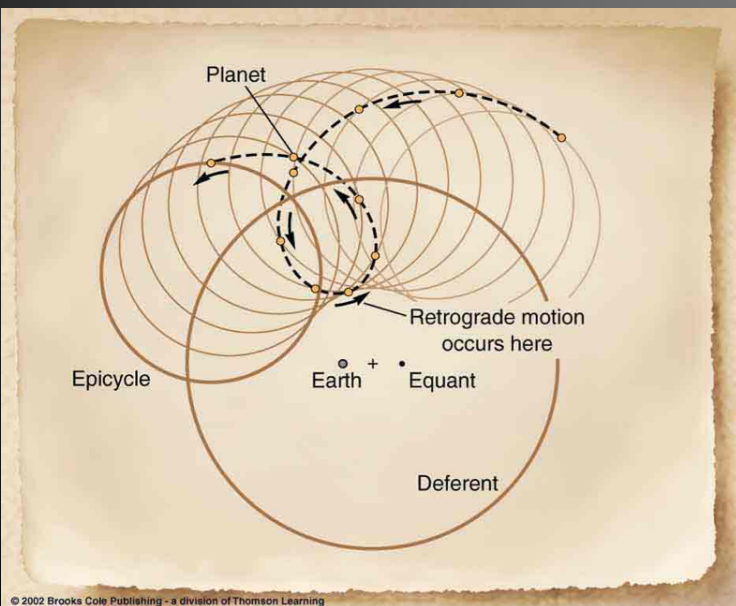
Bible Cosmizm (Genesis, Job, Psalms)

- The world as a highest masterpiece: “...and God saw that it was good”.
Thus, it deserves highest attention (compare with Platonism).
- God was free to make the world in one or another way. Thus, it's impossible to conclude about world from the pure reason only. To read the letters of God, one has to observe the world.
- Christianity accepted in itself the main currents of the ancient thought: Platonism, Aristotelianism, Stoicism, Cynicism, Skepticism... As to the fundamental science, it was inspired predominantly by Platonism with its greatest metaphysical revelation of the Cosmic Logos open to humans.

Copernicus/Ptolemy = Euclid / Egyptians



Nicolaus Copernicus (1473-1543)



For all **practical** purposes, Ptolemy model was good.

Copernicus rejected it on the **aesthetic** ground only.

Why the true theory must be beautiful?

Because the Cosmic Logos is divine...

Copernicus shared this Pythagorean belief -
but he failed to find this beauty...

Kepler, Newton

Johannes Kepler (1571-1630): “Geometry is one and eternal shining in the mind of God. That share in it accorded to humans is one of the reasons that humanity is the image of God.”

“I feel carried away and possessed by an unutterable rapture over the divine spectacle of heavenly harmony... I write a book for the present time, or for posterity. It is all the same to me. It may wait a hundred years for its readers, as God has also waited six thousand years for an onlooker.”



Isaac Newton (1643-1727) wrote more on Theology than on Physics.

“This most beautiful system of the sun, planets, and comets, could only proceed from the counsel and dominion of an intelligent and powerful Being... This Being governs all things, not as the soul of the world, but as Lord over all; and on account of his dominion he is wont to be called Lord God παντοκράτωρ, or Universal Ruler”



Galilei, Descartes

Galilei (1564-1642): Universe is a great book written in the mathematical language. Ignoramuses of this language wander in vain through a dark labyrinth.



“I do not feel obliged to believe that the same God who has endowed us with senses, reason, and intellect has intended us to forgo their use and by some other means to give us knowledge which we can attain by them.”

For **Rene Descartes (1596-1650)**, trust in God was a precondition to trust our ability to see true reality:

“Finally, if there be still persons who are not sufficiently persuaded of the existence of God and of the soul, by the reasons I have adduced, I am desirous that they should know that all the other propositions, of the truth of which they deem themselves perhaps more assured, as that we have a body, and that there exist stars and an earth, and such like, are less certain...”





Cartesian Circle

“When I imagine a triangle, even though such a figure may exist nowhere in the world except in my thought, indeed may never have existed, there is nonetheless a certain nature or form, or particular essence, of this figure that is immutable and eternal, which I did not invent, and which in no way depends on my mind.” (Platonic World)

These immutable eternal clear and distinctive (C&D) forms may come only from a perfect absolute mind, i.e. from God.

God, being perfect, does not deceive, so the C&D statements are true.

This is the “Cartesian Circle”.

Is it a logical fallacy?

What does it actually prove or express?

- It was Spinoza who first clearly proclaimed religion of the totally ruling Software – impersonal Substance – instead of personal God.
- His Substance was omnipotent and omnipresent, leading to total determinism and refutation of the free will.
- Ironically, his main book was called “Ethics”, but it was ethics which was actually negated by this book, as it is negated by any coherently deterministic worldview.

All the values lost their power when the old God was killed and impersonal Substance was enthroned instead.

What forced him to do that?



B. Spinoza (1632-1677)

What forced him to do that?

Spinoza at some moment of his life started to believe that there must be only one explanatory principle of the World. He saw that there were two of them: Reason and Person. Thus, one had to be sacrificed.

That is why divine personality was refuted by him. God was equated to the totality of ruling reason, sort of Cosmic Software.



Consequence:

"For the reason and will, which constitute God's essence, must differ by the breadth of all heaven from our reason and will, and have nothing in common with them except the name; as little, in fact, as the dog-star has in common with the dog, the barking animal."

Personal God vs Impersonal Reason

- **Descartes**: God was free to create the World in any way He wanted. Truth is what God wanted to make true. Two plus two is four because God wanted that to be so.
- **Leibniz** did not agree: Truths of Reason came into God's mind without asking any permission. Leibniz accused Descartes on a blasphemous idea of God's irrationality.
- Why does this question matter? This is a question of the free will of God and humans. This is a big question about personal God and human personalities. All the values and meanings are extremely sensitive to that.

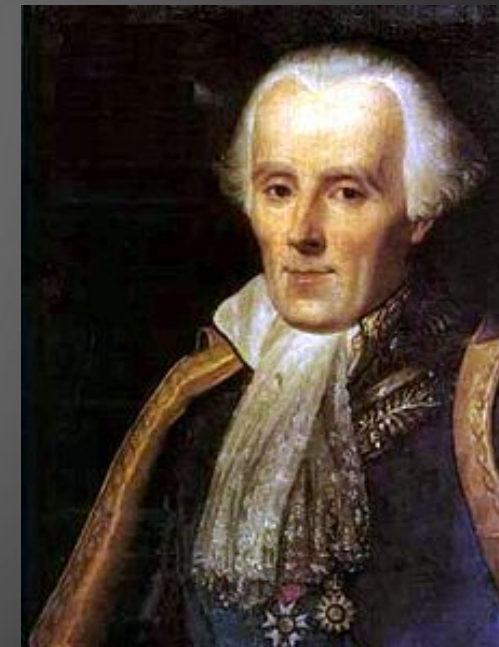


G.W. Leibniz (1646-1716)

Pure Mathematical God: Deism

Deism is a faith in a pure **mathematical God**:

- World functions according to impersonal Reason: World is created as a perfect Machine.
- Since the Design is perfect, God **does not intervene** after creation.
- Man has a divine gift of reason, so he is able to discover theories.
- Scientific cognition is one of the loftiest endeavors of humanity.
- While deistic seeds could be already found in **Aristotle (384-322BC)** and **Averroes (1126–1198)**, it really starts to spread from XVIIIc.: **Spinoza (1632-1677)**, **Leibniz (1646-1716)**, **d'Alembert (1717–1783)**, **Laplace (1749-1827)**.



P. S. Laplace, 1749-1827



P. S. Laplace, 1749-1827

- Some leading philosophers of Enlightenment (XVIII sec) assumed the Spinoza's worldview, or the totality of the inanimate impersonal scientific Logos.

“Laplace’s demon”:

We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes.

Deism: Impersonal God=The Source of Forms

Consequences:

- After the act of Creation, there are no true miracles.
- Prayers have only a psychological sense for unenlightened people.
- Communication between God and a human is impossible.

Problems:

- If God does not intervene, how could Man receive his divine gift of comprehension the Design long after Creation?
- What is a reason to believe that God has finished His creative work?
- Why would God refrain from hearing and responding to humans?
- If Man cannot communicate with God, why should he care about the Grand Design?

Perfect Social Forms: Plato

- Plato's "Republic"—Finding out the best social form. As soon as that is found, the next problem is how to preserve it. The destructive forces are coming from human imperfections (passions, poor thinking) and from various misleading ideas, esp. from poetry. Thus, to preserve the best social form, censorship, secret police and ideological repressions are needed.
- The main role belongs to the guardians, who themselves has to be kept aside from the dangerous literature for not to be spoiled by that.
- The city is ruled by philosophers, selected from the guardians.
- Thus, the very idea of keeping the perfect social form as the primary goal leads to a **closed** (Bergson, Popper) totalitarian society.
- Freedom requires a risk for the society to be exposed to any new ideas, including those who might liquidate the freedom (paradox of freedom).

Perfect Social Form: Αυτοκρατορία των Ρωμαίων

- Eastern Roman Empire considered itself as a perfect final social form, a harmony of the Church and State.
- There was **a single source of power**. The Emperor and the Patriarch were too close to contradict each other.
- It was a perfectly closed society, so no surprise it was **practically fruitless** for a millennium, as soon as this “symphony” was mainly established at ~VI AD.
- Later the Byzantine Empire was essentially repeated as the **Moscow Kingdom** XIV-XVIIc. Same idea of the “symphony”, same closeness of the Tsar and the Patriarch, same stagnation.

Spinoza: Totality of Reason

Spinoza at some moment of his life started to believe that there must be only one explanatory principle of the World. He saw that there were two of them: Reason and Person. Thus, one had to be sacrificed.

That is why human and divine personalities were killed by him. Man as totally governed by Reason/Nature became indistinguishable from objects:



B. Spinoza (1632-1677)

“The reason and will, which constitute God's essence, must differ by the breadth of all heaven from our reason and will and have nothing in common with them except the name; as little, in fact, as the dog-star has in common with the dog, the barking animal.”



P. S. Laplace, 1749-1827

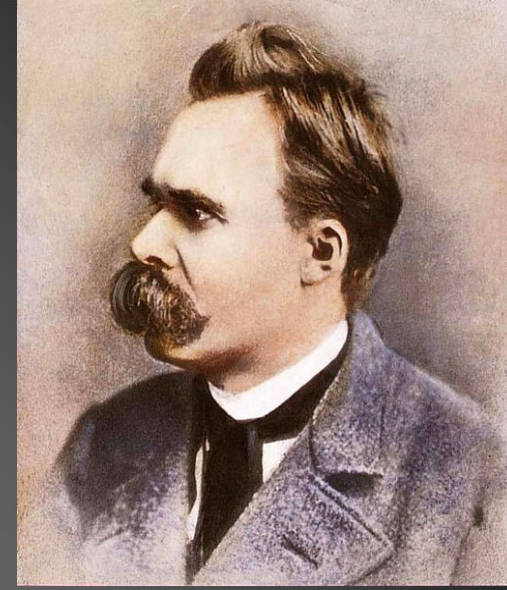
- Some leading philosophers of Enlightenment (XVIII sec) assumed the Spinoza's worldview, or the totality of the inanimate impersonal Reason.

“Laplace’s demon”:

We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes.



C. Darwin, 1809-1882



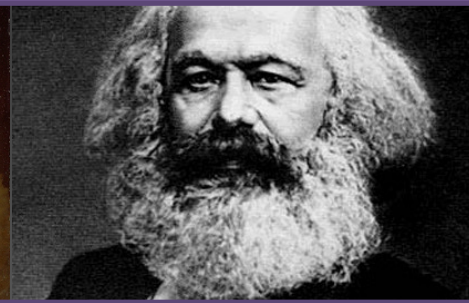
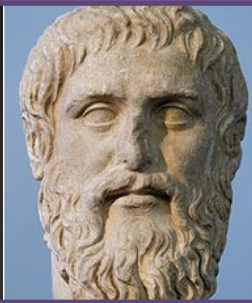
F. Nietzsche, 1844-1900

- After the Darwinian exclusion of God from life and reason (1859), Nietzsche coined his diagnosis: “God is dead”. Saying this, Nietzsche actually meant more than the “death of God”. He also meant death of all values: Truth, Justice, Love, Beauty, and yes – Reason. All of them lost their objective (cosmic) roots. Thus self-negation of Reason was spoken.
- Depersonalization of the Universe was finished. Man lost his divinity and fell down into a world of objects among objects. Any resistance to that became either obscurantism, “wishful thinking” or a white lie.



If man is an object, the society is a machine to be optimized. Improper elements have to be eliminated.

**With empty heavens under his head, man is running to collectivistic cults,
proclaimed from the face of Reason (Marxism), Life (Nazism) or Nature (Eco-Fascism).**



If man is an object, the society is a machine to be optimized. Improper elements have to be eliminated.



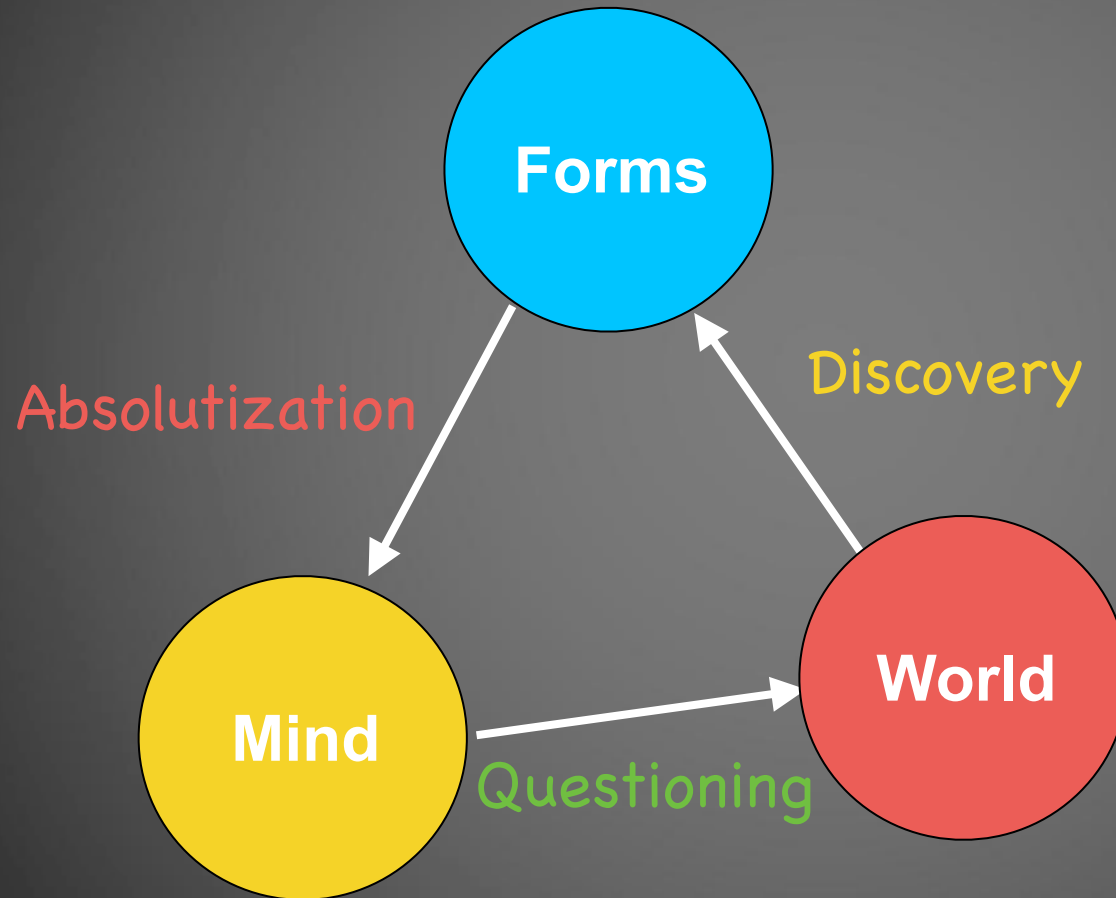
Scientific Communism

National Socialism

Some References

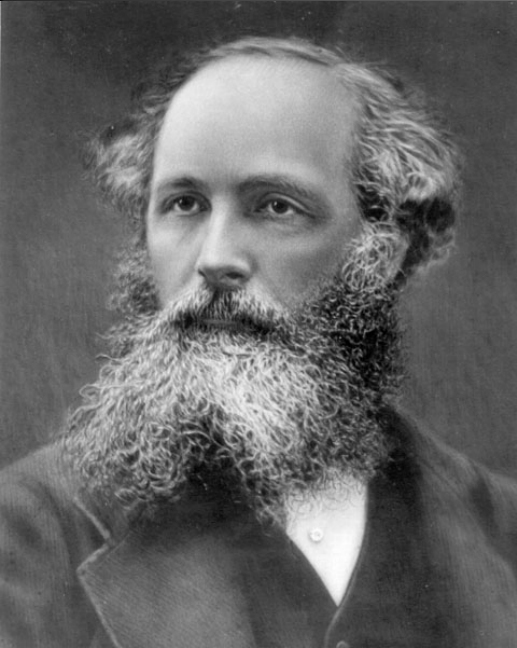
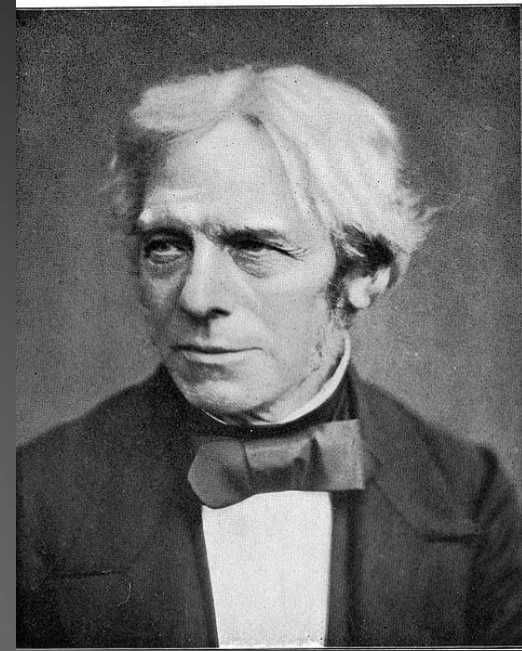
- Friedrich von Hayek, “The road to serfdom”, 1944.
- Friedrich von Hayek, “The counter-revolution of science : studies on the abuse of reason”, 1952.
- Erich Fromm, “Escape from Freedom” (U.S.), “The Fear of Freedom” (UK) (1941)

Absolutization of Reason



Fathers of Electrodynamics

Michael Faraday (1791-1867) was an elder and a preacher of a small Sandemanian Christian Church. “A strong sense of the unity of God and nature pervaded Faraday's life and work.” (J. Baggot, *New Scientist*, 1787 (1991)) ”I shall be with Christ, and that is enough.”- last words...



James Clerk Maxwell (1831-1879) was an an elder of the Church of Scotland. “I think that each individual man should do all he can to impress his own mind with the extent, the order, and the unity of the universe, and should carry these ideas with him as he reads such passages as Col. 1,..., Psalm 8, Heb 2:6, etc.”

“When I consider Thy heavens, the work of Thy fingers,
The moon and the stars, which Thou hast ordained;

What is man, that Thou art mindful of him? and the son of man, that Thou visitest him?”

Psalm 8, KJV

Henri Poincare (1854-1912)

“The sole objective reality consists in the relations of things whence results the universal harmony. Doubtless these relations, this harmony, could not be conceived outside of a mind which conceives them. But they are nevertheless objective because they are, will become, or will remain, common to all thinking beings.”

“If nature were not beautiful it would not be worth knowing, and life would not be worth living. I am not speaking, of course, of the beauty which strikes the senses, of the beauty of qualities and appearances.

I am far from despising this, but it has nothing to do with science. What I mean is that more intimate beauty which comes from the harmonious order of its parts, and which a pure intelligence can grasp.”

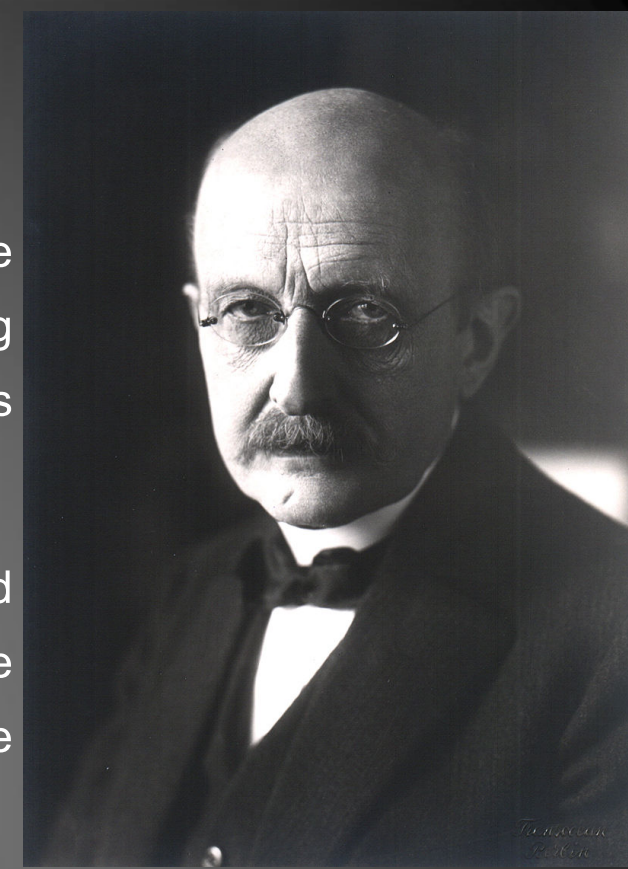
“Logic teaches us that on such and such a road we are sure of not meeting an obstacle; it does not tell us which is the road that leads to the desired end. For this, it is necessary to see the end from afar, and the faculty which teaches us to see is intuition. Without it, the geometrician would be like a writer well up in grammar but destitute of ideas.”



Max Planck (1858-1947)

“I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness.” (1931)

“Anybody who has been seriously engaged in scientific work of any kind realizes that over the entrance to the gates of the temple of science are written the words: Ye must have faith. It is a quality which the scientist cannot dispense with.” (1932)



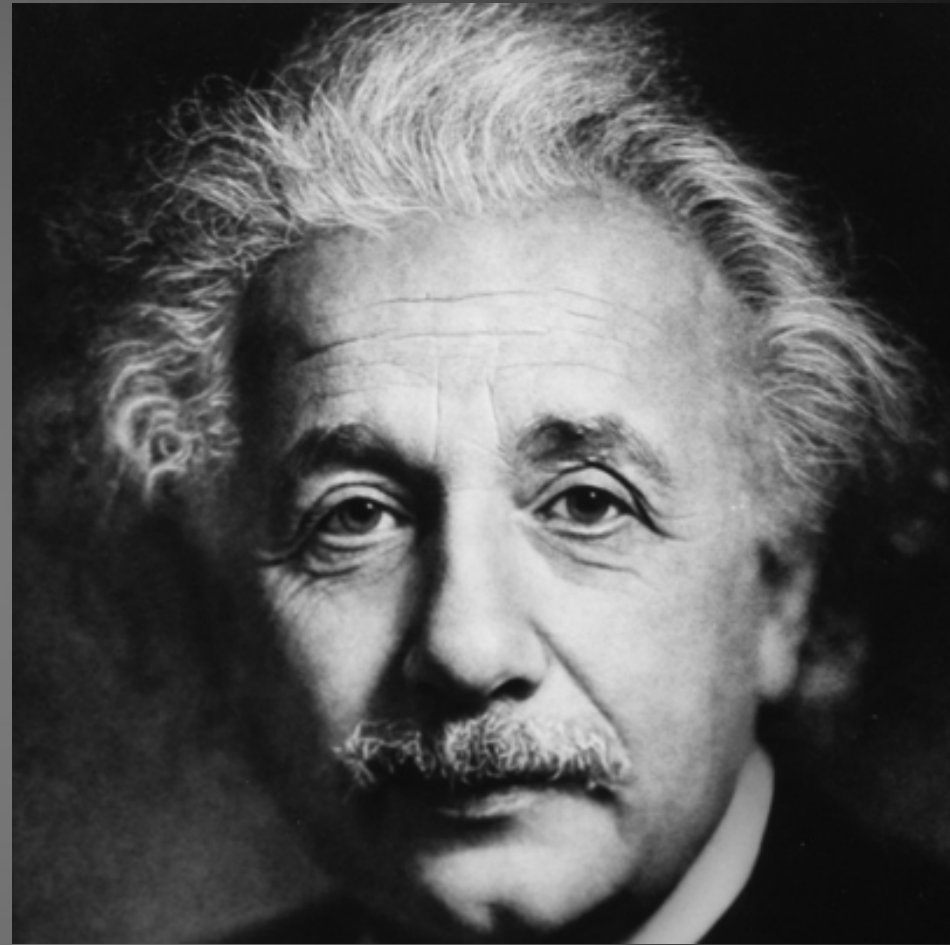
We must assume behind this [material] forces the existence of a conscious and intelligent mind. This mind is the matrix of all matter.” (1944)

“Следует неутомимо и непрестанно продолжать борьбу со скептицизмом и догматизмом, с неверием и суеверием, которую совместно ведут религия и естествознание, а целеуказующий лозунг в этой борьбе всегда гласил и будет гласить: к Богу!” (1937)

“...милостью неба, во мне с детства была глубоко укоренена вера в вечное. Да защитит и укрепит тебя Бог во всем, что еще ожидает нас, пока не придет к концу это безумие, в котором всем нам пришлось жить” (март 1945, письмо другу)

Albert Einstein (1879-1955)

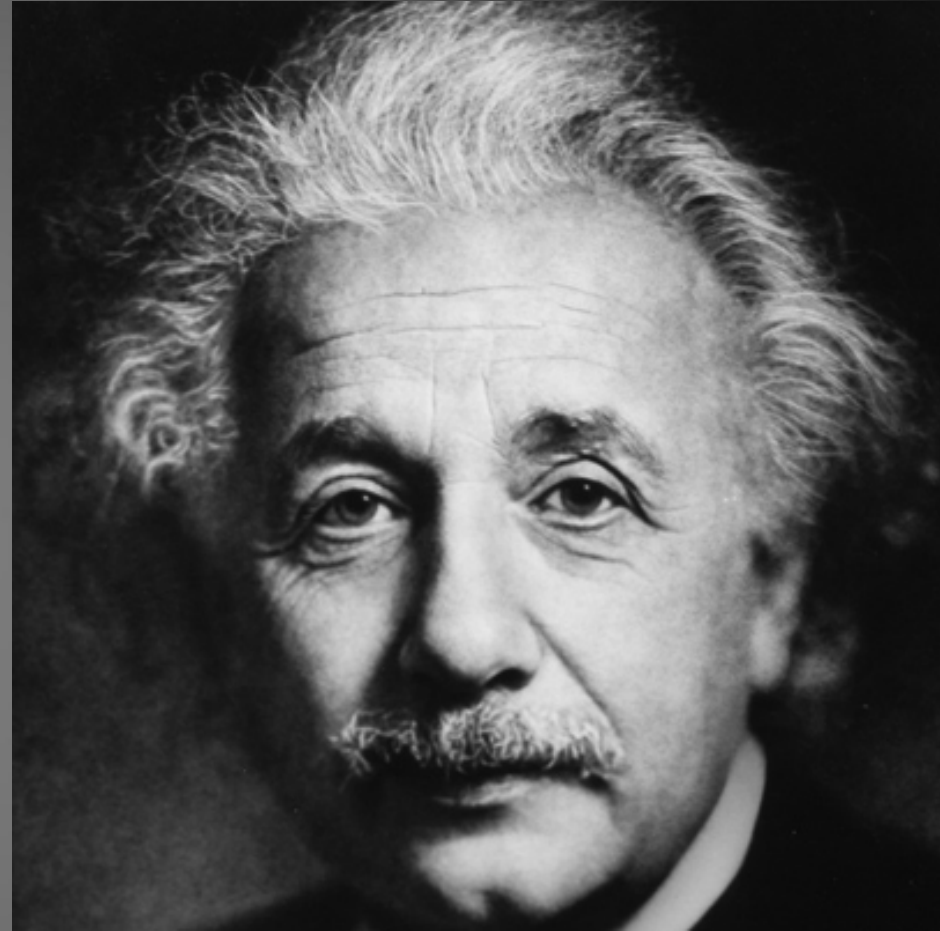
“I maintain that the cosmic religious feeling is the strongest and noblest motive for scientific research. Only those who realize the immense efforts and, above all, the devotion without which pioneer work in theoretical science cannot be achieved, are able to grasp the strength of the emotion out of which alone such work, remote as it is from the immediate realities of life, can issue. What a deep conviction of the rationality of the universe and what a yearning to understand, were it but a feeble reflection of the mind revealed in this world, Kepler and Newton must have had to enable them to spend years of solitary labor in disentangling the principles of celestial mechanics!



Cosmic Religious Feeling

Those whose acquaintance with scientific research is derived chiefly from its practical results easily develop a completely false notion of the mentality of the men who, surrounded by a skeptical world, have shown the way to kindred spirits scattered wide through the world and through the centuries. Only one who has devoted his life to similar ends can have a vivid realization of what has inspired these men and given them the strength to remain true to their purpose in spite of countless failures. It is **cosmic religious feeling that gives a man such strength**. A contemporary has said, not unjustly, that in this materialistic age of ours the serious scientific workers are the only profoundly religious people.”

A. Einstein, *Religion and Science*, 1930.



Niels Bohr (1885-1962)

“There are trivial truths and there are great truths. The opposite of a trivial truth is plainly false. The opposite of a great truth is also true.”

“...the idea of a personal God is foreign to me.”

“The fact that religions through the ages have spoken in images, parables, and paradoxes means simply that there are no other ways of grasping the reality to which they refer. But that does not mean that it is not a genuine reality. And splitting this reality into an objective and a subjective side won't get us very far... The fact that different religions try to express this content in quite distinct spiritual forms is no real objection. Perhaps we ought to look upon these different forms as complementary descriptions which, though they exclude one another, are needed to convey the rich possibilities flowing from man's relationship with the central order.”

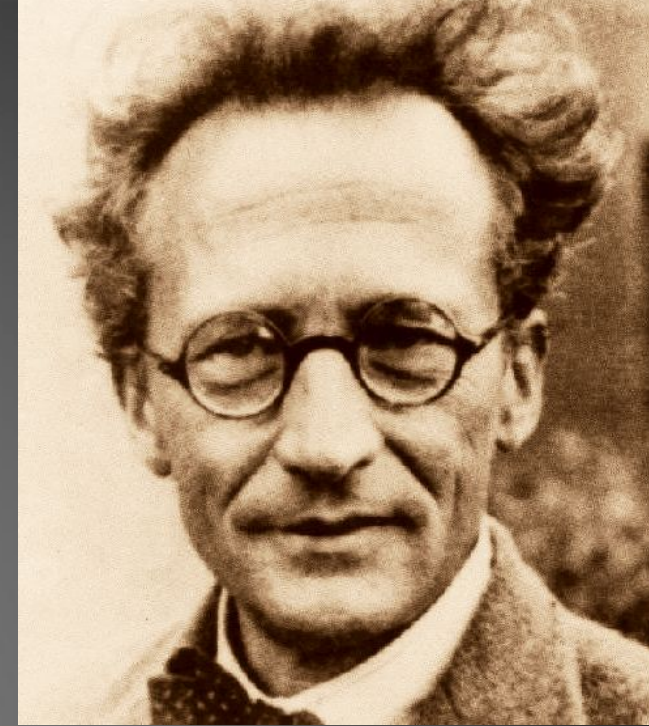
“Mathematicians, as everyone knows, work with an imaginary unit, the square root of -1 , called i ... An equally abstract concept is that of infinity, which also plays a very important role in modern mathematics. It, too, has no correlate, and moreover raises grave problems. In short, mathematics introduces ever higher stages of abstraction that help us attain a coherent grasp of ever wider realms. To get back to our original question, is it correct to look upon the religious 'there is' as just another, though different, attempt to reach ever higher levels of abstraction? An attempt to facilitate our understanding of universal connections? After all, the connections themselves are real enough, no matter into what spiritual forms we try to fit them.”



Erwin Schrodinger (1887-1961)

“Nirvana is a state of pure blissful knowledge... It has nothing to do with the individual. The ego or its separation is an illusion. Indeed in a certain sense two "I"s are identical namely when one disregards all special contents — their Karma. The goal of man is to preserve his Karma and to develop it further... when man dies his Karma lives and creates for itself another carrier.”

Writings of July 1918, quoted in “A Life of Erwin Schrödinger” by W. Moore (1994)



“Although I think that life may be the result of an accident, I do not think that of consciousness. Consciousness cannot be accounted for in physical terms. For consciousness is absolutely fundamental. It cannot be accounted for in terms of anything else.

As quoted in *The Observer* (11 January 1931); also in *Psychic Research* (1931), Vol. 25, p. 91

We do not belong to this material world that science constructs for us. We are not in it; we are outside. We are only spectators. The reason why we believe that we are in it, that we belong to the picture, is that our bodies are in the picture. Our bodies belong to it. Not only my own body, but those of my friends, also of my dog and cat and horse, and of all the other people and animals. And this is my only means of communicating with them.

“Nature and Greeks” (1954)

Werner Heisenberg (1901-1976)



“I think that modern physics has definitely decided in favor of Plato. In fact the smallest units of matter are not physical objects in the ordinary sense; they are forms, ideas which can be expressed unambiguously only in mathematical language.”

“If nature leads us to mathematical forms of great simplicity and beauty—by forms, I am referring to coherent systems of hypotheses, axioms, etc.—to forms that no one has previously encountered, we cannot help thinking that they are “true”, that

they reveal a genuine feature of nature.... You must have felt this too: the almost frightening simplicity and wholeness of the relationships which nature suddenly spreads out before us and for which none of us was in the least prepared.”

“in the course of my life I have repeatedly been compelled to ponder on the relationship of these two regions of thought [science and religion], for I have never been able to doubt the reality of that to which they point.”

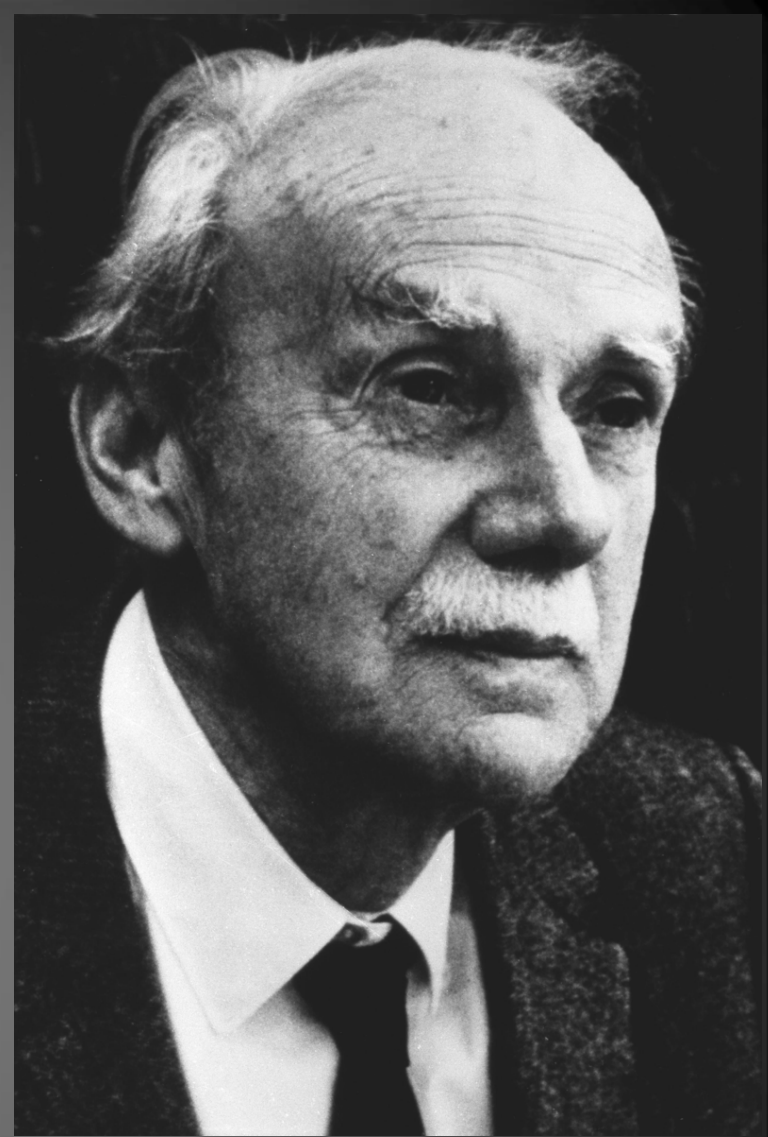
“The first gulp from the glass of natural sciences will turn you into an atheist, but at the bottom of the glass God is waiting for you.”

Paul Dirac (1902-1984)

“If you are receptive and humble, mathematics will lead you by the hand. Again and again, when I have been at a loss how to proceed, I have just had to wait until I have felt the mathematics lead me by the hand. It has lead me along an unexpected path, a path where new vistas open up, a path leading to new territory, where one can set up a base of operations, from which one can survey the surroundings and plan future progress.”

P.A.M. Dirac, *unpublished note*, 1975.

Amongst his many students was John Polkinghorne, who recalls that Dirac "was once asked what was his most fundamental belief. He strode to a blackboard and wrote that the laws of nature should be expressed in beautiful equations."



Eugene Wigner (1902-1995)

“...the mathematical formulation of the physicist's often crude experience leads in an uncanny number of cases to an amazingly accurate description of a large class of phenomena. This shows that the mathematical language has more to commend it than being the only language which we can speak; it shows that it is, in a very real sense, the correct language... The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve. We should be grateful for it and hope that it will remain valid in future research...”

“The Unreasonable Effectiveness of Mathematics in the Natural Sciences”, 1960.



<https://fermisocietyofphilosophy.wordpress.com/>

FERMI SOCIETY OF PHILOSOPHY

ABOUT CHARTER



philosophysociety@fnal.gov

Faith of Fundamental Science

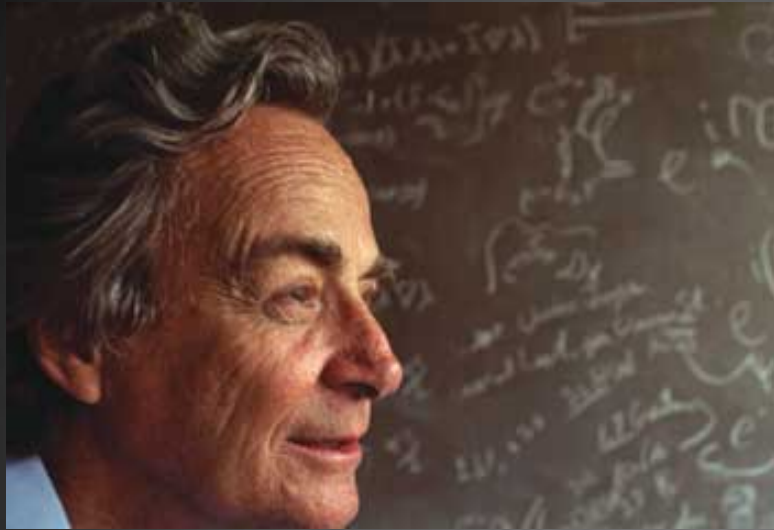
part VIII, Final:

The Loss of Philosophy

ALEXEY BUROV

Fermi Society of Philosophy, Feb 12, 2015

Richard Feynman (1918-1988)



“The character of physical law”, 1965:

To summarize, I would use the words of Jeans, who said that ‘the Great Architect seems to be a mathematician’. To those who do not know mathematics it is difficult to get across a real feeling as to the beauty, the deepest beauty, of nature. C. P. Snow talked about two cultures. I really think that those two cultures separate people who have and people who have not had this experience of understanding mathematics well enough to appreciate nature once.

Richard Feynman characterized himself as an “atheist”. At the same time, he enthusiastically stressed his belief in unity and mathematical elegance of laws of nature, as a most fundamental property of nature itself.

He never asked if his atheism is compatible with his enthusiastic faith in mathematical beauty of the physical laws. Contrary to the fathers of scientific revolution, he had never reflected on that fundamental question. That shows his *a-philosophical* set of mind.

Steven Weinberg (b. 1933)

“Why should the philosophy of science not be of more help to scientists?”

“We learn about the philosophy of science by doing science, not the other way around.”

“...the philosophy of science is just about as useful to scientists as ornithology is to birds.” (“Facing Up”, 2001)



Plato about birds

“But the race of birds was created out of innocent light-minded men, who, although their minds were directed toward heaven, imagined, in their simplicity, that the clearest demonstration of the things above was to be obtained by sight; these were transformed into birds, and they grew feathers instead of hair.”

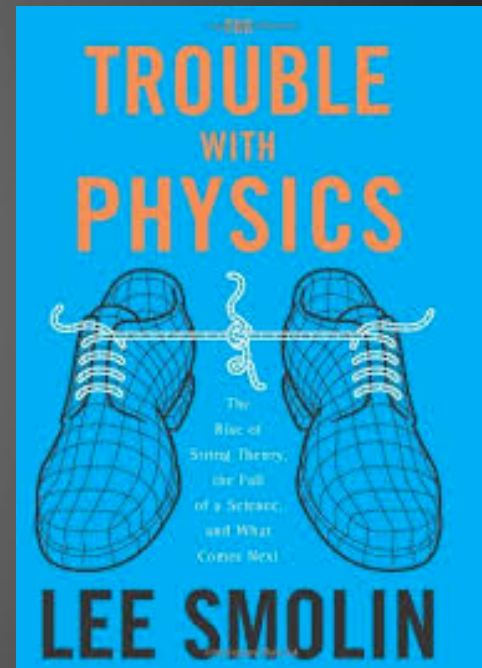
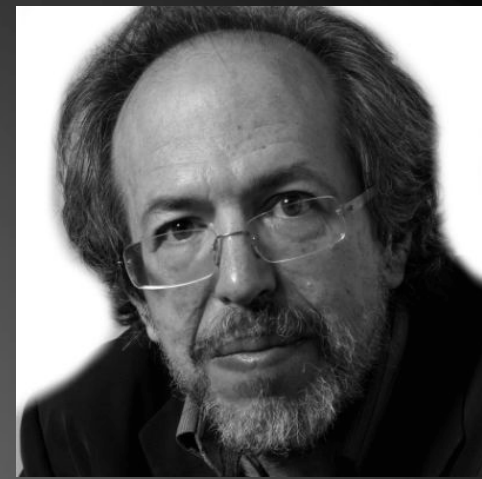
Plato, “Timaeus”



Pythagorean Faith of Physics: reflections

- A belief in mathematical beauty of the laws of nature, human ability to discover them, and highest value of such discoveries was and is essential to Physics. All great discoveries were driven by this belief and a posteriori were confirming, supporting and further inspired it (Euclid, Copernicus, Kepler, Descartes, Newton, Maxwell,..., Plank, Einstein,... Dirac).
- Is this belief compatible with atheism (Feynman)? Is it compatible with the idea that the laws of nature are random, being only limited by the anthropic condition (Weinberg)?
- Why neither Feynman nor Weinberg did not question the compatibility of the faith of Physics and their atheism? Isn't it a loss of ability to think philosophically, to reflect their views? This loss of philosophical awareness seems typical among top physicists after WWII...

Lee Smolin's Observation of Science



“The atmosphere [*Harvard, end of 70s*] was not philosophical; it was harsh and aggressive, dominated by people who were brash, cocky, confident, and in some cases insulting to people who disagreed with them... The spirit was pragmatic; “Shut up and calculate” was the mantra... This style is pragmatic and hard-nosed and favors virtuosity in calculating over reflection on hard conceptual problems. This is profoundly different from the way that Albert Einstein, Niels Bohr, Werner Heisenberg, Erwin Schrödinger, and the other early-twentieth-century revolutionaries did science. Their work arose from deep thought on the most basic questions surrounding space, time, and matter, and they saw what they did as part of a broader philosophical tradition, in which they were at home... In the approach to particle physics developed and taught by Richard Feynman, Freeman Dyson, and others, reflection on foundational problems had no place in research. This freed them from the debates over the meaning of quantum physics that their elders were embroiled in and led to thirty years of dramatic progress. This is as it should be: Different styles of research are needed to solve different kinds of problems. Working out the applications of established frameworks requires very different kinds of thinking—and thinkers—than inventing those frameworks in the first place. However, as I will argue in detail in the pages to come, the lesson of the last thirty years is that the problems we’re up against today cannot be solved by this pragmatic way of doing science.” (“The Trouble With Physics.”, 2006)

Fathers of Fundamental Science

Pythagoras - Orphic reformer, enunciated communion with God through “theorein”. Father of theory per se.

Democritus - Paradoxical thinker, believed in benevolent gods, determinism of atoms and void; he distinguished “genuine” (theoretic) and “obscure” (sensory) knowledge.

Plato - developed Pythagorean teaching about objective Reason, transcendental God, similarity of human mind to divine, and human salvation by cognition.

Euclid, Archimedes - Platonics.

Aristotle, Epicurus - ancient Deists (nothing personal between God/gods and humans)

Copernicus, Kepler, Galilei, Descartes, Newton - Christians, Platonics.

Euler, Cauchy - devoted Christians, Platonics

Faraday, Maxwell - Christians, Platonics.

Leibniz, Laplace, d’Alembert, Gauss, Boltzmann - Deists

Not a single skeptic, Kantian, materialist....

Fathers of Scientific Revolution

Henri Poincare (1854-1912) Platonic (Objective idealist)

Max Planck (1858-1947) : **Deist**

David Hilbert (1862-1943) : **Deist**

Albert Einstein (1879-1955) - Spinozian (**Deist**)

Niels Bohr (1885-1962) - **Deist**

Werner Heisenberg (1901-1976) - Platonic, believed in a personal contact with God.

Wolfgang Pauli (1900-1958) - **Deist**

Erwin Schrödinger (1887-1961) - Spinozian/Vedanta, primacy of divine Consciousness.

Paul Dirac (1902-1984) - Marxist before WWII; Platonic after; member of the Pontiff Academy.

Kurt Gödel (1906-1978) - Leibnizian (**Deist**), believed in afterlife.

John von Neumann (1903-1957) - "There probably is God". **Roman Catholic** at the end.

Pythagorean Creed

- Fundamental Physics was indeed born and driven by the “cosmic religious feeling” (Einstein). Rational verbalization of this **Pythagorean faith** could be formulated as a following *creed*:
 - Behind the phenomena, there is a beautiful **Logos** structuring the World.
 - Logos is unified: it shows the Mind of God who is **One**.
 - Man’s mind is **in similarity** to the Mind - therefore, the divine laws are discoverable.
 - The World is **contingent**, so experiments are required (Galilei, Bacon).
 - Human cognition of the Grand Design is a part of our **loftiest endeavor** - of our ascending to God, Who is the source of truth and beauty.
- This coherent faith combines theology, ontology, anthropology and ethics, showing the scientific cognition as a noblest way of eternal value.
- This faith unifies Ancient Greek, Christian, and Deist fathers of Science.

By their fruits ye shall know them

- Truth of a faith is to be known by its fruits.
- Fundamental science is a main fruit of the Pythagorean faith, nurturing science through centuries.
- Science, with its cosmic scale $\sim 10^{45}$, with up to 12-14 digits of accuracy of the fundamental laws, with its tremendous role in history, is an unbelievably impressive fruit of its faith.
- Thus, with an unprecedented power, science testifies to the truth of Pythagorean faith, truth of its belief about God, World and Man.

Deism vs Theism

Deism fails answering the following crucial questions:

- If God does not intervene, how did Man receive the divine reason long after Creation?
- While, post-QM, God could intervene without breaking any law, what is a rational ground to believe that He does not intervene, does not listen and does not answer?
- Is it reasonable to believe in the 'Great Architect' without consciousness?
- For both Deism and Theism, the true values are set by the Author of everything existing. What is the value of the cosmic cognition, if the Creator does not care about that?
- Why great Deists never seriously discussed these problems?

A source of Deism:

- A believe in the purely mathematical/atemporal Deistic God is driven by
a poorly reflected idolization /absolutization /cult of pure Reason.

Reason vs Thought



“Thinking begins only when we have come to know that reason, glorified for centuries, is the most stiff-necked adversary of thought.”

M. Heidegger, *The Word of Nietzsche: "God Is Dead"*, 1943.

Reason, introduced by Greeks, requires dis-discovery of atemporal transcendental essences behind the veil of phenomena, forms (εἶδος), Logos, Reason.

World, comprehended through Reason only, is essentially atemporal, everything new only seems to be new. All acts of creation, divine and human, are lost in the kingdom of Reason, and thus, are either denied or proclaimed illusory. The value of thought is lost.

Therefore, Reason, **glorified so much** (=idolized, absolutized), is, indeed, the very stiff-necked adversary of Thought.

Deism -> Naturalism

Inconsistency of **Deism** led to its decline.

With growing popularity of **Darwinism**, **Deism** started losing its followers to **Naturalism**.

According to **Naturalism**, Nature does not have a creator, it **is a cause of itself**.

Thus, **Man is a robot**, accidentally emerged due to some machinery and chaos of blind and meaningless material processes. The World itself is most likely a grimace of Chaos (Weak Anthropic Principle+Full Blown Multiverse=Chaosogenesis).

Hence, all our “knowledge” and “theories” are mere consequences of this chaotic mechanics or even of a pure Chaos. There is no reason to value them except for survival and comfort. But survival and comfort are not the values which generated and empowered fundamental science.

Deism -> Naturalism

No surprise, that **Naturalism**, known since **Democritus**, showed its complete **infertility** in the history of science.

Naturalistic answer to the human question about ourselves: “we are robots in a meaningless world” kills any inspiration, which is the primary source of moral, science, art, cognition. Thus, Naturalism is an intellectual suicide, destroying all the foundations for cognition, creativity and a meaningful moral life. Survival and comfort per se are very poor values.

No doubt that a community asserting so demoralizing views should not expect a support from society. Wide-spread Naturalism is a highly dangerous sickness of the scientific communities and the whole European civilization.

Russell's Worship

"Brief and powerless is Man's life; on him and all his race the slow, sure doom falls pitiless and dark. Blind to good and evil, reckless of destruction, omnipotent matter rolls on its relentless way; for Man, condemned today to lose his dearest, tomorrow himself to pass through the gate of darkness, it remains only to cherish, ere yet the blow falls, the lofty thoughts that ennoble his little day; disdaining the coward terrors of the slave of Fate, to worship at the shrine that his own hands have built; undismayed by the empire of chance, to preserve a mind free from the wanton tyranny that rules his outward life; proudly defiant of the irresistible forces that tolerate, for a moment, his knowledge and his condemnation, to sustain alone, a weary but unyielding Atlas, the world that his own ideals have fashioned despite the trampling march of unconscious power."

Bertrand Russell, "A Free Man's Worship", 1903

Comment [AB]: What makes any thought being "**lofty and noble**", what makes a "**shrine**" in the "empire of chance irresistibly ruled by the wanton tyranny under the tramping march of unconscious power"? What could be sacred at all in this nightmare world for creatures formed by that nightmare???

How a famous logician and philosopher could be so poor in expression of his worship?

Main obstacles with Christianity

Two main obstacles to accepting Christianity:

law-breaking miracles and the problem of evil (theodicy, vindication of God).

Law-breaking miracles, as very special, unreproducible events, cannot contradict scientific foundations, unless the latter are idolized. Sometimes, God breaks His laws to save us, His children. Loving us, He is doing that. Respecting us, He is doing that very seldom. Thus, miracles do not contradict neither science nor rational theology (more - in e.g. C.S. Lewis, "Miracles").

Problem of evil: if God is benevolent and omnipotent, why is there evil?

A reasonable answer is that God created the World for His free-will kids. Freedom of will requires the World being fundamentally undetermined, including in itself Nothingness, Chaos (Epicurus). The tragedy and the absurdity of life is another side of world's openness to our free will. The crucified God shares our pain, saving us from the onslaught of evil.

Thus, Christianity and science can be compatible.

Science as a Sign of Truth

As a fruit of the Pythagorean faith, Science shows the truth of its faith.

“ Ye shall know them by their fruits.” Matthew, 7:15-21, KJB.

By virtue of its faith, fundamental science does respond to a command of the Delphic deity, thus witnessing about the true nature of Man. Expressing its Pythagorean Creed by a shortest formula, I do not see anything better than

Humans are growing kids of God.

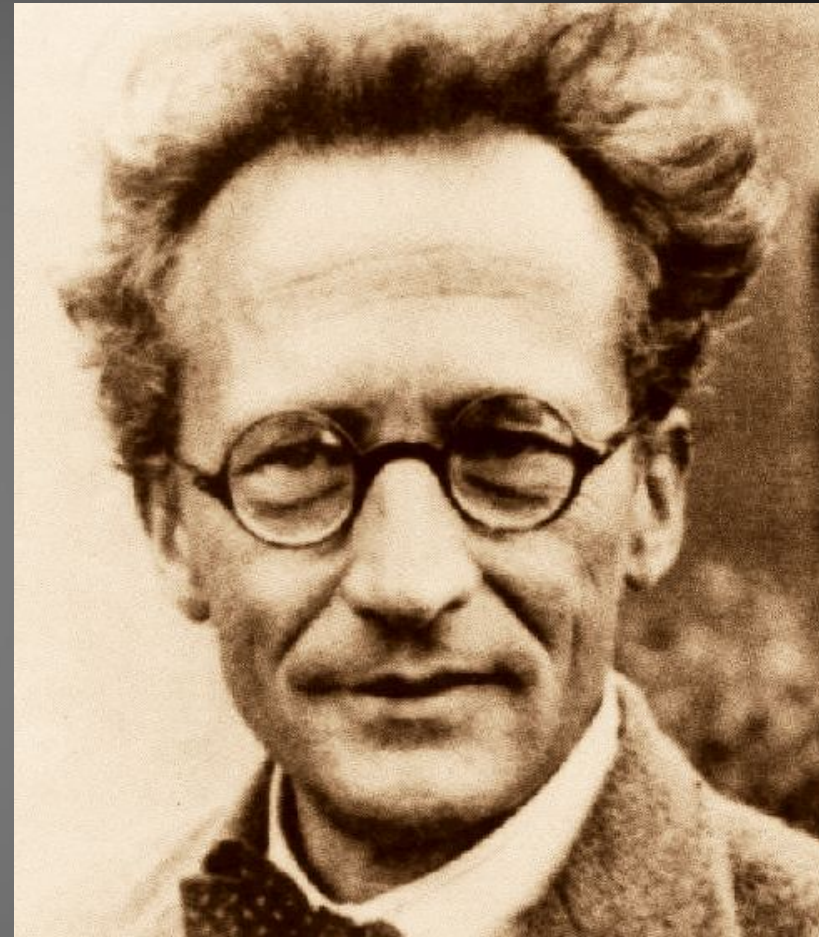
Thank You!

Value of Science

“... you are bound to ask me now: What, then, is in your opinion the value of natural science? I answer: Its scope, aim and value is the same as that of any other branch of human knowledge. Nay, none of them alone, only the union of all of them, has any scope or value at all, and that is simply enough described: it is to obey the command of the Delphic deity: **get to know yourself!**”

Erwin Schrödinger,

“Science and Humanism”, 1951.



My recent articles

- Welcome to my blog (Russian): <http://www.snob.ru/profile/27355/blog>:
- Вера в разум и его культ
- Человек глазами науки
- Любовь к отечеству и его культ
- Метафизика Космогенеза
- Генезис космического наблюдателя

Some backup slides

- Welcome to my blog (Russian): <http://www.snob.ru/profile/27355/blog>