

Campaign

FΔQ

Undates

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Fundamental physics playing cards

Project We Love Grenoble, France Playing Cards

Story

PROJECT BUDGET

RISKS



€7,563

247

hackers

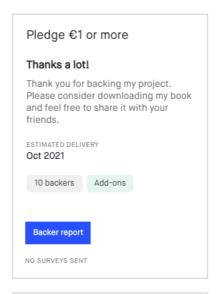
pledged of €7,000 goal

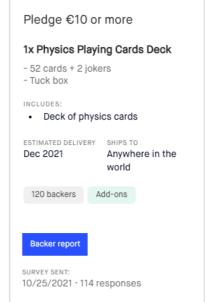
A project about the marvels of the fundamental physics. A deck of playing cards, each card explains one subject, from the elementary constituents of atoms to the entire Universe. I also wrote a book where each card is explained on a page of text. You can download it on this link for free.

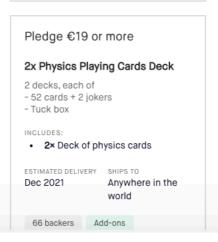
Each suit is dedicated to one branch of physics. Numbers represent the most important phenomena, from the most basic ones (2-6) to the cutting edge of modern research (7-10). Court cards represent physicists who made the most important contribution to the development of this branch and their discoveries. Ace depicts the key concept for the whole branch.

Project summary.

Support







Successful Kickstarter campaign, 7 Sept - 7 Oct 2021, €7563 collected out of €7000 goal

The cards are currently on the way to the backers

Links to join and share:

https:// www.kickstarter.com/ projects/physicscards/ playing-cards-about**fundamental-physics**

https://www.facebook.com/ groups/1016043322480064

https:// www.instagram.com/ physicsismyfavoritegame/

General idea

Numbers

Main discoveries





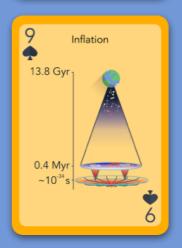
Some of the

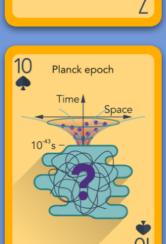
current

studies







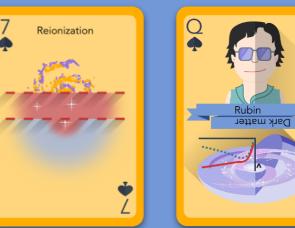


Element





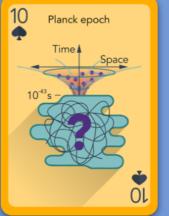
Most general concept





Perspectives of the fields







Diamonds: Quantum Mechanics



From the Plank equation, photoelectric effect, wave function, Bohr's atom to the superconductivity, studies of the BEC and fusion reactors

Hearts: Particle Physics



From Dirac and elementary forces to quark-gluon plasma, neutrino oscillations and GUT.

Clubs: Astrophysics



From the Sun and Solar system to exoplanets and gravitational waves

Spades: Cosmology



From the General Relativity, redshift and notion of the expanding Universe To the dark energy, inflation studies and the Planck epoch

Jokers: Two Theories to Rule Them All



Book

4 Physics Is My Favorite Game



Max Planck - the black body spectrum

The black body is a physical term meaning a body that accumulates all the light, emitted towards it. Typically such a body should also emit light. The dependence of the intensity of this light on its wavelength (wavelength is the distance between two subsequent peaks of the wave) could be theoretically predicted. Such dependence is called the spectrum. And according to the calculations of XIX century physicists, this theoretically predicted spectrum was dramatically different from the experimentally observed one.

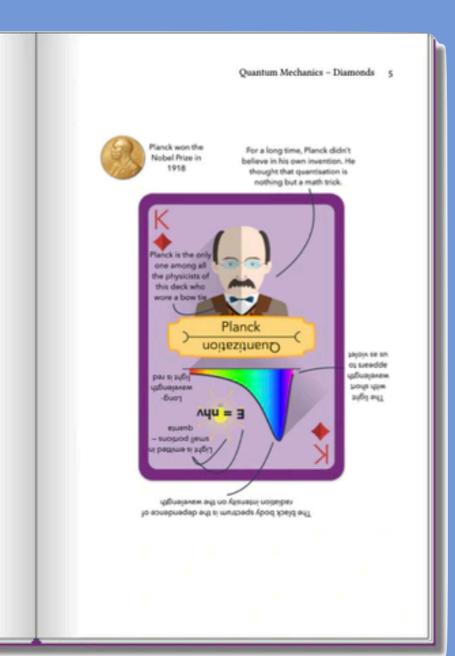
Although the problem sounds quite abstruse, it is very practical. Any hot body emits light. For example, a red-hot steel billet on a factory glows in the black body spectrum. Your body glows too, though you don't see it. The reason why you don't see it is that the spectrum of the black body falls steeply on short wavelengths, and the visible light has very short waves. However, the theoretical model predicts the opposite: the intensity should increase to infinity on the short wavelengths. So every object around you must be glowing very bright, according to the theory (this problem was called the ultru-violet catastrophe).

And what was this theory? It is the theory, developed 100 years before by Thomas Young, that tells that the light is a wave. Right. That's what we told – the light, the wavelength... And then came Max Planck (1858 - 1947) who in 1900 solved the long-standing mystery with the black body spectrum. He postulated that the light waves are quantum, which means they are particles. Look, here comes the only formula in our book:

 $E = nh\nu$

where E is the energy of light, h is just a constant, n is the number of quanta and ν (it is a greek letter, called $m\bar{p}$) is the frequency of light, which is directly related to the wavelength through the speed of the wave. The constant hwas later called the Planck constant. It is one of the fundamental constants of Nature. So here is the frequency ν , which is a wave characteristic. But there is also n for the number of ... what? Waves? But you can't count waves! A wave is a continuous object! You can count only particles!

So this equation implies that the light is at the same time a wave and a particle. This self-contradictory Planck's equation and his idea of quantization of light laid the foundation of the totally new quantum physics. The odd combination of wave and particle natures, introduced in quantum mechanics, is called wave-particle duality.

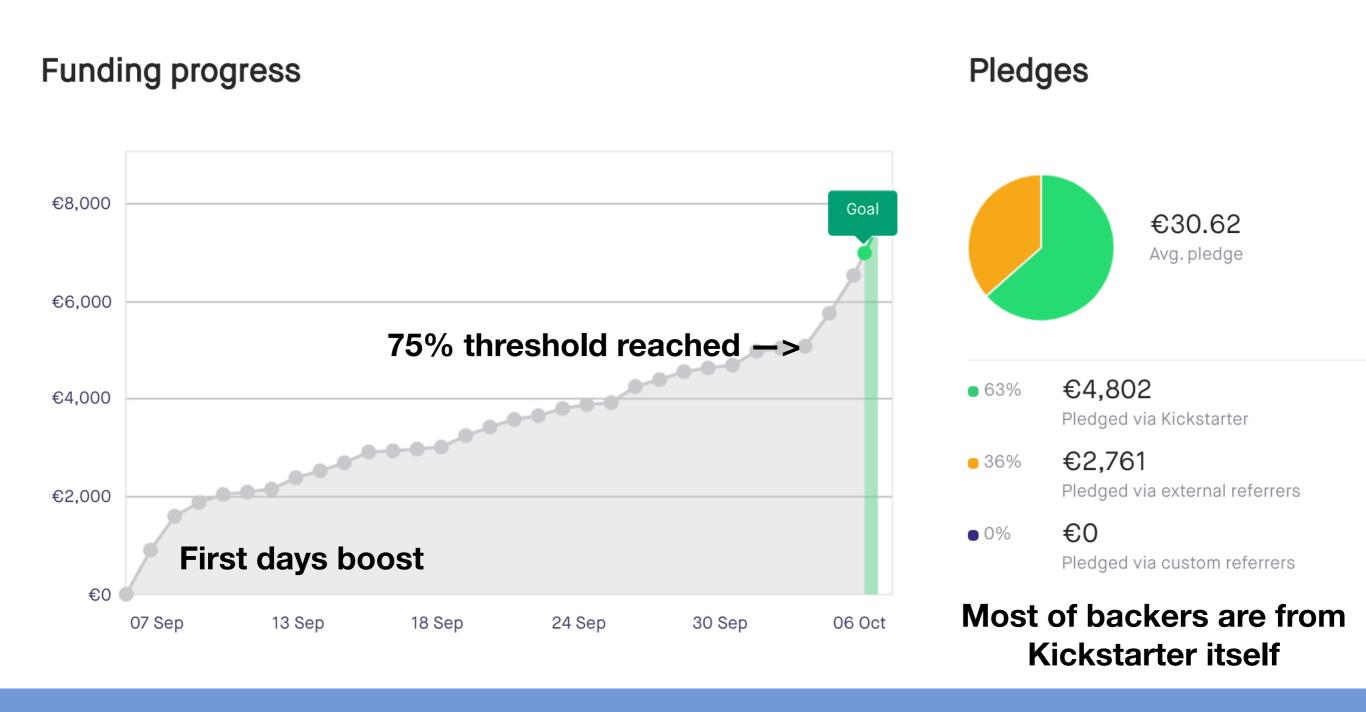


- Every card is explained on one page
- Cards are annotated
- Continuous story, from basic principles to the most advanced studies
- Cards reference to each other
- Suggested materials for the most curious readers
- Free digital version
- Printed version was planned as a stretch goal (not reached)

Special thanks to the proofreaders: Jason Veatch, David Droz, Vladimir Prudkovskiy, Alexander Stolpovskiy

Book is distributed in digital version under the CC license: https://github.com/ MStolpovskiy/Physics_cards_book

Kickstarter campaign



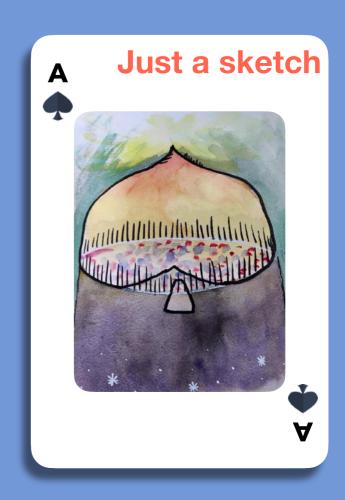
Take away message: want to start a crowdfunding campaign?

Ask those who did it before!

Two more decks are coming

- One deck about the main experiments (while the current one is more about concepts)
 - Same suits: from quantum mechanics to cosmology
 - Style: watercolour and markers
 - Book: not many plans for the moment. Extension of the current book? Short booklet?
 Or a complete book?
- One about history, from Ancient Greece to the XIXth century
 - Greeks
 - Newton & Co
 - XVIII century: mechanics, thermodynamics
 - XIX century: electromagnetism, statistical mechanics
 - Queens: Most important guys are transformed in their female versions





Collaboration with Vert Dider



ФИЗИКА — моя любимая игра 2:01

Колода «физических» карт.
Видео для Kickstarter

5,3 тыс. просмотров •
2 месяца назад

Amazing YouTube channel of the very professional outreach enthusiasts

Translation of the English outreach videos to Russian (not only physics):

- Veritasium
- Minute physics
- Stanford lectures
- etc.

Interviews with many interesting persons, see https://www.youtube.com/channel/UCns- VVpT1KtwsKub0pYwAnA

Planned series of short cartoons based on my cards. See example on the <u>Kickstarter page</u> + promotion of the future Russian version of the cards

