wyborcza.pl
KRAKÓW

to be available soon...

1 ZDJĘCIE

Projekt Credo (credo.ifj.edu.pl)

Krakowscy astrofizycy mają pomysł, chcą

PolskieRadio.pl | WIADOMOŚCI | JEDYNKA | DWÓJKA | TRÓJKA | CZWÓRKA | POLSKIE RADIO 24 | ...

PolskieRadio.pl | Trójka

Trójwymiar

ostatnia aktualizacja:
30.08.2017 20:40

Eksperyment kosmiczny. Telefon w służbie nauki

TRÓJKA

Dzięki specjalnej aplikacji CREDO Detector każdy smartfon może, dzię
swojemu modułowi GPS, stać się częścią programu mającego na celu
ciemnej materii.

AUDIO | 1 plik

03'13 +

Eksperyment kosmiczny. Telefon w służbie nauki (Trójwymiar/Trójka)

pap Nauka w Polsce

TYGODNIK POWSZECHNY

AUTORZY | BLOGI | ARCHIWUM | REDAKCJA | WYDAWCA | FUNDACJA | KUP PRE

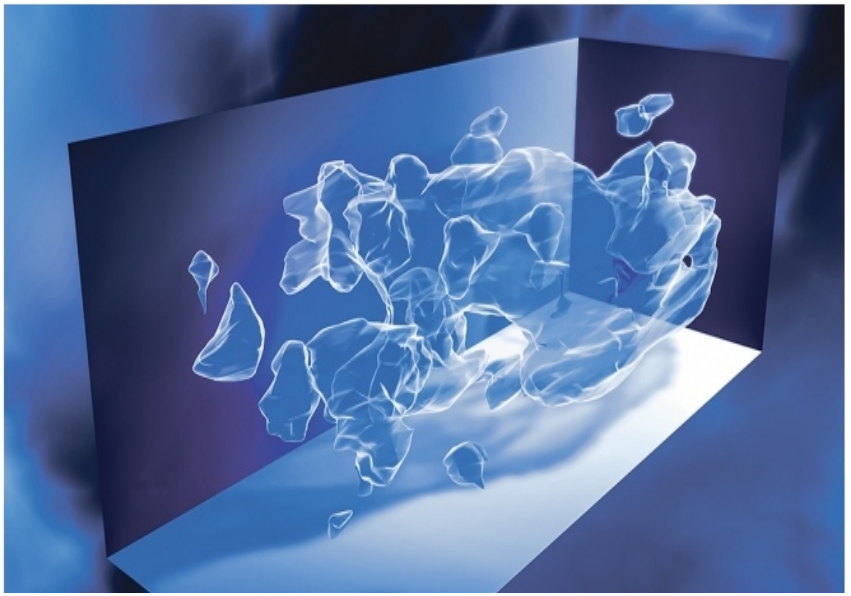
MENU

STRONA GŁÓWNA » NAUKA » BŁYSKI CIEMNEJ MATERII

BŁYSKI CIEMNEJ MATERII

MICHAŁ KRUPIŃSKI - | 25.07.2017 | CZYTA SIĘ 8 MINUT

Eksperyment polskich naukowców ma pomóc wyjaśnić, czym jest ciemna materia – jeden z najbardziej zagadkowych składników wszechświata. Każdy będzie mógł w nim wziąć udział – wystarczy mieć smartfon z GPS-em.



Nauki medy

ytków: krzy

A A

ać

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m
w
emnej

likacji
rody na

GPS,
owcom
a cząstka

ać o
techniki

„I do think CREDO has a unique capability of entering in and exploring a completely uncharted realm of science." Mikhail V. Medvedev

Media about us

2017

- CREDO Anniversary Symposium 2017

Telefon w służbie nauki

Od dziś każdy może za pomocą smartfona poszukać ciemnej materii

Od środy każdy może za pomocą smartfona poszukać ciemnej materii

Chcą znaleźć ciemną materię. Potrzebny milion ochotników ze smartfonami

Badaj kosmos smartfonem i wspieraj rozwój nauki

Badaj kosmos smartfonem i pracuj na Nobla – naukowcy z PK w projekcie CREDO

Rocznicowe seminarium CREDO w Instytucie Fizyki Jądrowej w Krakowie, 30-31.08.2017

- CREDO Inaguration

TVP3 Kraków – Kronika, EVENING NEWS – Smartfonowe obserwatorium

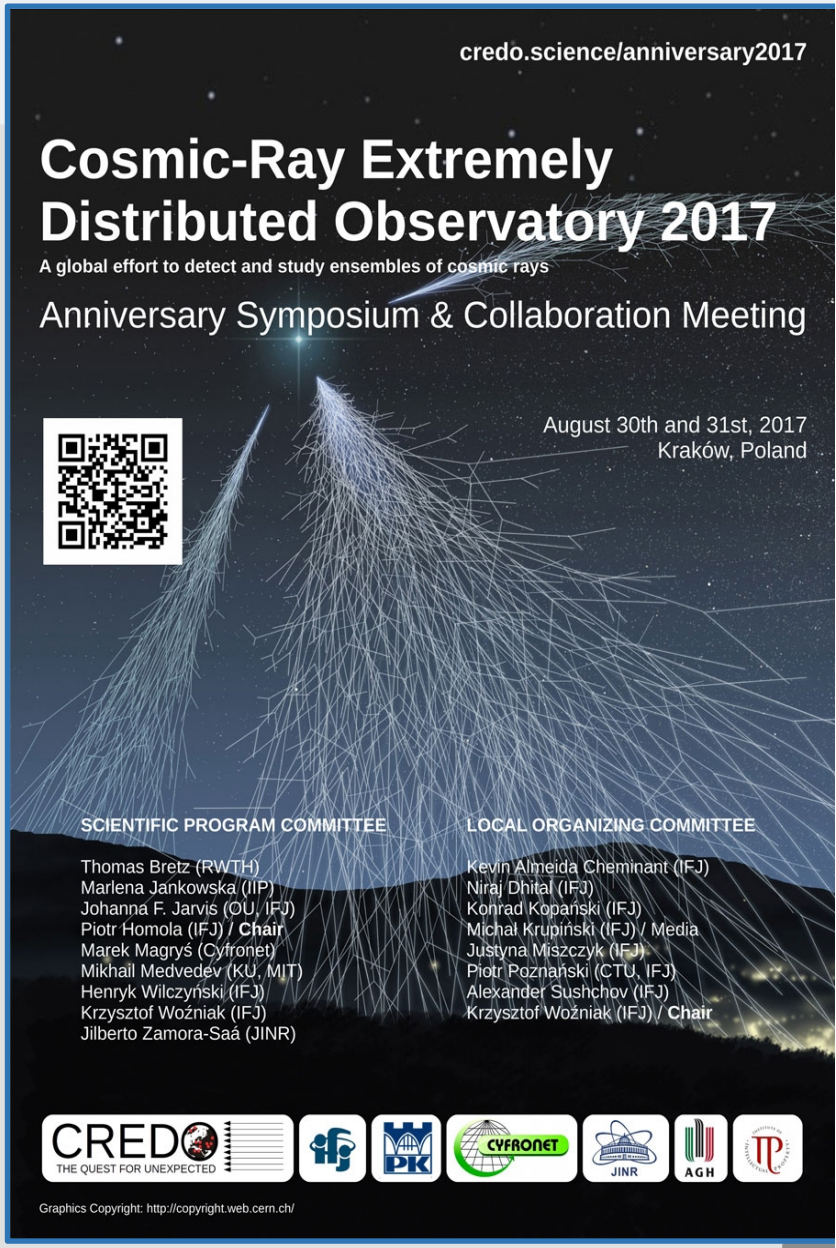
RMF24, Projekt CREDO: Pożycz nauce smartfona, może dostaniesz..... Nobla

Gazeta Wyborcza, Masz smartfona? Zostań odkrywcą, obserwuj promieniowanie kosmiczne

Radio Eska, Prace astrofizyków z Krakowa

Radio Kraków, Każdy może przyczynić się do ważnego odkrycia naukowego. Wystarczy... telefon komórkowy

Start projektu CREDO i jego możliwe implikacje dla rozwoju astrofizyki



http://credo.science/media-about-us/, 25.09.2017 r.

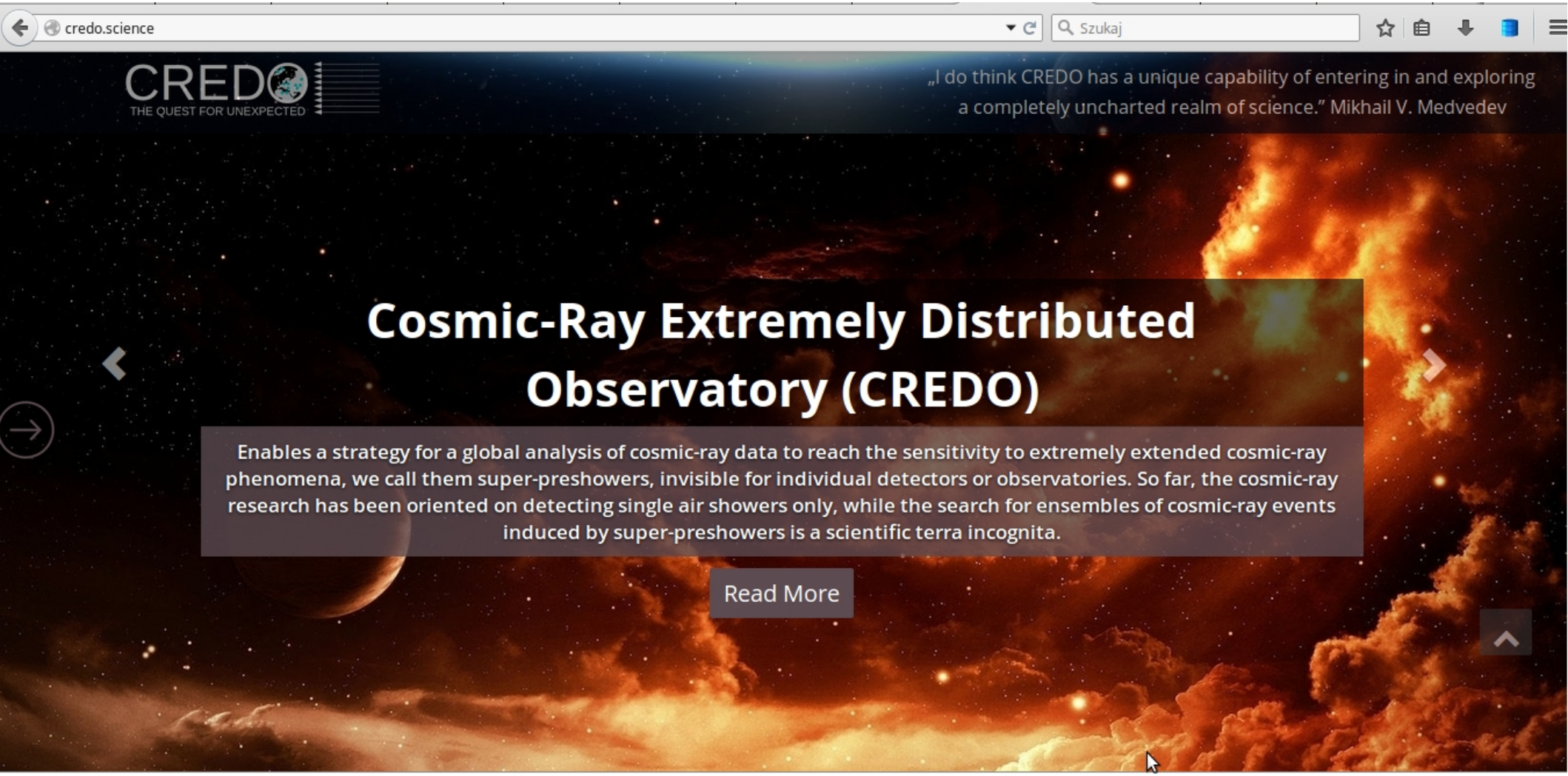
Public engagement / citizen science: a tool

new era in science:
Smart Science?

Public contribution (**co-authorship!**) to scientific success:

Level 1. supporting the growth → larger collaboration = better science
Level 2. data acquisition → more devices = better science
Level 3. data analysis → advanced members = better science
Level 4. education → deeper involvement = better science
Level 5. experience → **practical philosophy** = better science

Visit credo.science...



… and contribute to CREDO science.

CREDO

THE QUEST FOR UNEXPECTED

facebook /credo.science

Level 1:

growth/scale generation

http://credo.science
https://play.google.com/store/
apps/details?id=
science.credo.credomobiledetektor

CREDO
THE QUEST FOR UNEXPECTED

CREDO detector

Level 2:

data acquisition

CREDO Detector: examples

User: „smph-kitkat”, https://api.credo.science/web/user/smph-kitkat/
Team: „IFJ”
Device: Smasung Galaxy Grand Prime, model SM-G531F
System: Android 4.1.1
Average detection rate: ~10/hr

Example images:

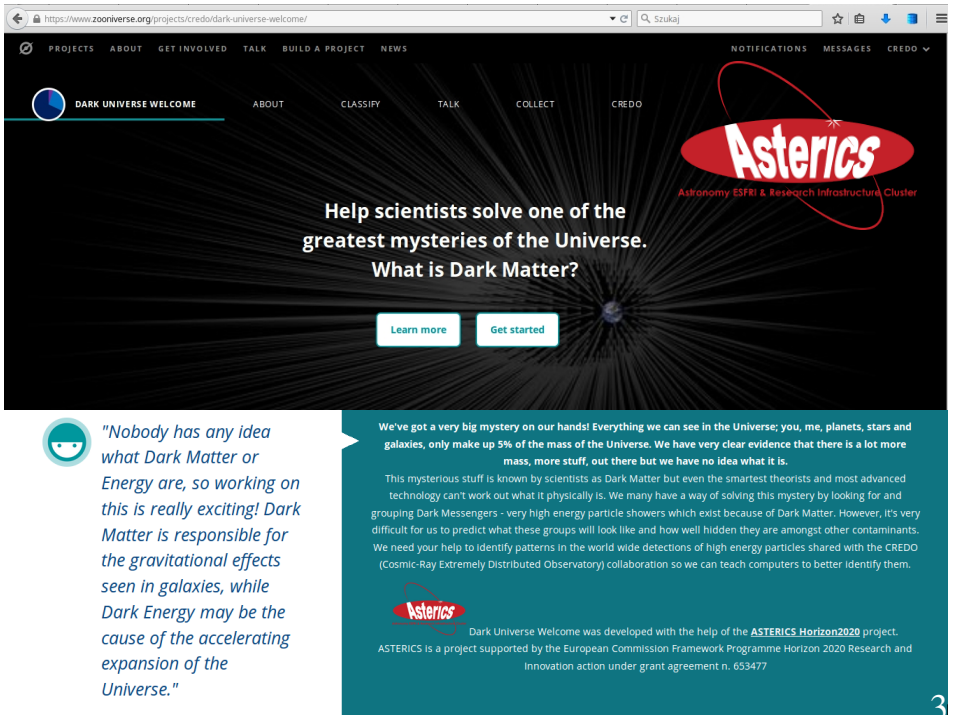


CREDO

THE QUEST FOR UNEXPECTED

Dark Universe Welcome

kategoria wiekowa: 7+



"Nobody has any idea what Dark Matter or Energy are, so working on this is really exciting! Dark Matter is responsible for the gravitational effects seen in galaxies, while Dark Energy may be the cause of the accelerating expansion of the Universe."

We've got a very big mystery on our hands! Everything we can see in the Universe; you, me, planets, stars and galaxies, only make up 5% of the mass of the Universe. We have very clear evidence that there is a lot more mass, more stuff, out there but we have no idea what it is.

This mysterious stuff is known by scientists as Dark Matter but even the smartest theorists and most advanced technology can't work out what it physically is. We many have a way of solving this mystery by looking for and grouping Dark Messengers - very high energy particle showers which exist because of Dark Matter. However, it's very difficult for us to predict what these groups will look like and how well hidden they are amongst other contaminants. We need your help to identify patterns in the world wide detections of high energy particles shared with the CREDO (Cosmic-Ray Extremely Distributed Observatory) collaboration so we can teach computers to better identify them.

Asterics

Dark Universe Welcome was developed with the help of the **ASTERICS Horizon2020** project. ASTERICS is a project supported by the European Commission Framework Programme Horizon 2020 Research and Innovation action under grant agreement n. 653477

3

Level 3:

data analysis

Public engagement as a scientific tool

The match: “IFJ” vs. “Team Rzezawa”

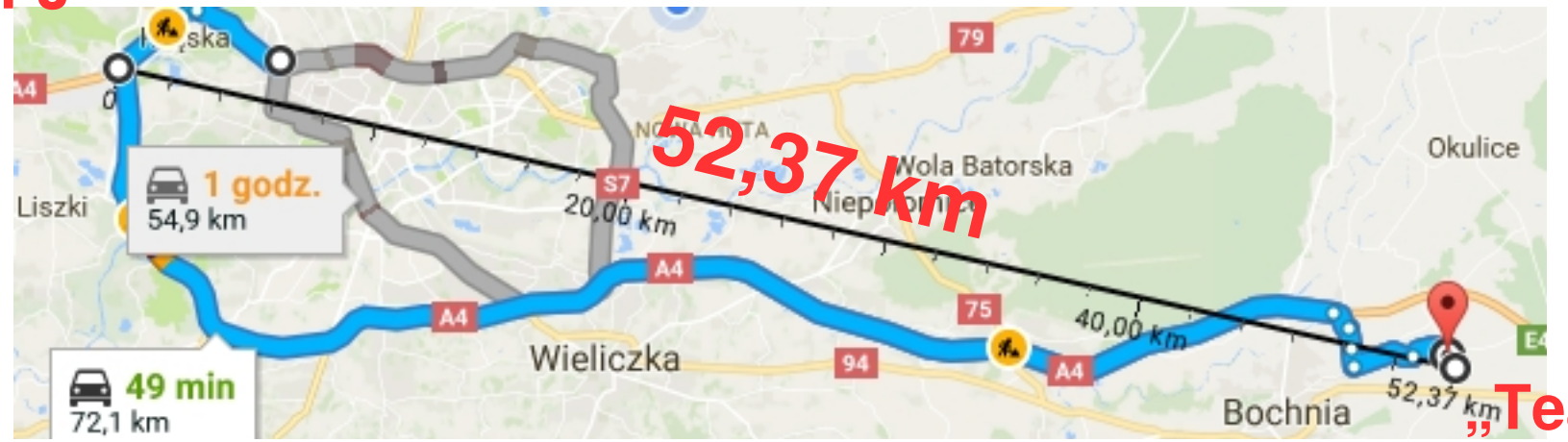
Discipline: **catching secondary cosmic ray particles with mobile devices with CREDO Detector**

When? 16.11.2017, 11:00 – 12:00

Where? IFJ PAN, Gimanzjum Publiczne Rzezawa, Poland, world

Transmitted live: CREDO YouTube Channel
Number of registered players: 32:30
Number of catched particles: 12:4
Final score: -135 do -257

„IFJ”



„Team Rzezawa”

Level MAX: fun and emotions

Quantum Gravity with gamma astronomy

https://www.ucdavis.edu/news/gamma-ray-delay-may-be-sign-new-physics

UCDAVIS

Quick Links

ABOUT US ADMISSIONS ACADEMICS RESEARCH CAMPUS LIFE NEWS

Gamma Ray Delay May Be Sign of 'New Physics'

Delayed gamma rays from deep space may provide the first evidence for physics beyond current theories.

The MAGIC (Major Atmospheric Gamma-ray Imaging Cherenkov) telescope found that high-energy photons of gamma radiation from a distant galaxy arrived at Earth four minutes after lower-energy photons, although they were apparently emitted at the same time. If correct, that would contradict Einstein's theory of relativity, which says that all photons (particles of light) must move at the speed of light.

"Everybody's very excited," about this result, said Daniel Ferenc, a physics professor at UC Davis and a member of the MAGIC collaboration. Ferenc cautioned that the results need to be repeated with other gamma-ray sources and that a simpler explanation had not been ruled out. But, "it shows that such measurements are possible," he said.

The researchers propose that the delay could be caused by photons interacting with "quantum foam," a type of structure of space itself. Quantum foam is predicted by quantum gravity theory, an attempt to unite quantum physics and relativity at cosmic scales.

UC Davis Chancellor May Announces Emily Galindo and Rahim Reed to Fill Interim Leadership Roles
March 13, 2018

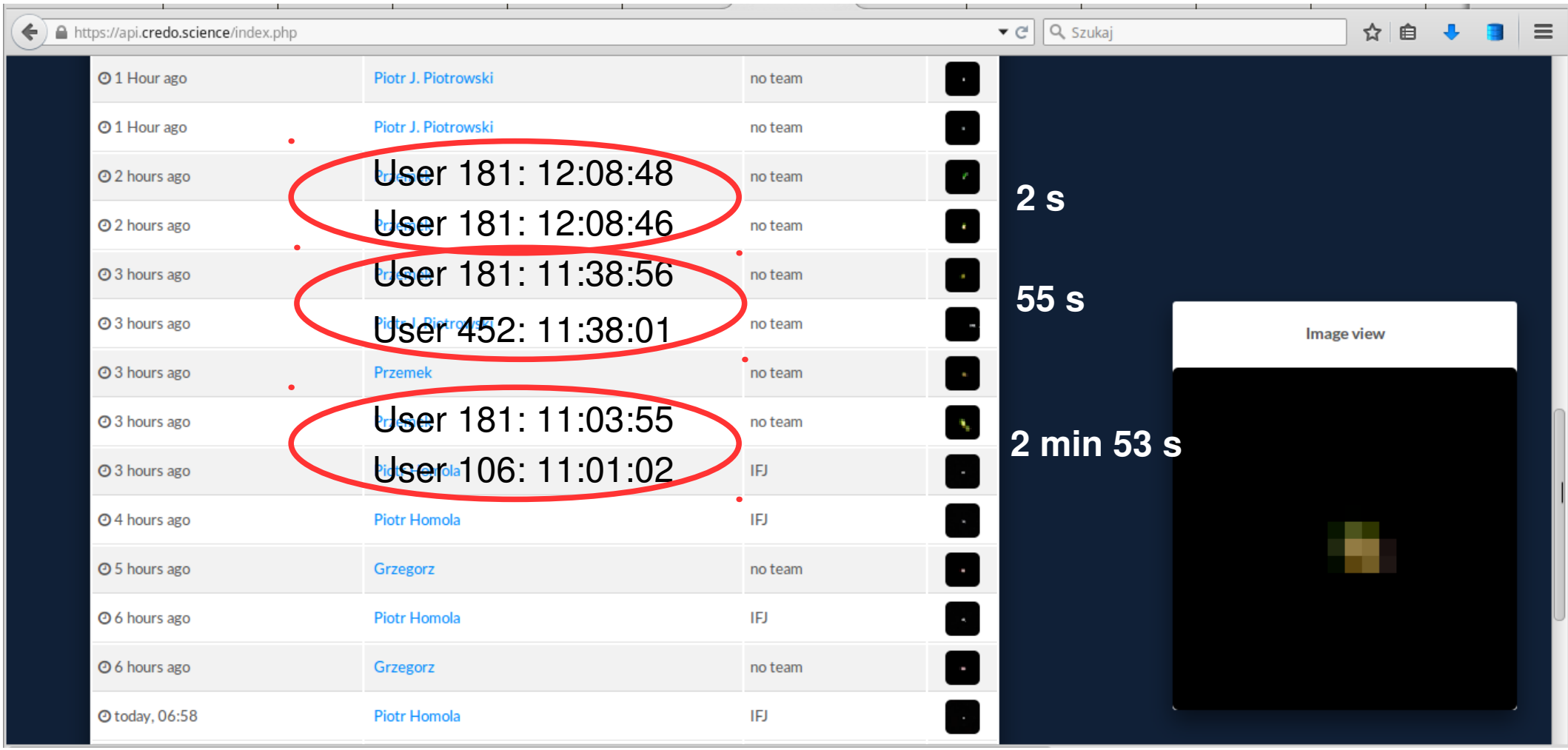
→ 4 min. delay could be the signature of a special space structure: Quantum foam

→ predicted by Quantum Gravity

Quantum Gravity with smartphones!

On-line experiment: broadcasting live at api.credo.science

Once upon a time, and more precisely on 16.03.2018, around 11:00 CET...



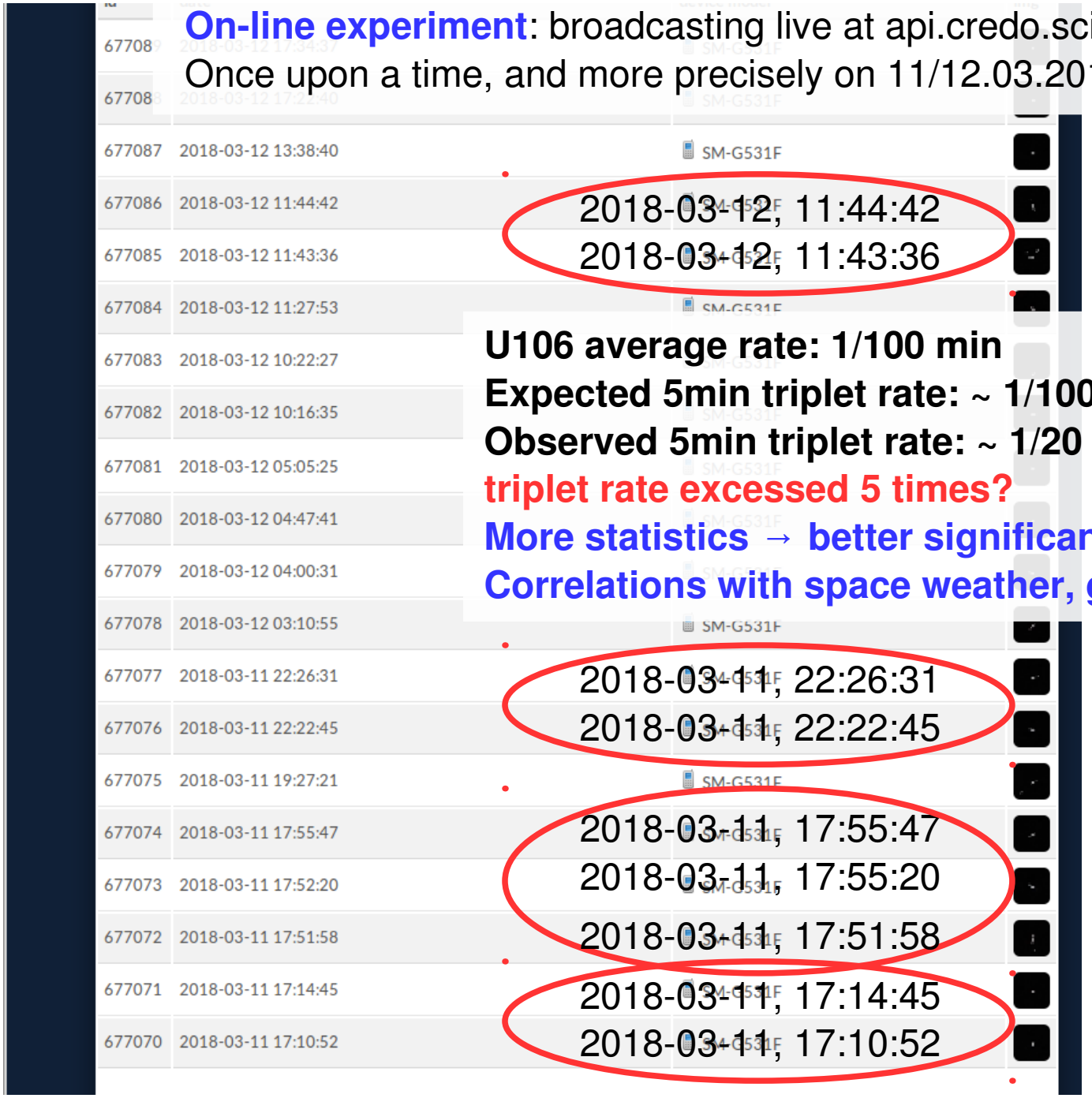
Expected vs. Observed?

doublet / triplet / multiplet rate, duration of doublets,

distance between the multiplet detection sites, geographical alignment of the lines, ...

Quantum Gravity with a smartphone!

On-line experiment: broadcasting live at api.credo.science
Once upon a time, and more precisely on 11/12.03.2018, at user's 106 house...



2018-03-12, 11:44:42
2018-03-12, 11:43:36

1 min 6 s

U106 average rate: 1/100 min
Expected 5min triplet rate: ~ 1/100 days
Observed 5min triplet rate: ~ 1/20 days
triplet rate excessed 5 times?
More statistics → better significance
Correlations with space weather, geomagnetic changes?

2018-03-11, 22:26:31
2018-03-11, 22:22:45

3 min 46 s

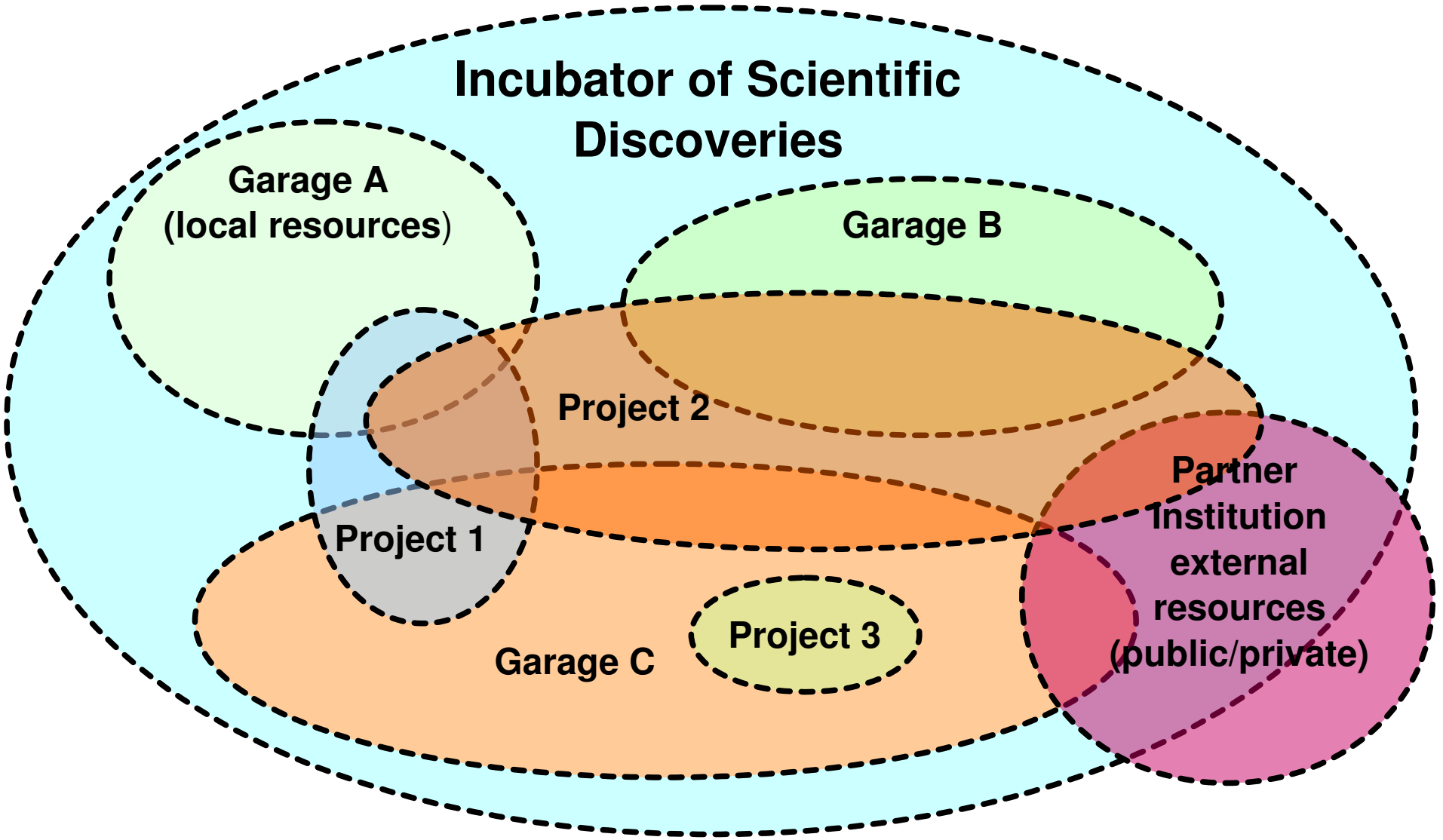
2018-03-11, 17:55:47
2018-03-11, 17:55:20
2018-03-11, 17:51:58

3 min 49 s (a triplet!)

2018-03-11, 17:14:45
2018-03-11, 17:10:52

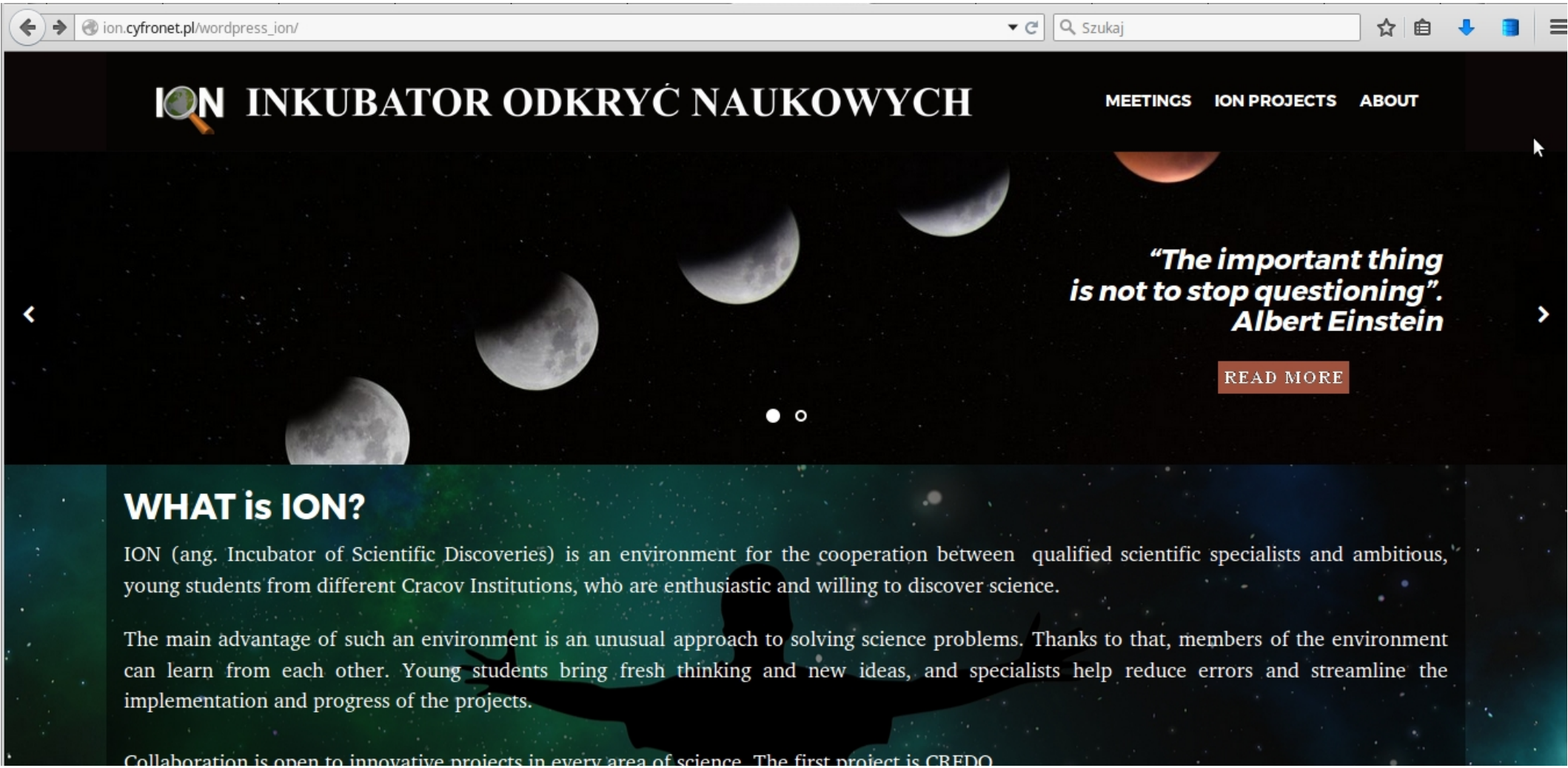
3 min 53 s

Incubator of Scientific Discoveries: vision



Resources: money, space, tools, skills, competencies, advise, ...
Projects!: team, goal, road map, budget, action, reports, **continuity** → **discoveries!**
Distributed = access to more resources = **synergy** = better chance for discoveries.

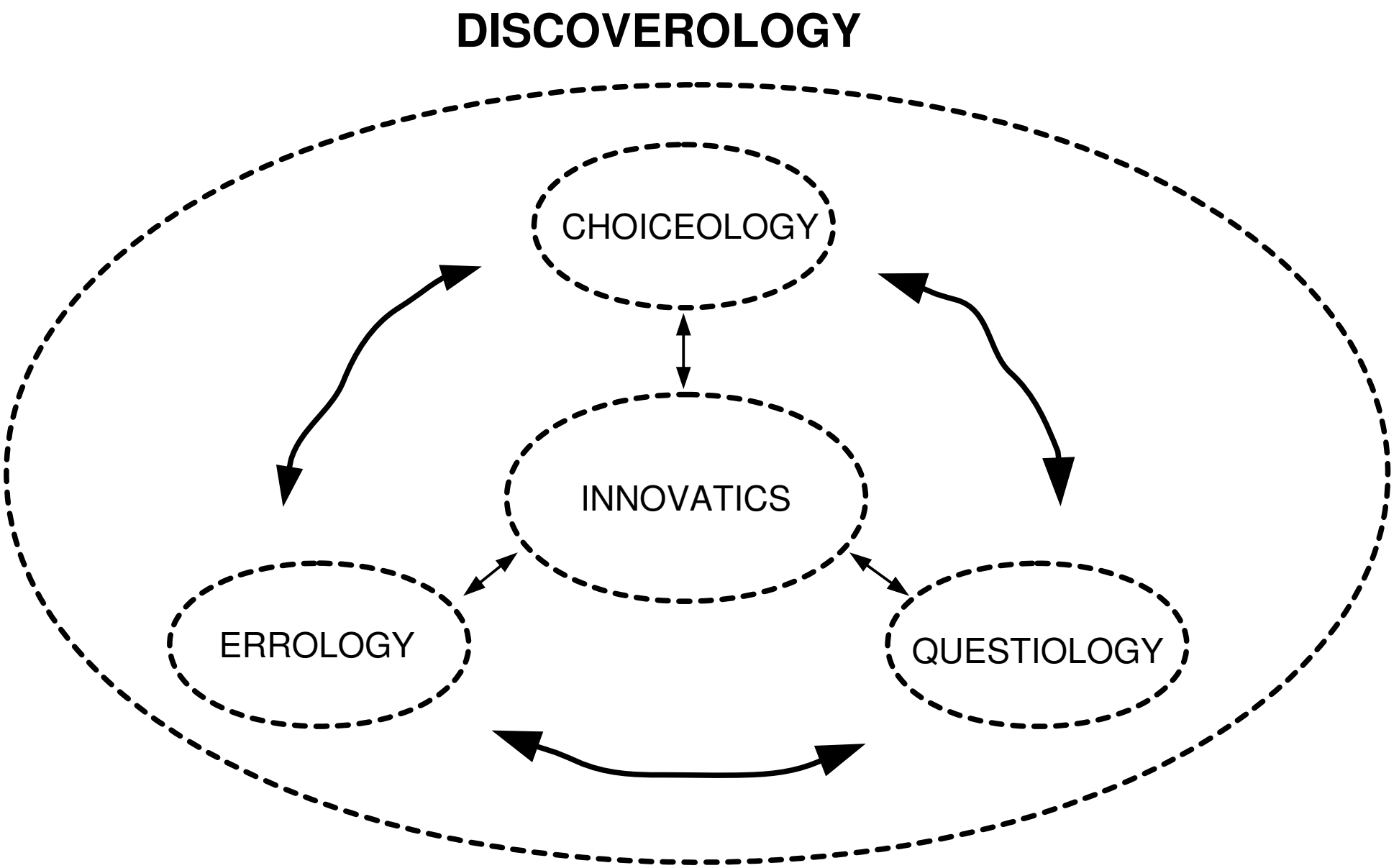
Incubator of Scientific Discoveries



Begin your journey to the Nobel Prize early...

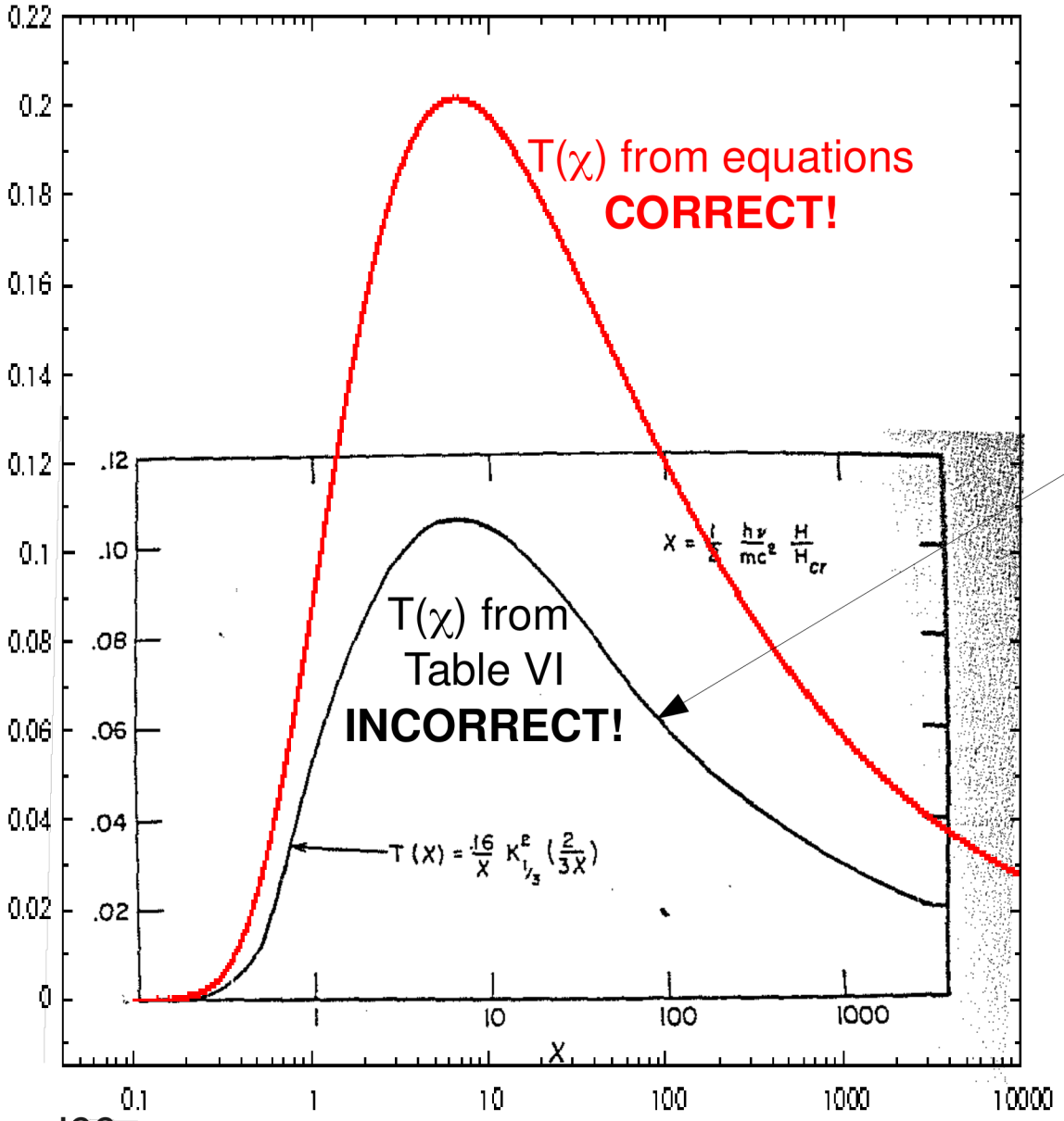
Example upcoming training: **"Mentality of discoverers" [psychology]**

Training to discoveries or... discipline?



from: P. Homola, “Introduction to Discoverology”, chapter in “AI: Law, Philosophy & Geoinformatics”, 2018

ERROLOGY: do I do well?



Erber '66:

FIG. 9. The magnetic pair production function $T(\chi)$; compare (3.4a-d).

Erber '66:

TABLE VI. The magnetic pair production function $T(\chi)$.

χ	$T(\chi)$
0.2	2×10^{-4}
0.3	2.2×10^{-3}
0.4	6.6×10^{-3}
0.7	0.026
1.2	0.055
3.0	0.094
5.0	0.10
6.0	0.10
7.0	0.10
9.0	0.10
15	0.099
30	0.085

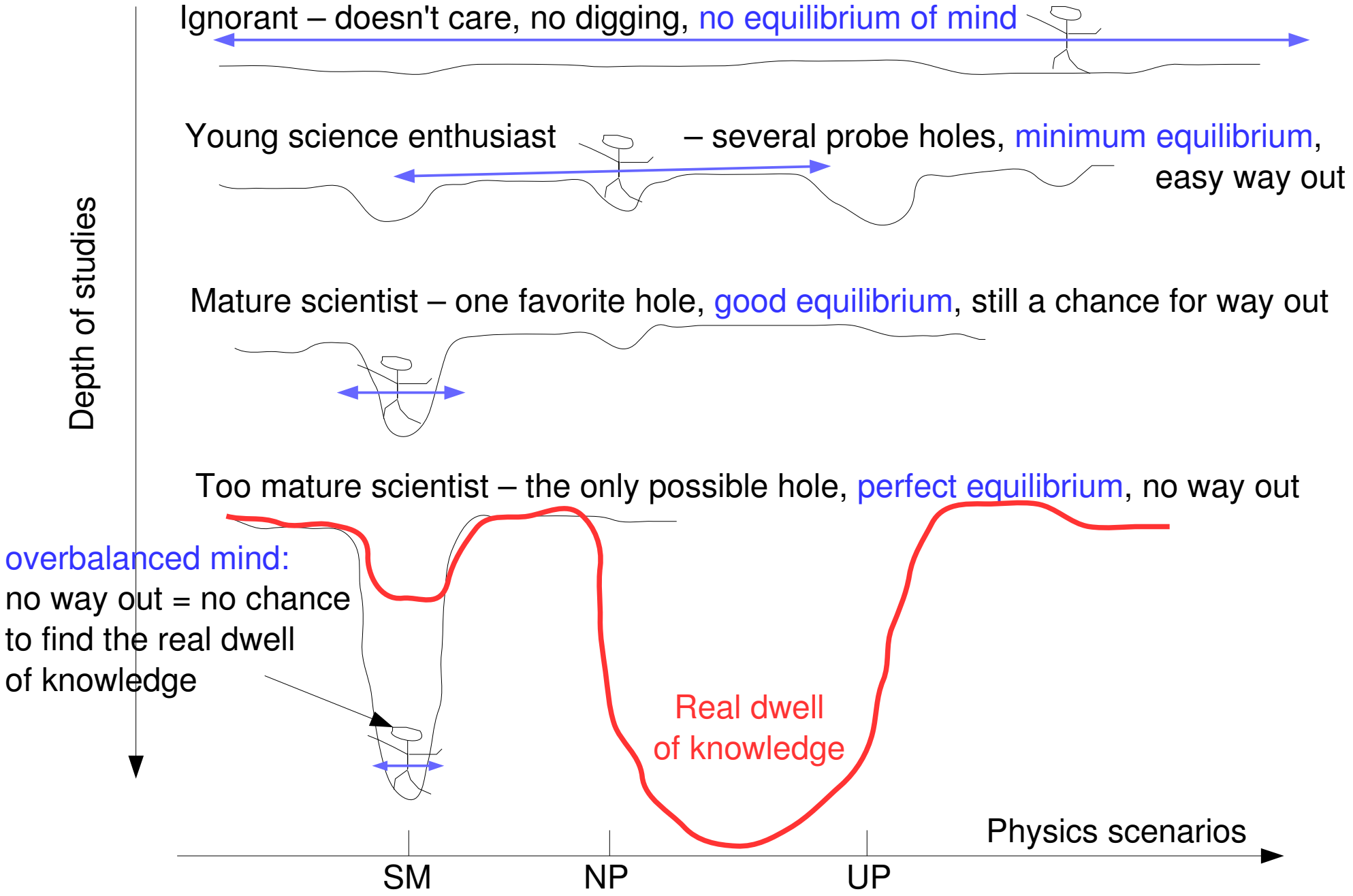
INCORRECT!

T(χ) from equations significantly larger than in Table VI of the standard reference Erber '66.

Taking T(χ) values from Table VI leads to an **underestimation** of pair production probability [!].

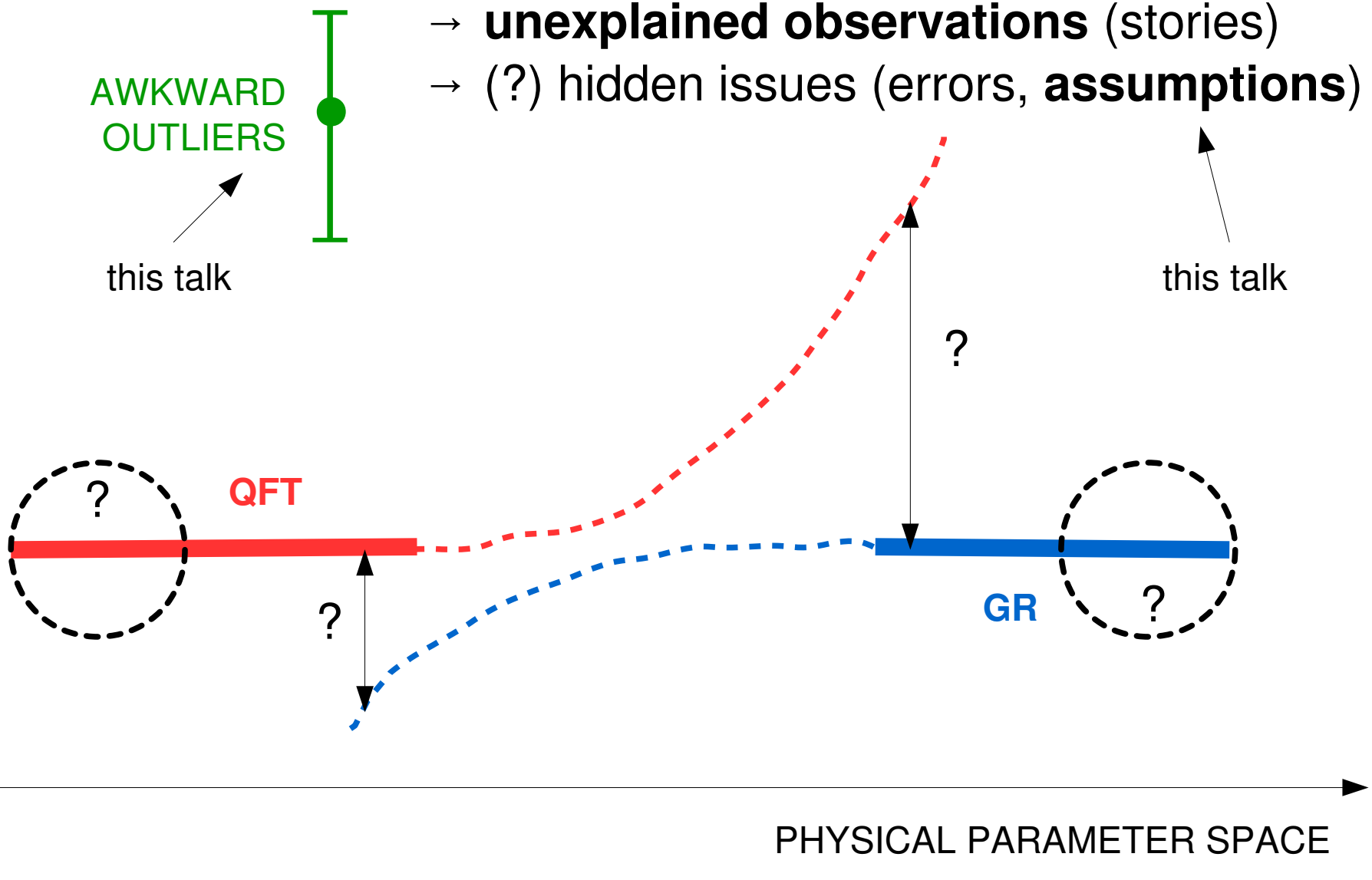
Mistake mentioned in:
→ Homola et al. 2005
→ Klein 2006

Digging a well of knowledge or why young is good



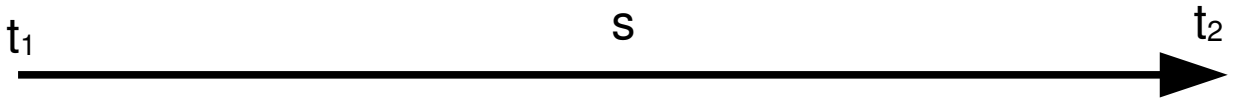
Understanding the Universe

→ key theories disagree
→ **unexplained observations** (stories)
→ (?) hidden issues (errors, **assumptions**)



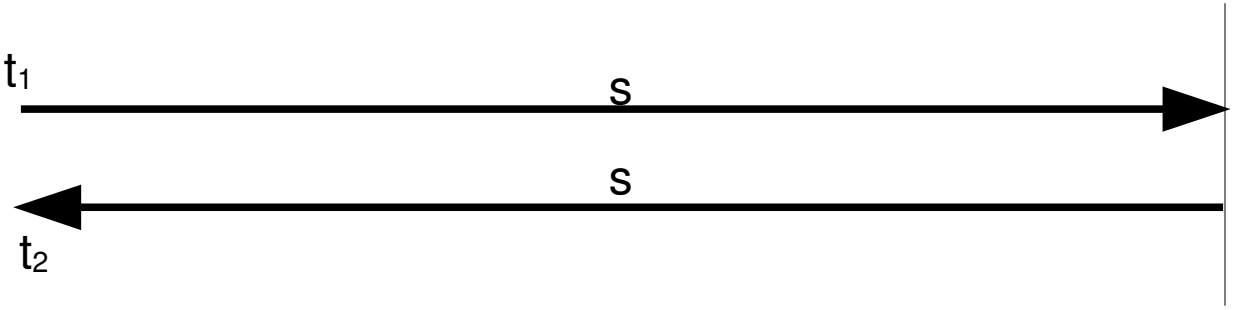
Speed of light = c? Which speed of light:...

… „one-way" or ...



$v_{light\text{-}one\text{-}way} = s/(t_2 - t_1)$

… „two-way"?



$v_{light\text{-}two\text{-}way} = 2s/(t_2 - t_1)$

… potential and beyond

Wolfram's Everything

Piotr Homola

Institute of Nuclear Physics PAN

CREDO Week, Discoverology Workshop, 1.10.2018

“We need new ideas”

https://www.livescience.com/63692-standard-model-broken-supersymmetry-new-physics.html

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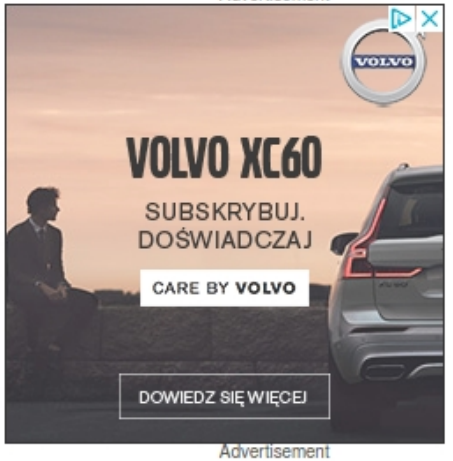
Bizarre Particles Keep Flying Out of Antarctica's Ice, and They Might Shatter Modern Physics

By Rafi Letzter, Staff Writer | September 26, 2018 08:16pm ET



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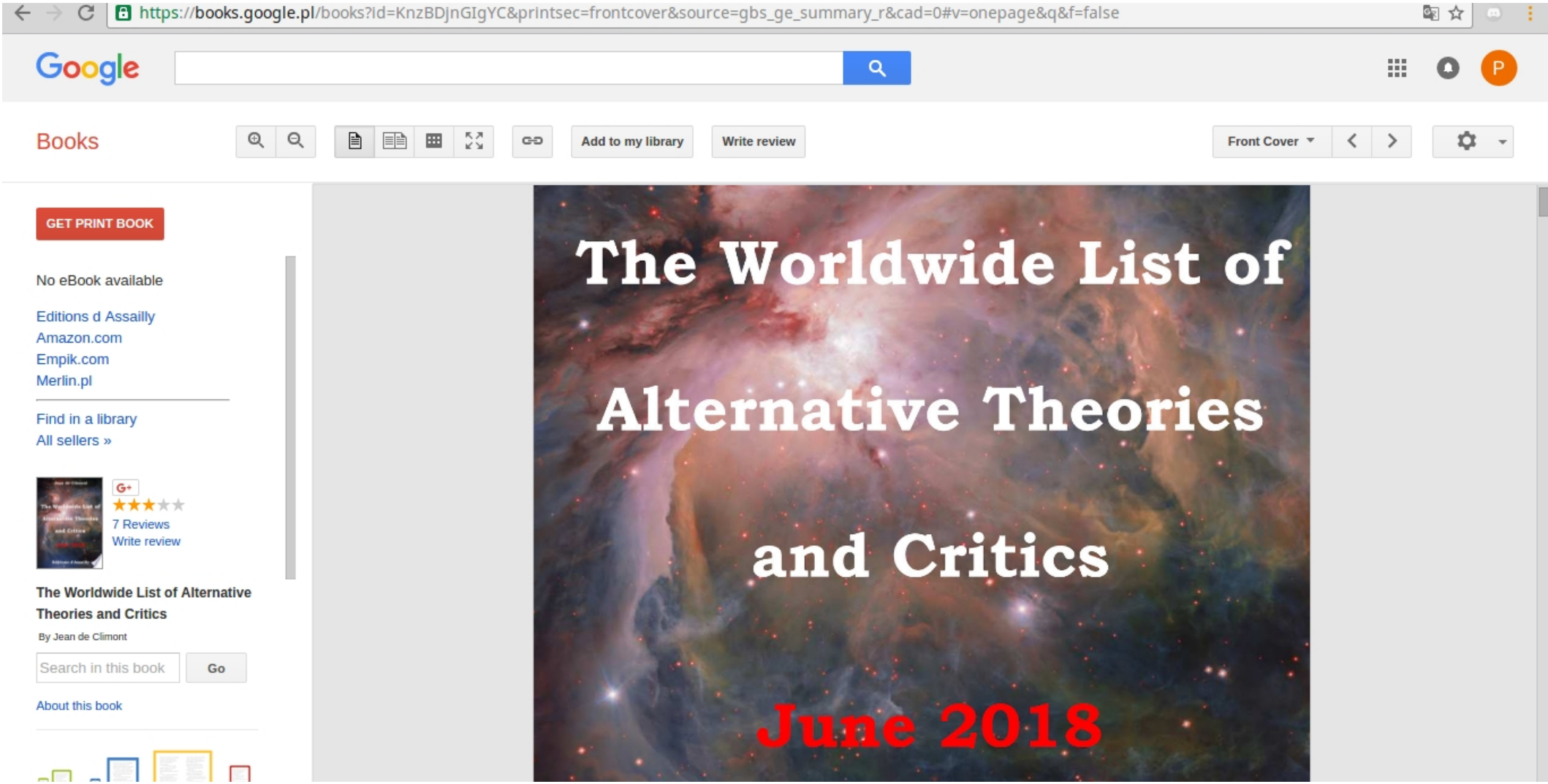
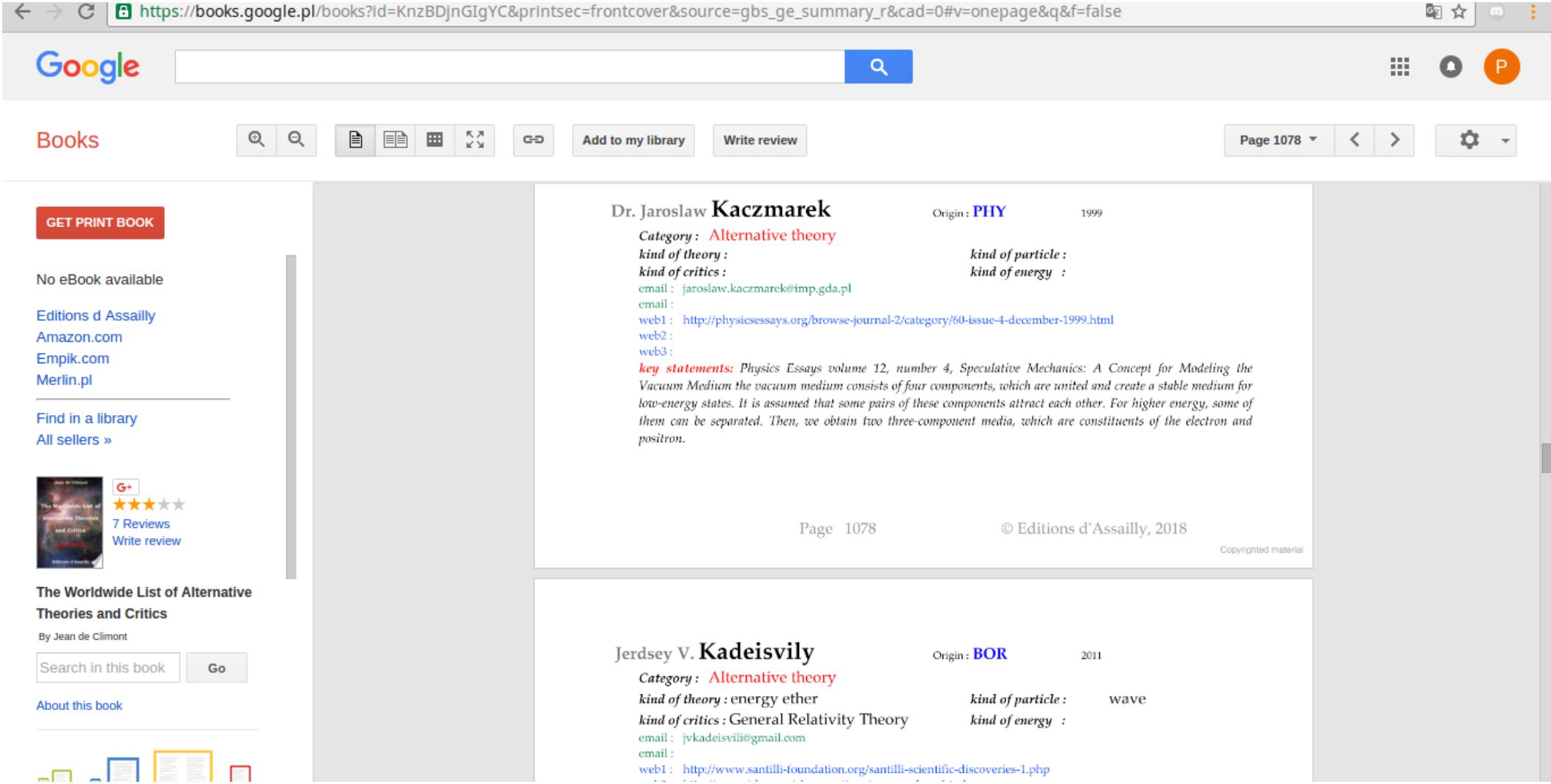
Well, how about...



Well, how about...



Dr. Jarosław Kaczmarek, **p. 1078**

Alternatives...

Vacuum medium mechanics as unified theory of elementary particle interactions - current stage of development

Jarosław Kaczmarek
Institute of Fluid-Flow Machinery, Polish Academy of Sciences,
80-231 Gdańsk, ul. J.Fiszera 14, Poland

Abstract

In this work a mathematical description of processes considered within multicomponent vacuum medium is discussed. First part of this work is devoted to description of electromagnetic field for low energy where the description is predominantly linear and for higher energy where the equations are nonlinear. In particular nonlinear description of electric field in vicinity of charged particle is consistently described together with Coulomb type field considered on larger distances from the particle. One also describes, by nonlinear equations, effects which appear in electromagnetic wave and are interpreted as precreation states. States of the vacuum medium which are responsible for generation of the wave function are discussed. In particular one postulates existence of the chain state of charged particles. Introduced properties of the vacuum medium

Alternatives...

blog.stephenwolfram.com/2015/12/what-is-spacetime-really/

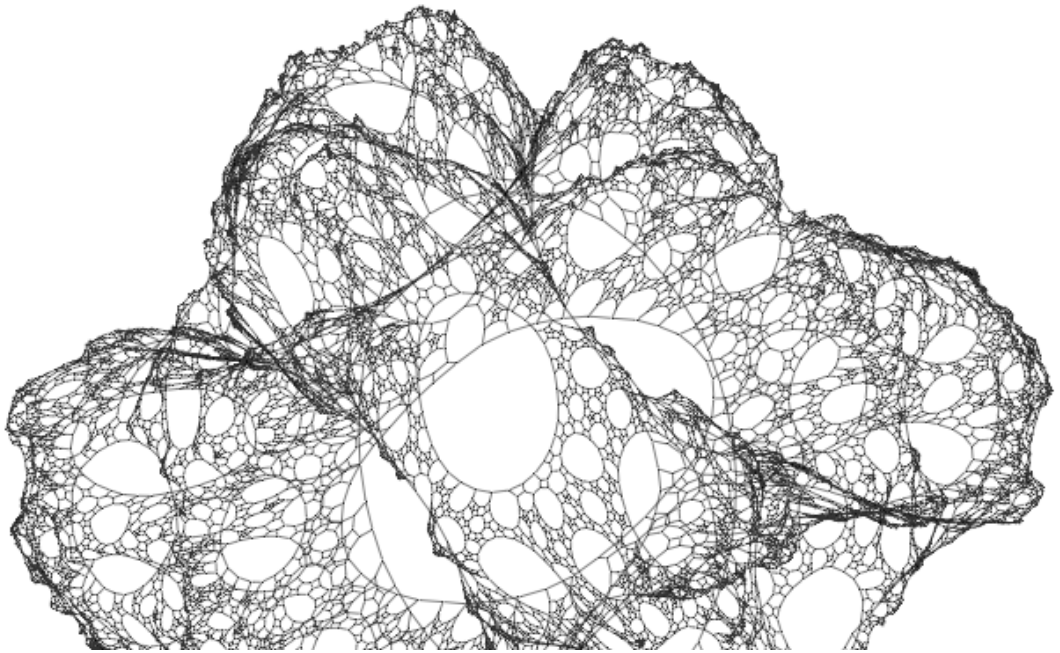
STEPHEN WOLFRAM | Blog

kelvin

ABOUT BLOG PUBLICATIONS MEDIA SCRAPBOOK CONTACT

What Is Spacetime, Really?

December 2, 2015



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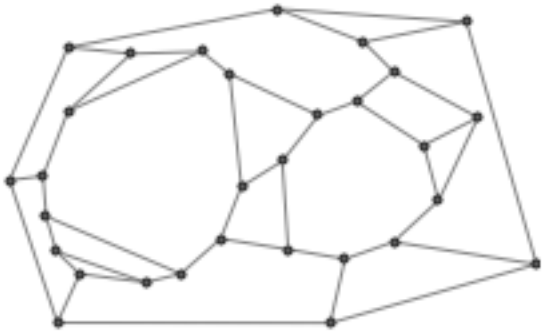
April 1, 2018

Wolfram: simple ultimate theory?

Wolfram's Blog, What is Spacetime, Really?

A Simple Ultimate Theory?

In the abstract it's far from obvious that there should be a simple, ultimate theory of our universe.... what I discovered is that in the computational universe even extremely simple programs can actually show behavior as complex as anything. So then the question arises: could one of these simple programs in the computational universe actually be the program for our physical universe?

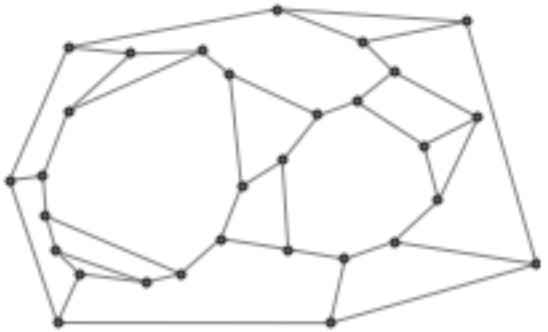


Wolfram: … “knots in the ether” ...

Wolfram's Blog, What is Spacetime, Really?

Maybe There’s Nothing But Space

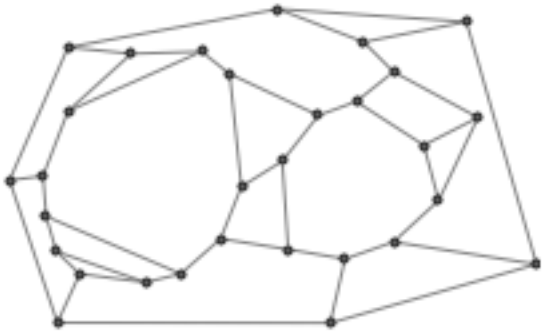
But, OK, if space is a network, what about all the stuff that’s in space? What about all the electrons, and quarks and photons, and so on? In the usual formulation of physics, space is a backdrop, on top of which all the particles, or strings, or whatever, exist. But that gets pretty complicated. And there’s a simpler possibility: **maybe in some sense everything in the universe is just “made of space”**.



Wolfram: … “knots in the ether” ...

Wolfram's Blog, What is Spacetime, Really?

Particles, Quantum Mechanics, Etc.
It’s wonderful to be able to derive General Relativity. But that’s not all of physics. Another very important part is quantum mechanics. It’s going to get me too far afield to talk about this in detail here, but presumably particles – like electrons or quarks or Higgs bosons – must exist as certain special regions in the network. In qualitative terms, they might not be that different from Kelvin’s “knots in the ether”.



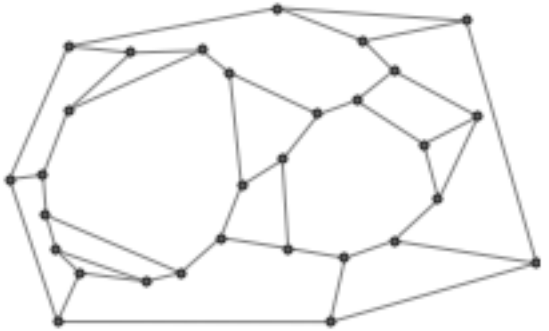
Wolfram and discoverology

Wolfram's Blog, What is Spacetime, Really?

To Do Physics, or Not to Do Physics?

...The first is simply, “You’ve got to do it!” They say that the project is the most exciting and important thing one can imagine, and they can’t see why I’d wait another day before starting on it. The second class of responses is basically, “Why would you do it?” Then they say something like, “Why don’t you solve the problem of artificial intelligence, or molecular construction, ... There’s also a third class of responses, which I suppose my knowledge of the history of science should make me expect. **It’s typically from physicist friends**, and typically it’s some combination of, **“Don’t waste your time working on that!”** and, **“Please don’t work on that.”** The fact is that the current approach to fundamental physics – through quantum field theory – is nearly 90 years old. It’s had its share of successes, but it hasn’t brought us the fundamental theory of physics. But for most physicists today, the current approach is almost the definition of physics. So when they think about what I’ve been working on, it seems quite alien – like it isn’t really physics. And some of my friends will come right out and say, “I hope you don’t succeed, because then all that work we’ve done is wasted.

We need new ideas!



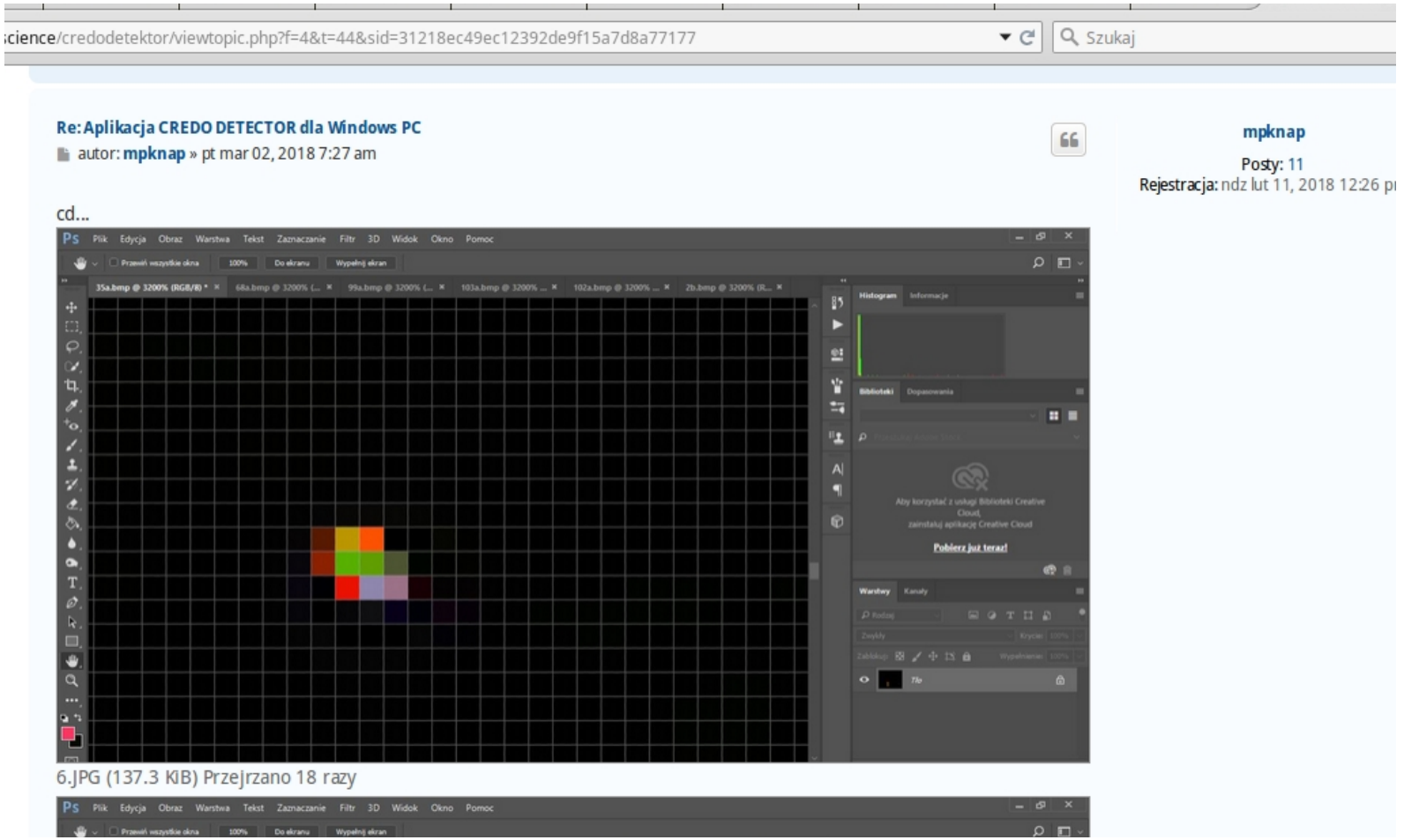
CREDO attracts... e.g. Ukrainian youth

ca. 250,000 talented youth! ca. 20% technical/scientific!

→ CREDO invited to discuss partnership!

CREDO attracts... also non-experts

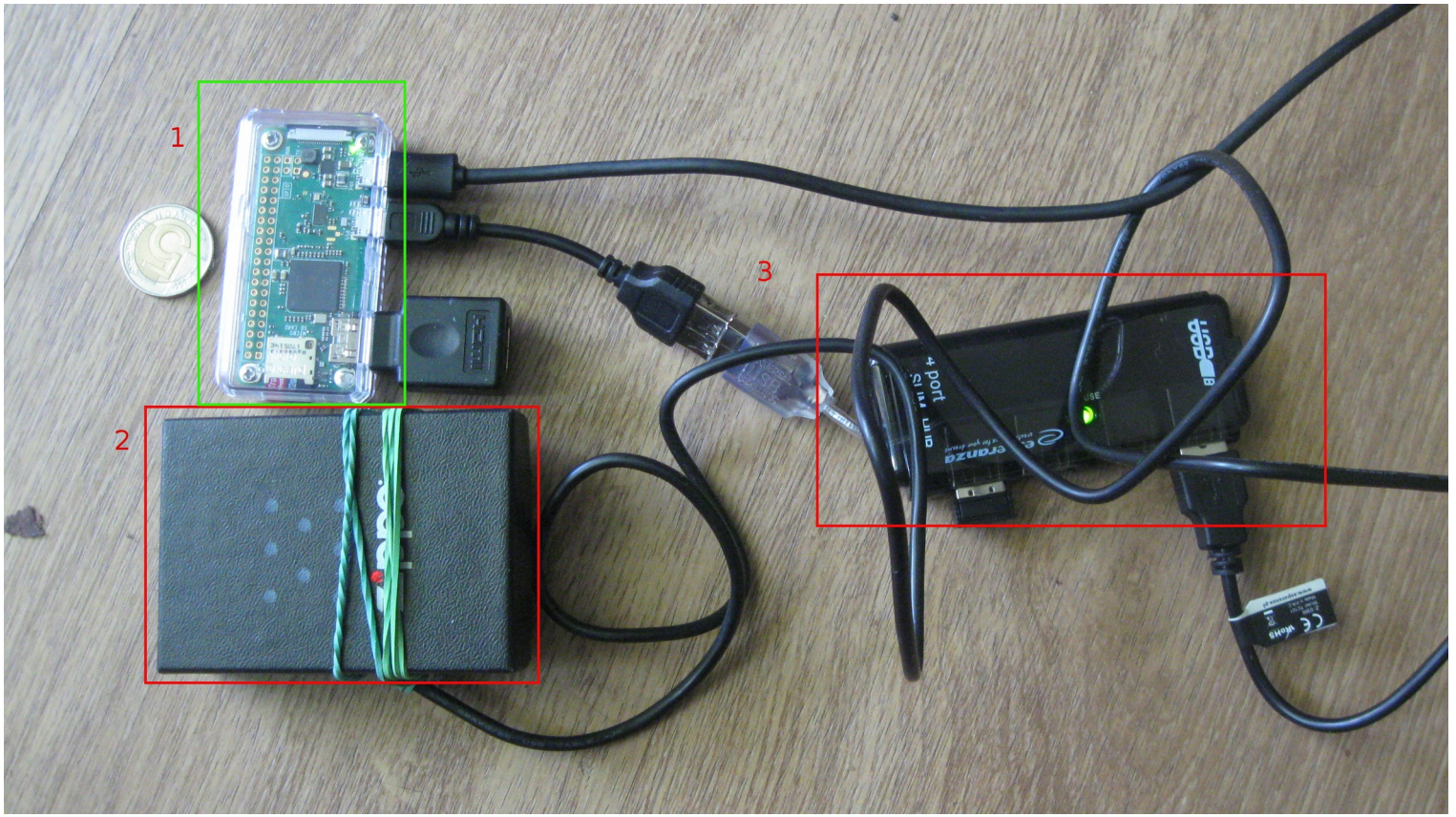
→ **PC application to catch particles with an internet camera, by a 41-year old science enthusiast!**



Info & download [author: Marek Knap]:
https://credo.science/credodetektor/viewtopic.php?f=3&t=45

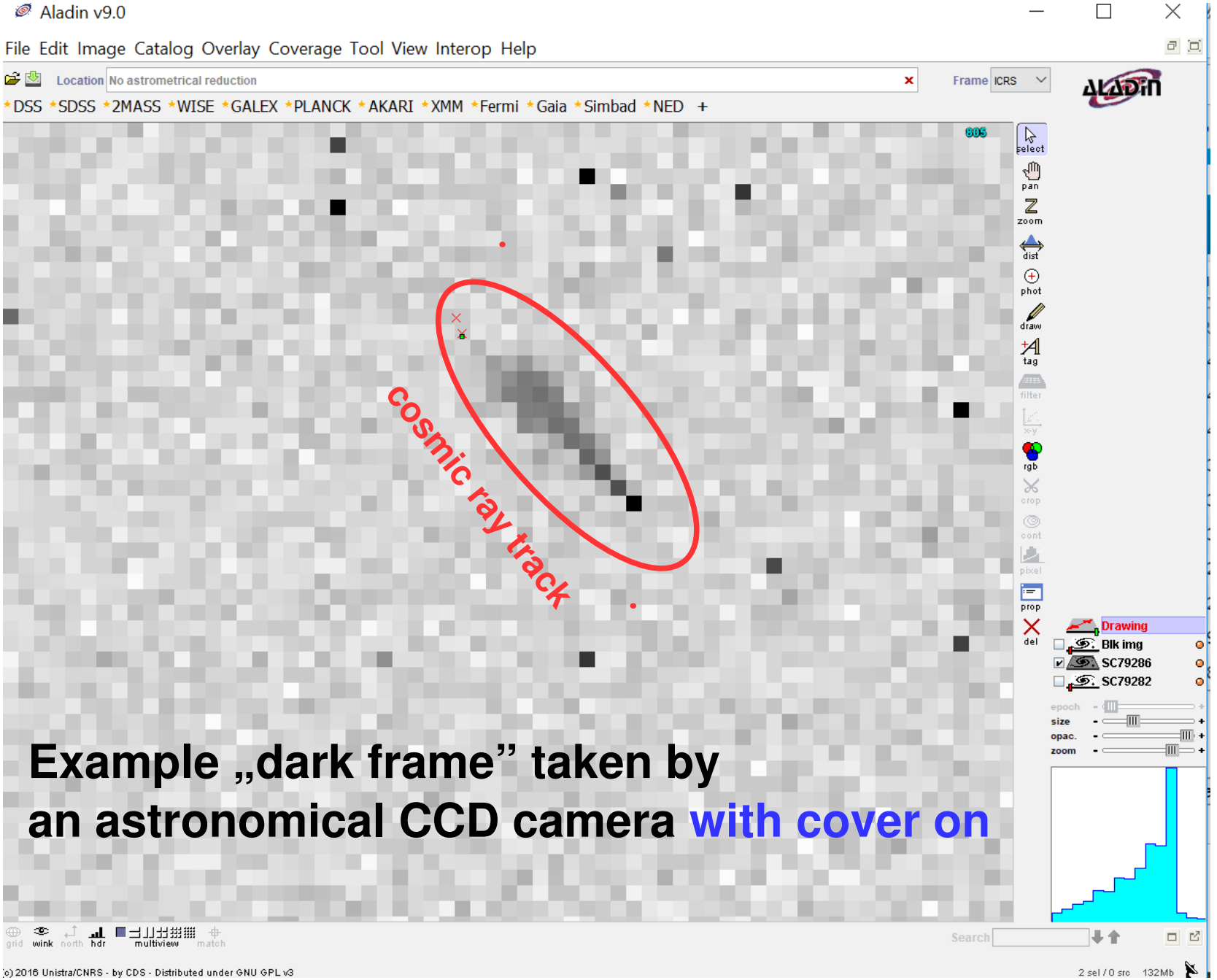
CREDO attracts... also non-experts

→ **PC application: linux version working with RasperryPi!**
By „TrueTom”



Info [author: Tomek/TrueTom]:
https://github.com/prawdziwytomasz/TrueTom/tree/Credo-Linux

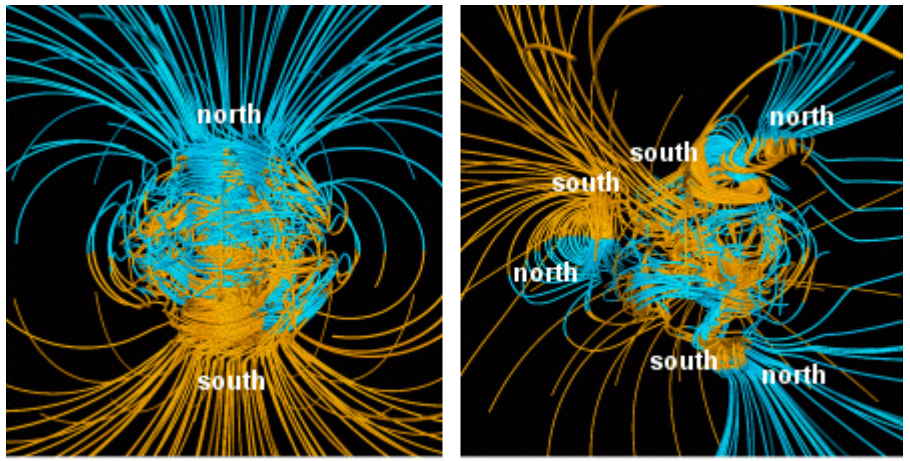
CREDO attracts... astronomers!



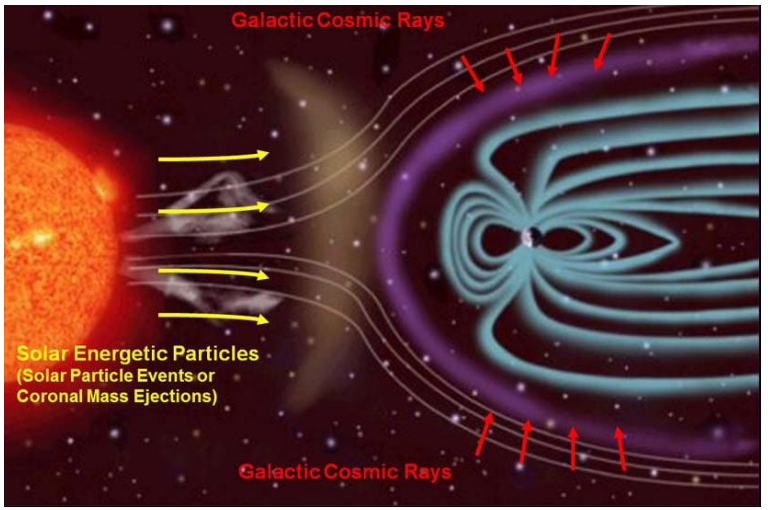
Credit & idea by Massimo Ramella (INAF)

CREDO and p. 18: interdisciplinary opportunities

Wikipedia: „Geomagnetic reversal”



Wikipedia: „Health threat from cosmic rays”



Earth outer core: Liquid (molten iron)
→ geomagnetism

↓

Impulse (tidal forces)
→ hydrodynamics: waves

↓

→ Mechanical wave upwards (slow, hours?)
→ Electromagnetic wave („instant”, ms)

↓

Local geomagnetic field vector changes
AND seismic effect might occur!

↓

Variation of the CR rate!

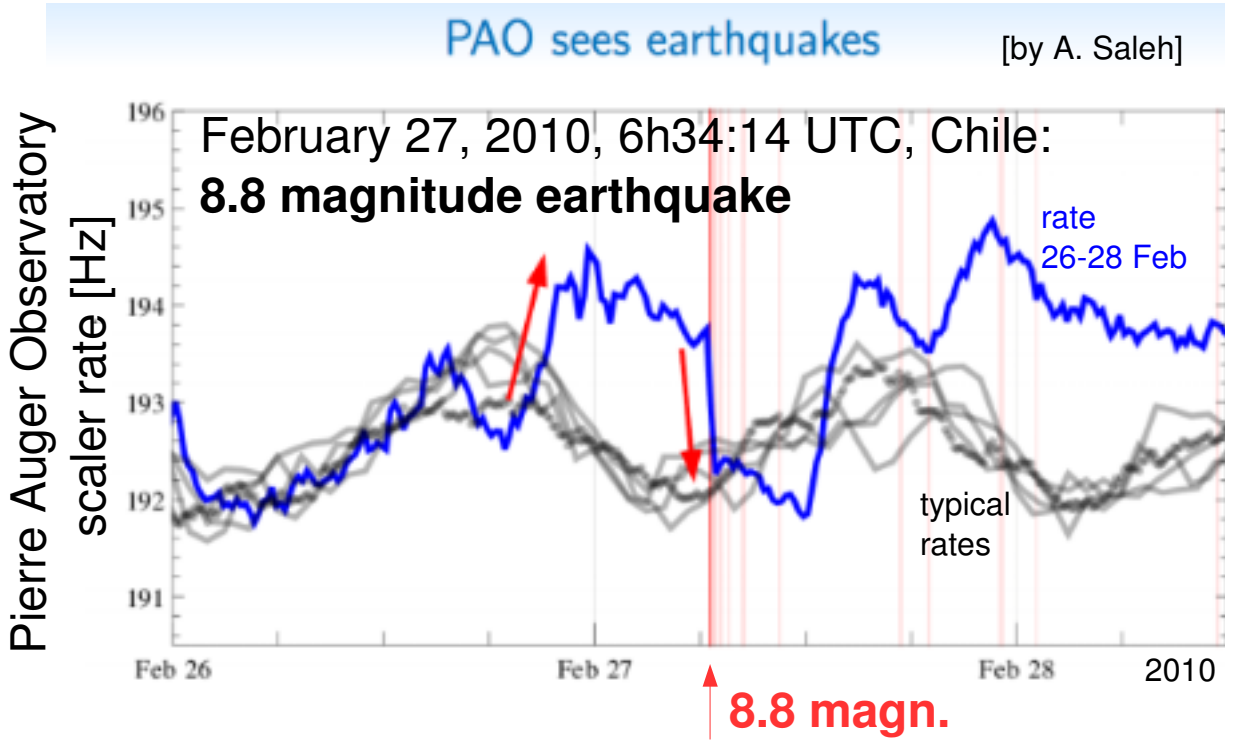
↓

Earthquake precursors?

CREDO

THE QUEST FOR UNEXPECTED

Scientific diversity: GEO



→ **CREDO-earthquakes task** [already existing]

Inhabitants of territories threatened by earthquakes [= potential CREDO public egagement target]:

2,7 billion people

Science as a service to the human community?

Even the smallest chance to save lives

= **a must check!**

CREDO

THE QUEST FOR UNEXPECTED

Scientific diversity: BIO

[Livescience.com, October 11, 2016]

On a Long Trip to Mars, Cosmic Radiation May Damage Astronauts' Brains

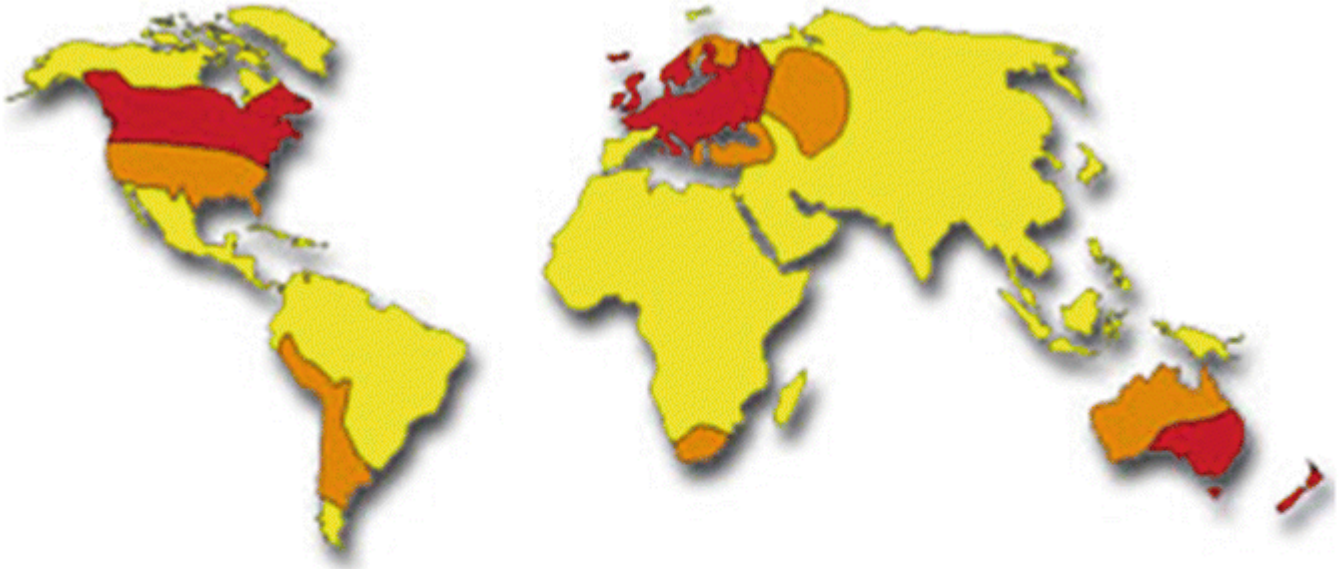
… and how can cosmic rays affect us on Earth?

Imagine a global network of cosmic ray detectors and global data on EEG...

CREDO

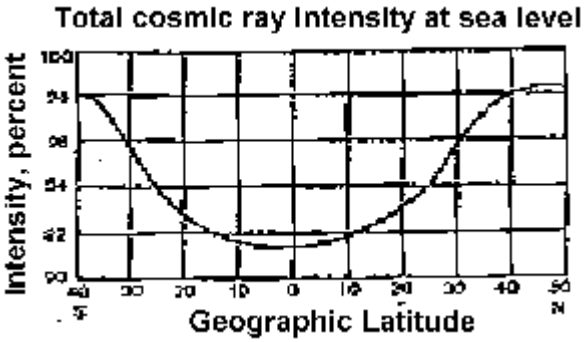
THE QUEST FOR UNEXPECTED

Scientific diversity: BIO



Worldwide distribution of MS

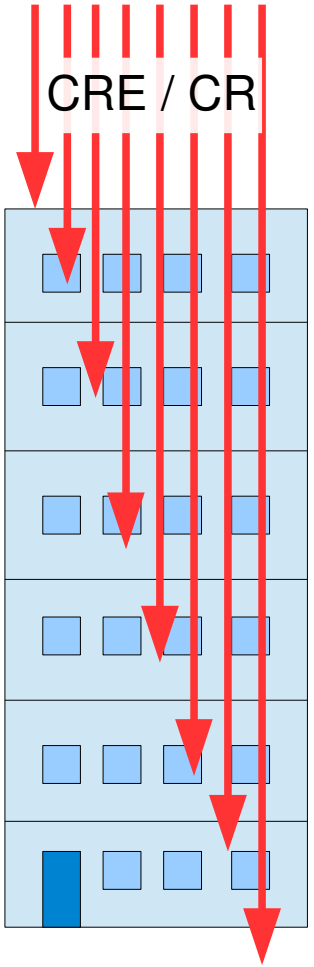
- Higher than 30/100,000
- Between 5/100,000 and 30/100,000
- Below 5/100,000



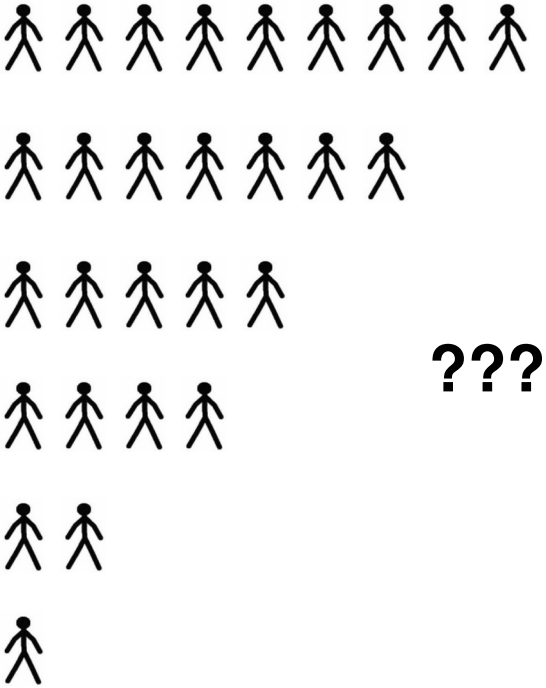
http://www.geoexplo.com/airborne_survey_workshop_rad.html

Costelloe L., Fletcher J., Fitzgerald D. (2016) Neuroinflammatory Disorders. In: Hardiman O., Doherty C., Elamin M., Bede P. (eds) Neurodegenerative Disorders. Springer, Cham, https://doi.org/10.1007/978-3-319-23309-3_15

multiple sclerosis and cosmic rays: the floor test???



or



???

success guaranteed?

Mission

N_{ATM} >= 1 → scenarios + fishing / Education

Strategy

Spread globally & grow giant → „1 million colleagues”

Tactics

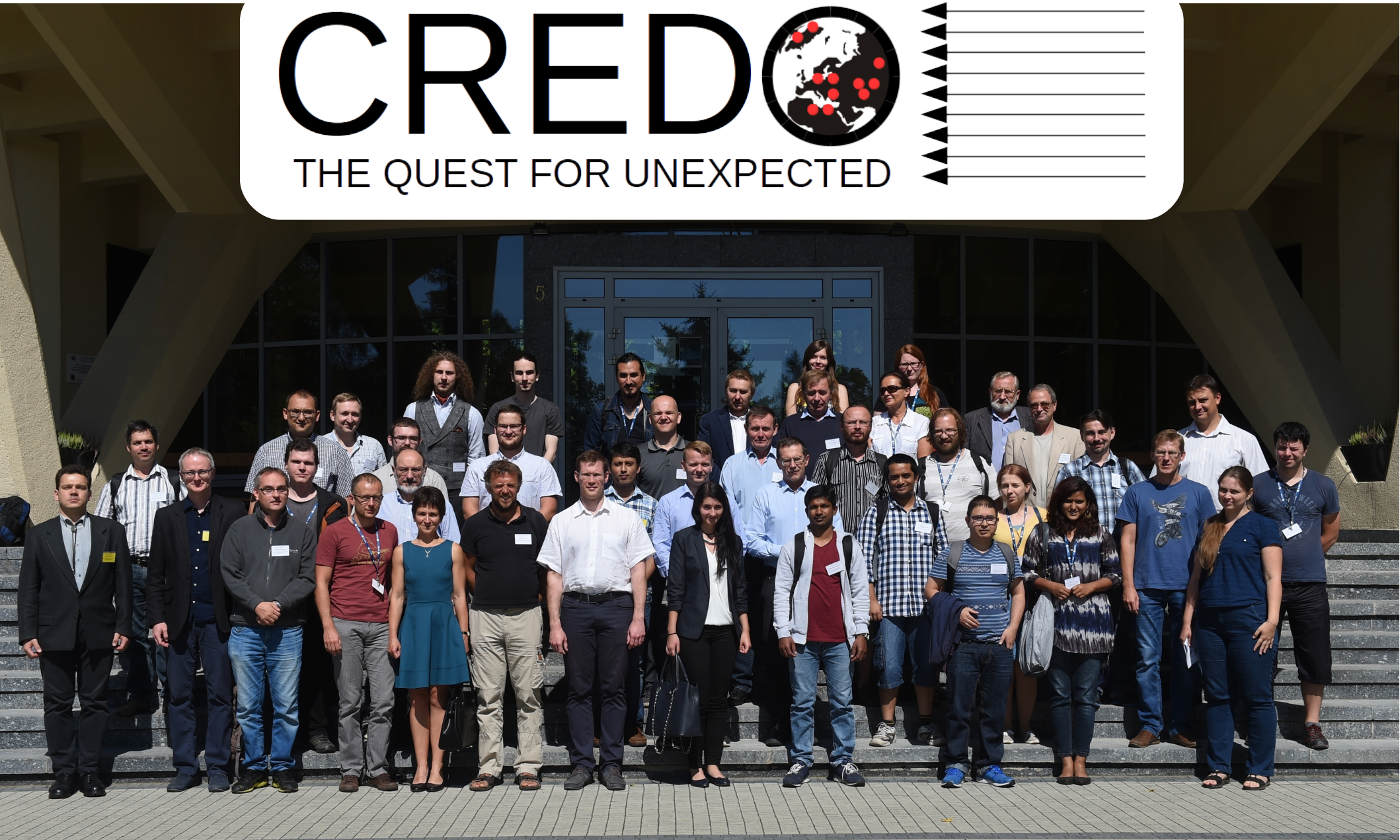
- tools: variety of detectors / citizen science
- users: young + old
- training: discoverology

Potential

- multidimensional: **beyond astrophysics, beyond science**

CREDO

THE QUEST FOR UNEXPECTED



CREDO The 1st Anniversary Symposium
IFJ PAN Kraków, 30th August 2017

fot. Jan Zych

2140 TFLOPS in CPUs + 256 TFLOPS in GPUs
2232 nodes, 53568 CPU cores, 279 TB RAM
10 PB usable disk space @ 180 GB/s

CREDO ready :) see M. Magryś, 15:15

2.4 PFLOPS, #59 ON TOP500