

CREDO Week 2018

NOW!

**Cosmic-Ray Extremely Distributed Observatory:
join a global effort to detect and study
cosmic-ray ensembles.**

Including:

- Discoverology Workshop
- The CREDO School
- Anniversary Symposium
- Collaboration Meeting



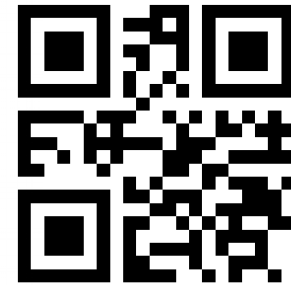
**1-5 October, 2018,
Kraków, Poland**



Think Big!

with...

CREDO 
THE QUEST FOR THE UNEXPECTED



Piotr Homola[□]

[□]) Institute of Nuclear Physics
Polish Academy of Sciences, Kraków, Poland

^{*)} <http://credo.science>

CREDO 2nd Anniversary Symposium, IFJ PAN, Kraków, 4.10.2018

Orders of Magnitude



Spacetime Foam

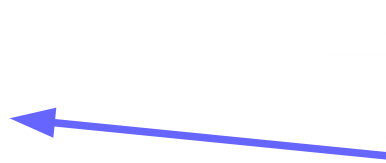
Cosmology,
Dark Matter, ...



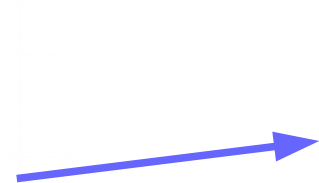
Orders of Magnitude



Spacetime Foam



CREDO 
THE QUEST FOR THE UNEXPECTED



Cosmology,
Dark Matter, ...



$N_{\text{ATM}} > 1$ motivated by data! (1)

VOLUME 50, NUMBER 26

PHYSICAL REVIEW LETTERS

27 JUNE 1983

Possible Observation of a Burst of Cosmic-Ray Events in the Form of Extensive Air Showers

Gary R. Smith, M. Ogmen, E. Buller, and S. Standil

Physics Department, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada

(Received 7 April 1983)

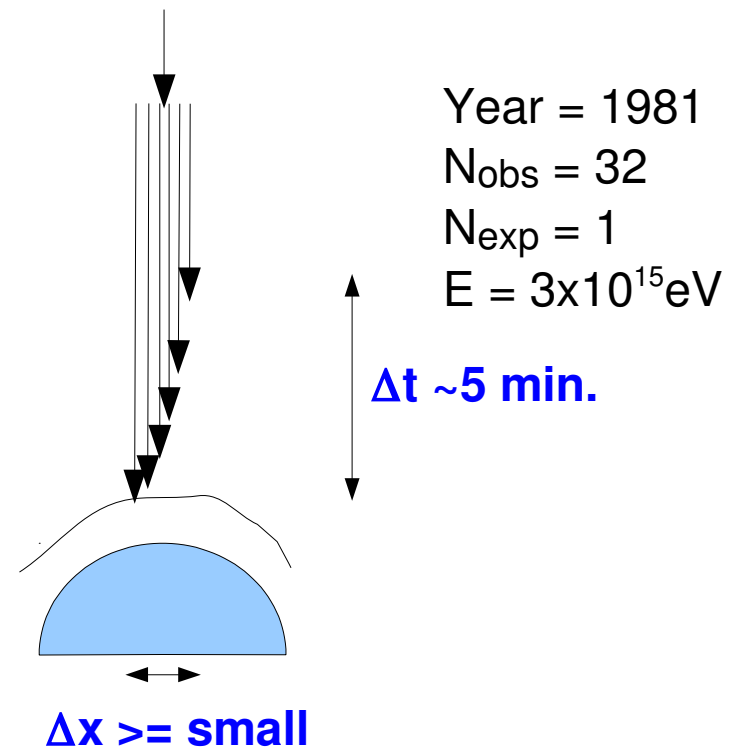
A series or burst of 32 extensive air showers of estimated mean energy 3×10^{15} eV was observed within a 5-min time interval beginning at 9:55 A.M. (CST) on 20 January 1981 in Winnipeg, Canada. This observation was the only one of its kind during an experiment which recorded 150 000 such showers in a period of 18 months between October 1980 and April 1982.

PACS numbers: 94.40.Pa, 94.40.Re, 95.30.-k

Forgotten (!) treasure (?) no. 1

PH: Correlated cosmic rays?

$N_{\text{ATM}} > 1$?



DID YOU KNOW THAT YOU HAVE AN INTERGALACTIC PARTICLE DETECTOR RIGHT IN YOUR POCKET?

Install CREDO Detector app for Android
and hunt for the deeply hidden
treasures of the Universe.

Find CREDO Detector on



or scan QR



The CREDO Detector App, status 4th October 2018



Some statistics

- 390k+ visible detections (1.4m+ overall)
- 745k+ device pings (sums up to 48 years looking for particles)
- 2k+ users with at least 1 detection
- 4k+ devices
- 1k+ user teams
- 10s of GBs used for storage of data, metrics and backups

Credit: M. Magryś, Cyfronet

→ First Light in **Quantum Gravity Previewer**,
the first experiment on the CREDO infrastructure!

→ <https://credo.science/quantum-gravity-previewer/> [Press Conference & Release: 18:00]

CREDO: simple is (also) beautiful!



credo.science → YouTube

- animation
- the app tutorial

- spacetime tunnel:

https://www.youtube.com/watch?v=6GN0Y4MTi_w&feature=youtu.be&t=8m22s

- Why? Credo.science → experiments

Example No 1: credo.science/quantum-gravity-previewer

- CREDO movie trailer: <https://vimeo.com/288433113/d52afd465d>

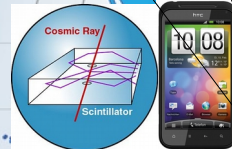
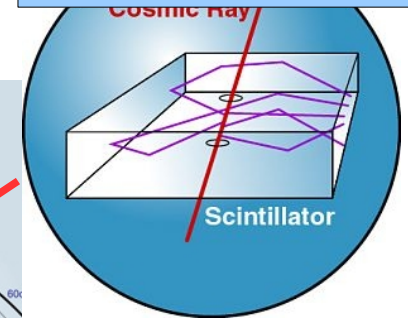
CREDO: the first $N_{\text{ATM}} \geq 1$ observatory

Cosmic-Ray Extremely Distributed Observatory

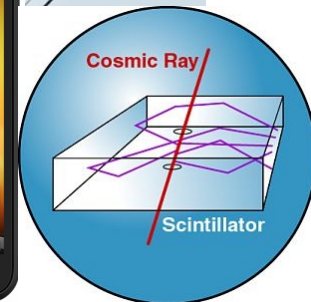


OPEN

Status March 2016:
„an idea”

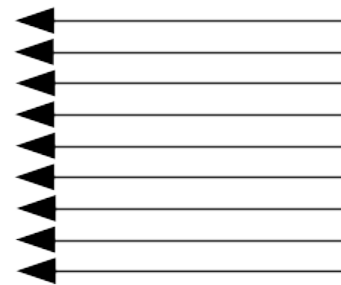


DATABASE/
INTERFACE

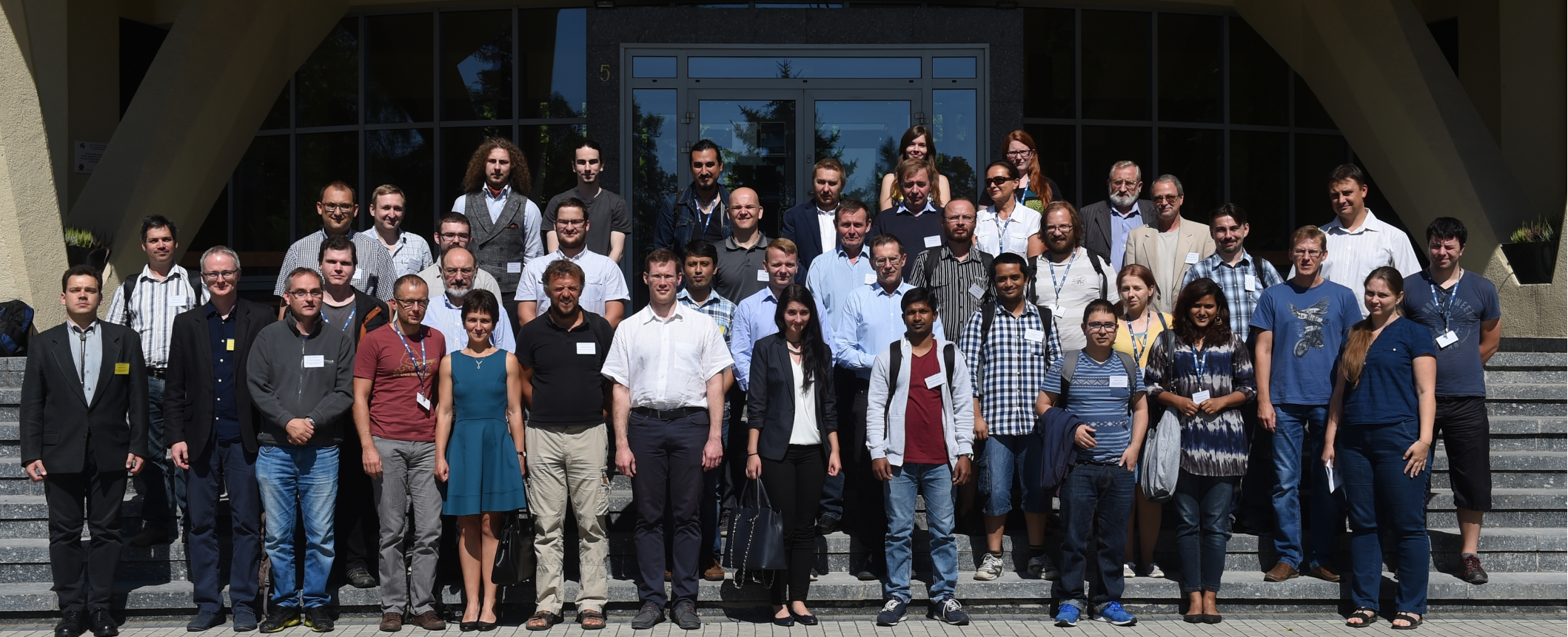


Central database/interface: access to everything for everybody

CREDO



THE QUEST FOR UNEXPECTED



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

fot. Jan Zych



THE QUEST FOR THE UNEXPECTED

Conference photo: 4.10.2018 (Thursday),
13:00, stairs in front of the main entrance

CREDO The 2nd Anniversary Symposium
IFJ PAN Kraków, 4th October 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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Wolfram's Everything

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

STEPHEN WOLFRAM | Blog

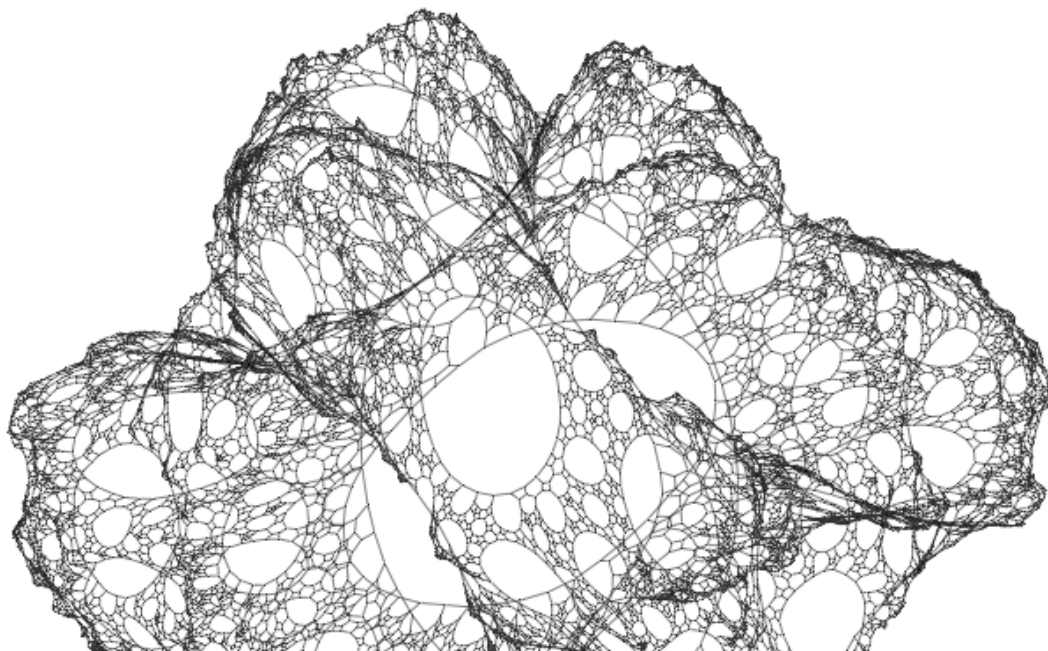
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kelvin

2 z

What Is Spacetime, Really?

December 2, 2015



Search Blog



RECENT POSTS



We've Come a Long Way in 30 Years (But You Haven't Seen Anything Yet!)

June 21, 2018



Launching the Wolfram Challenges Site

April 12, 2018



Learning about the Future from 2001: A Space Odyssey, Fifty Years Later

April 3, 2018



Buzzword Convergence: Making Sense of Quantum Neural Blockchain AI

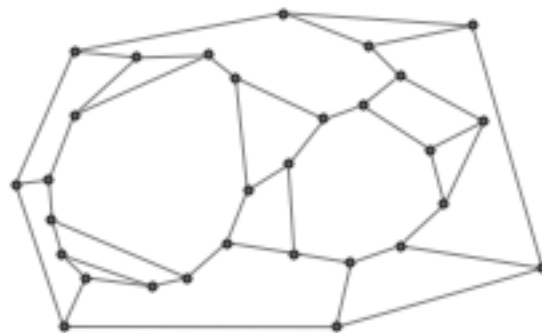
April 1, 2018

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?**

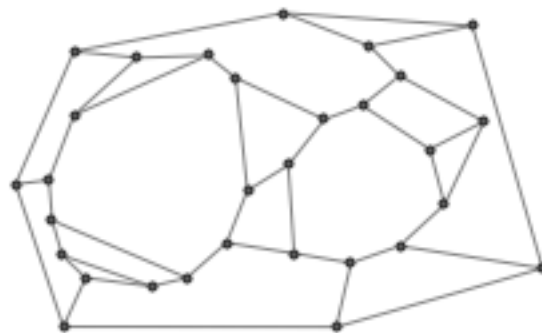


Wolfram: ... “knots in the ether” ...

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”**.

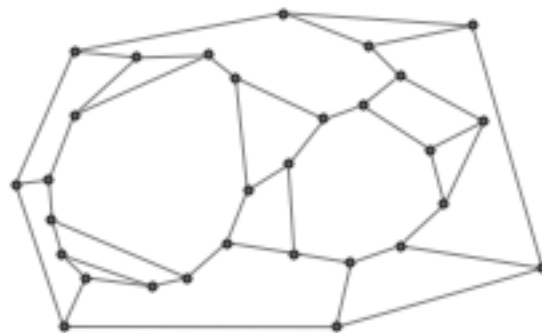


Wolfram: ... “knots in the ether” ...

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?

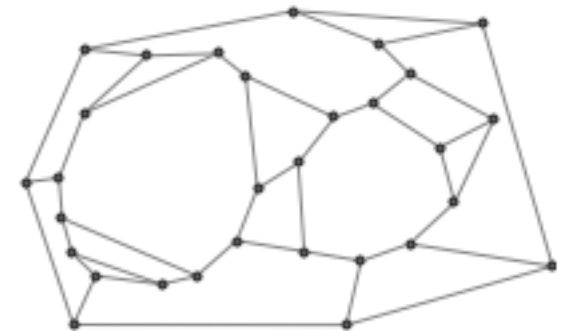
To Do Physics, or Not to Do Physics?

...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!





success guaranteed?

Mission

$N_{\text{ATM}} \geq 1 \rightarrow$ scenarios + fishing / Education

Strategy

Spread globally & grow giant \rightarrow „1 million colleagues”

Tactics

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

Potential

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