



CREDO monitor:
the simplest tool to analyze real data

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Scientific motivation

Problems we aim at:

Dark matter origin

UHECR puzzle



Theoretical explanation:

SHDM decay or annihilation

Topological defects

Key obstacle:

Non-observation

UHE photons



Main idea:

Super-preshowers

(cosmic-ray cascades)

Basic tool:

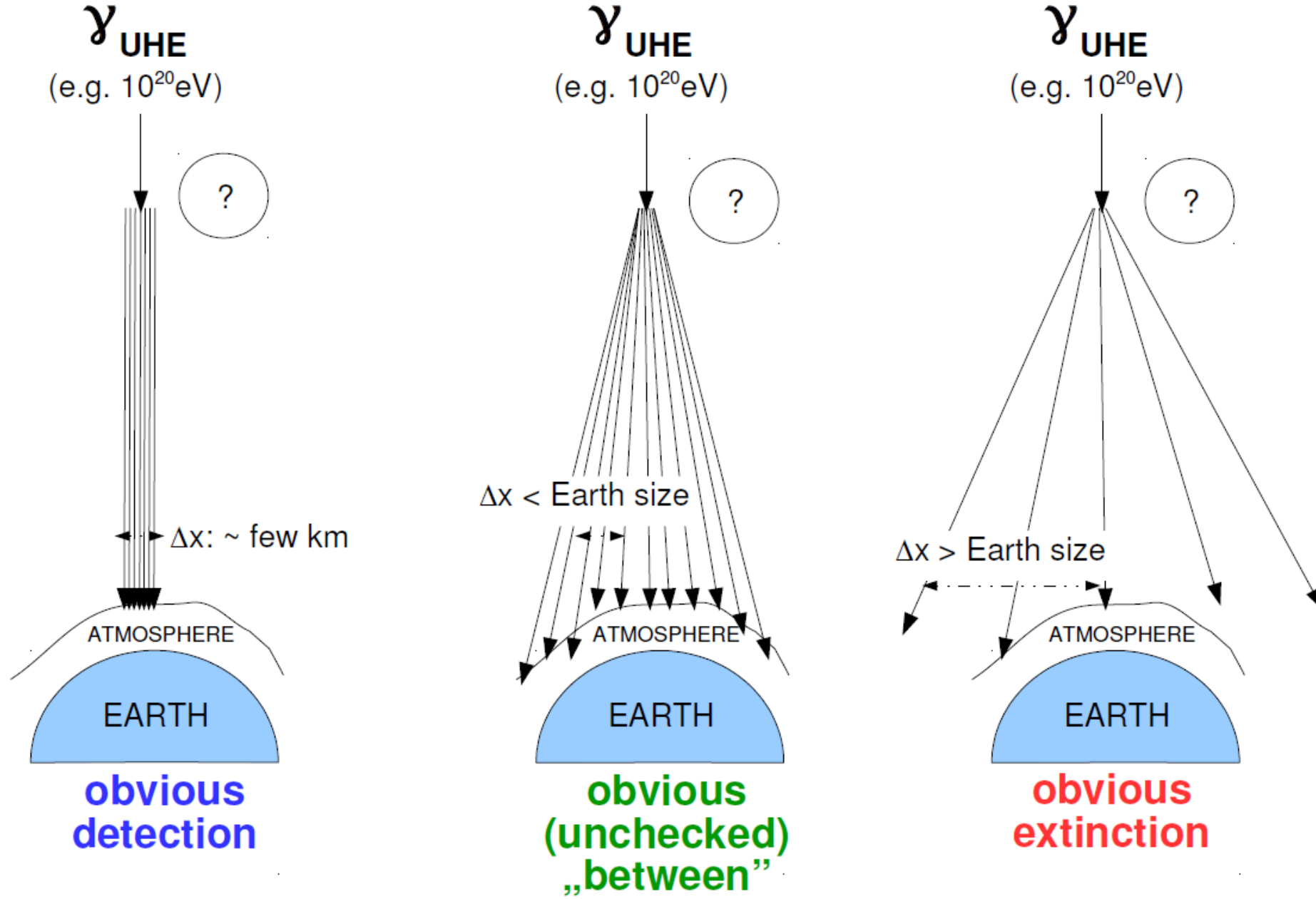
Time clustering analysis



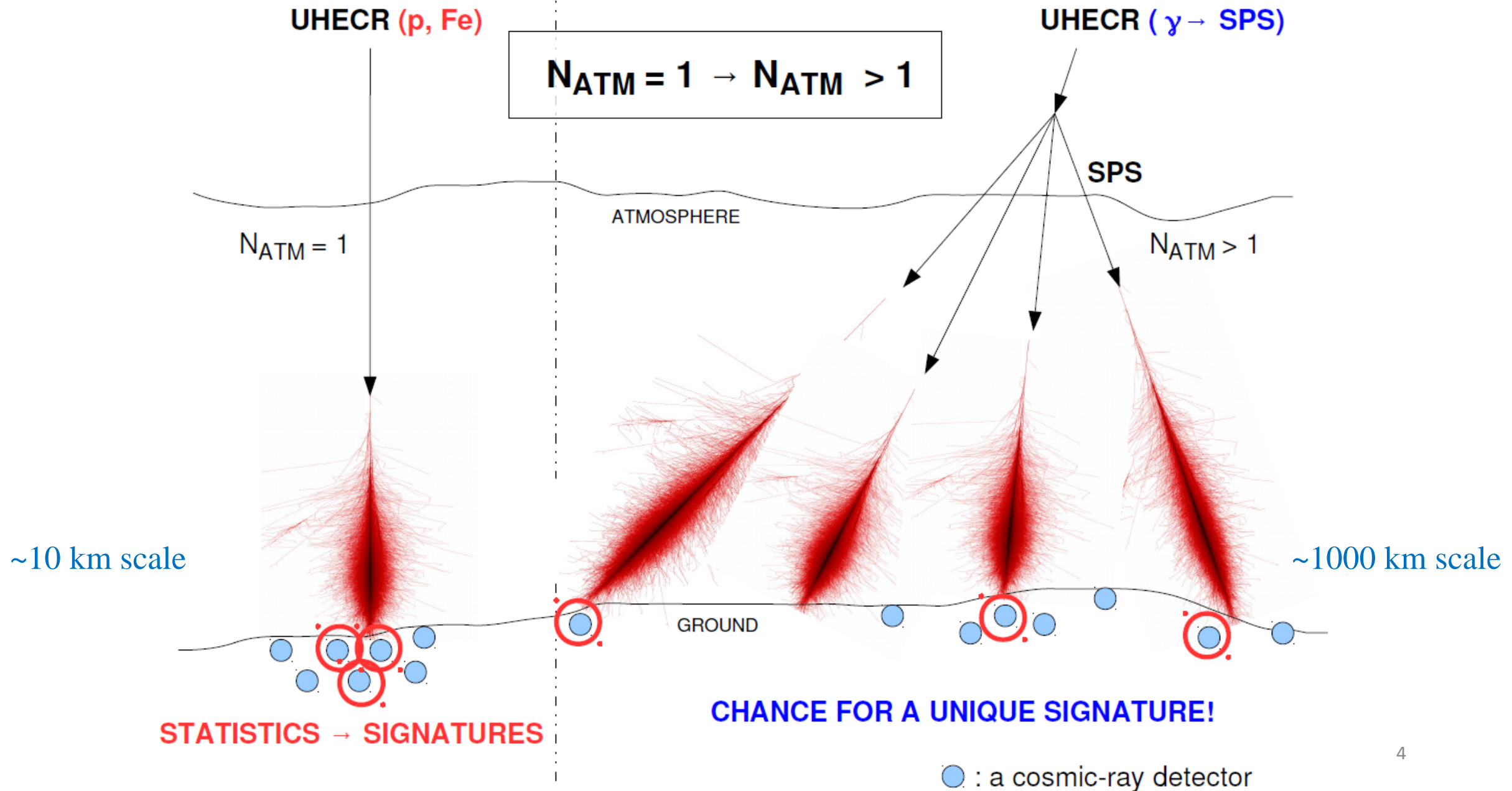
Outcome:

Maps to classify

Super-preshowers on Earth: untouched ground



Generalized scheme of UHECR research



CREDO: the quest for unexpected



Citizen science motivation

Citizen science

From Wikipedia, the free encyclopedia

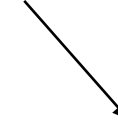
Citizen science (CS) (also known as **crowd science**, **crowd-sourced science**, **civic science**, **volunteer monitoring** or **networked science**) is scientific research conducted, in whole or in part, by amateur or nonprofessional scientists. Citizen science is sometimes described as "public participation in scientific research", [participatory monitoring](#) and [participatory action research](#).^[1]

Mutual benefit resulting from synergy!



Participants get opportunities:

- To educate themselves
- To do real science
- To feed their curiosity
- To become co-authors of a scientific paper



CREDO gets:

- Manpower
- Geographical expansion
- Popularization of its ideas and PR

CREDO Monitor: a citizen science tool for “fishing”

Requirements:

- Easy to get and to use
- Not boring
- Automated
- Functional

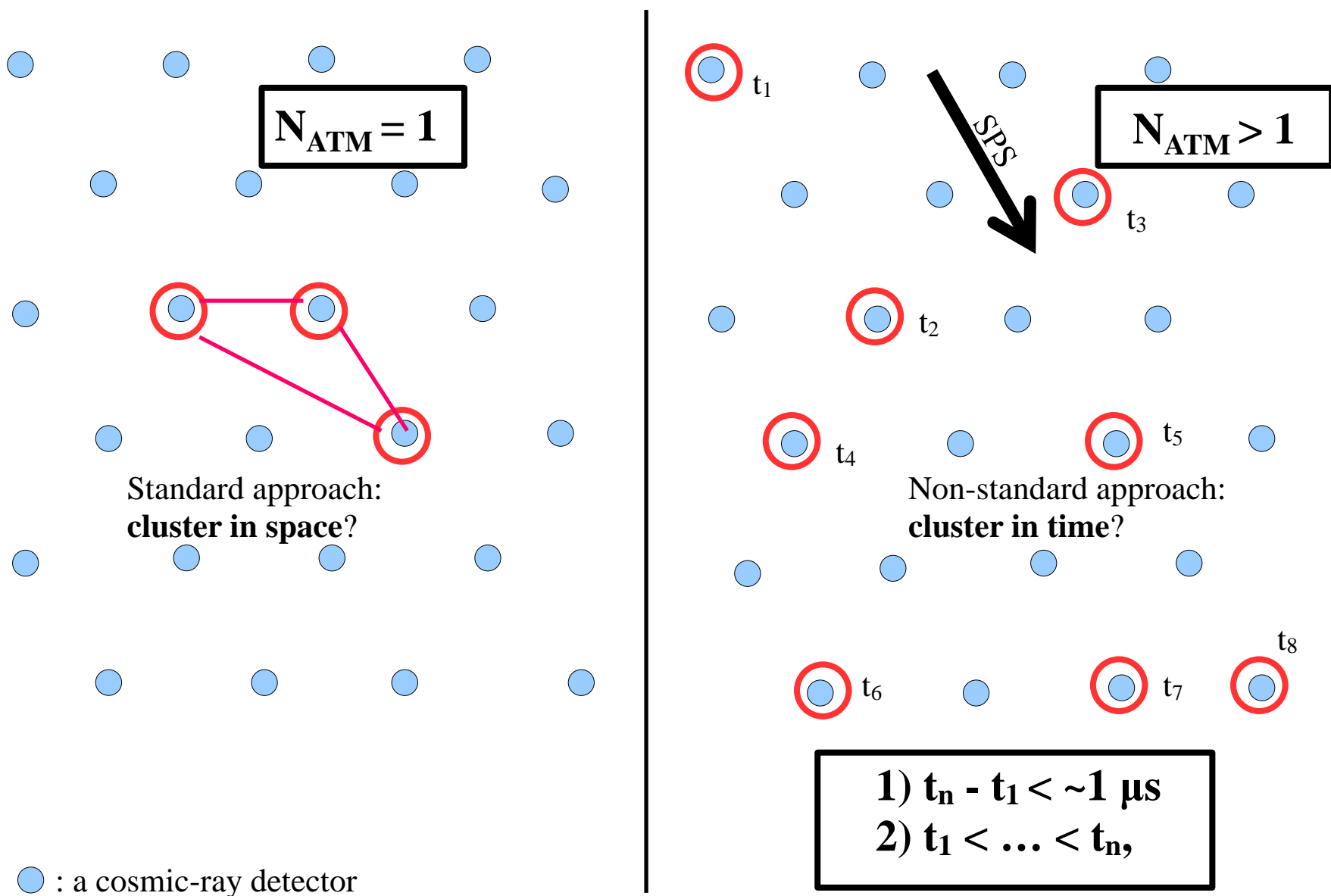
Expectations from the users:

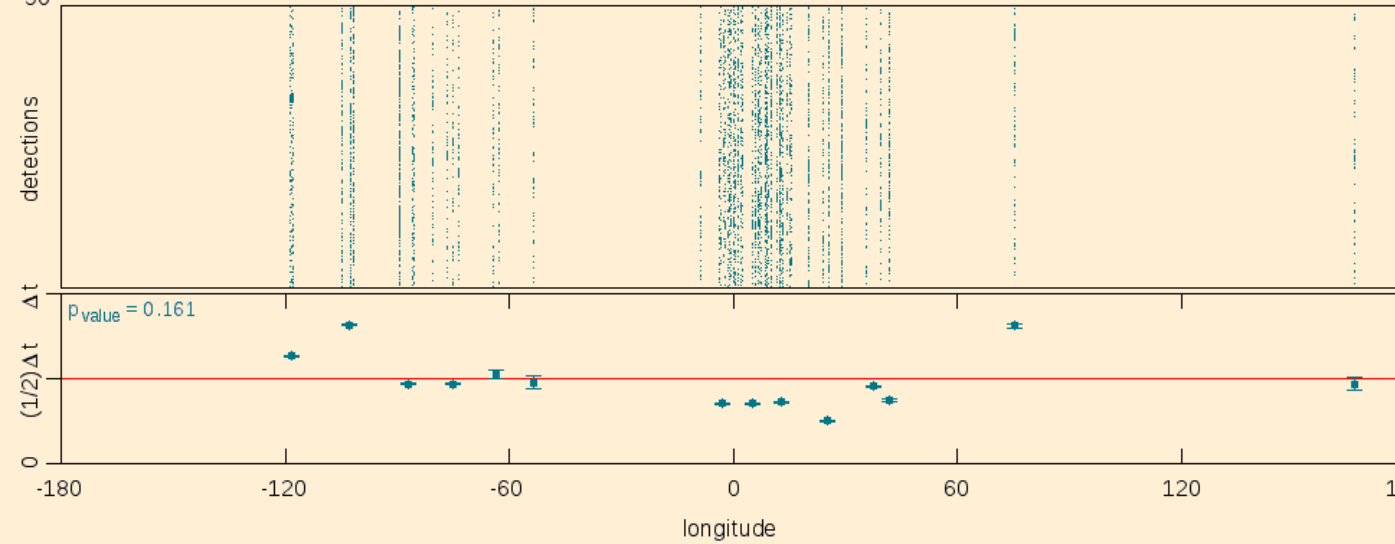
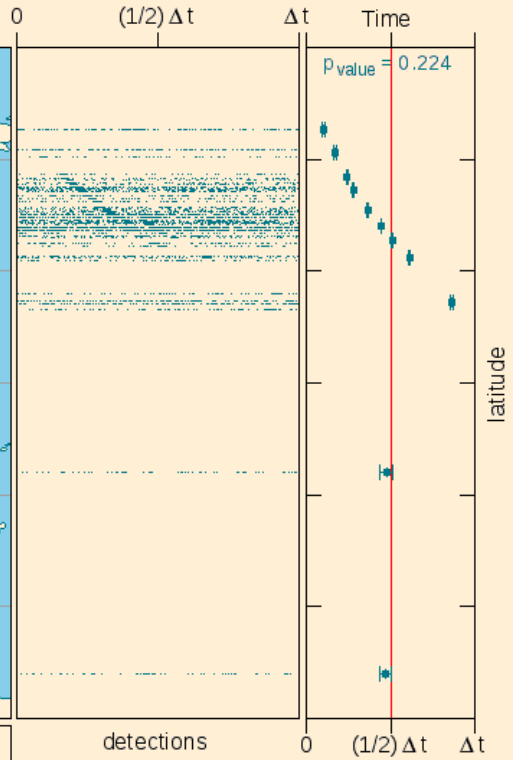
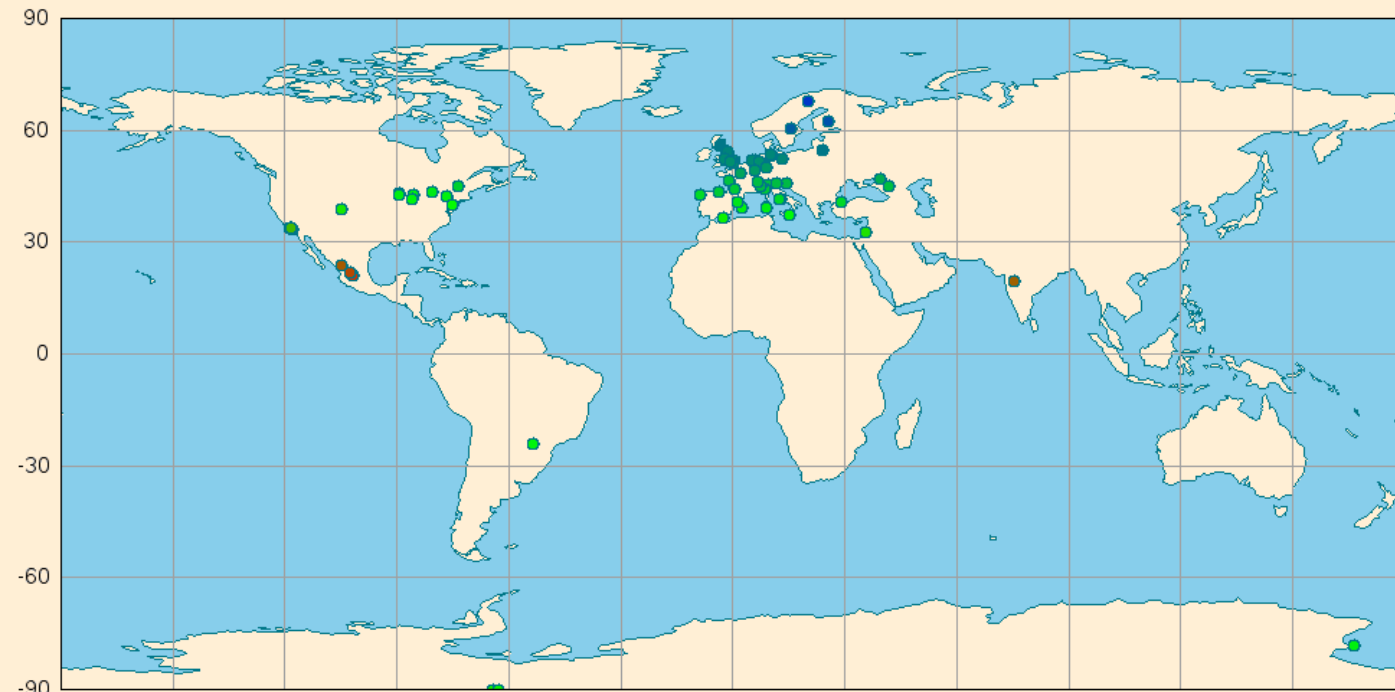
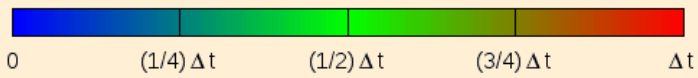
- Training/tuning the algorithm(s)
- Helping the scientists
- Attracting new users of mobile/pocket detectors

Data processing steps

- 1. Acquisition (HiSPARC, Showers of Knowledge, QuarkNet)
- 2. Conversion to the convenient format
- 3. Sorting by time
- 4. Merging into final form (daily data sets)
- 5. Data analysis
- 6. Map production

A chance for a **unique** super-preshower **signature**



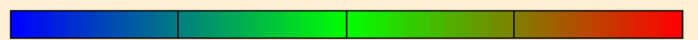


How an SPS signature can look like

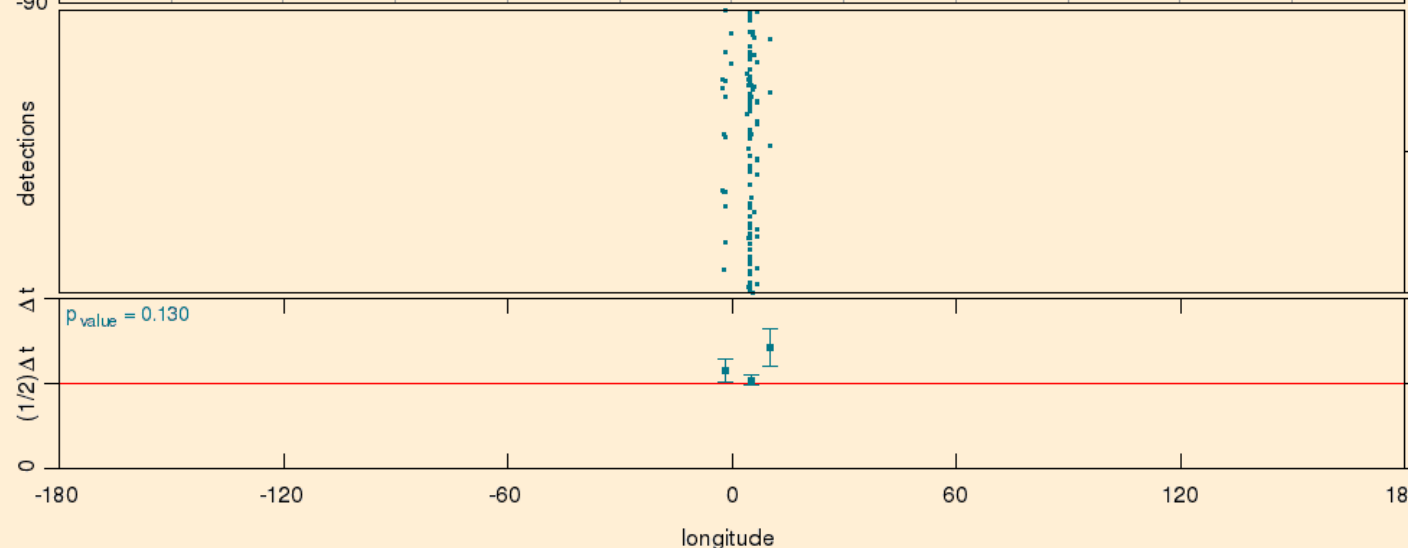
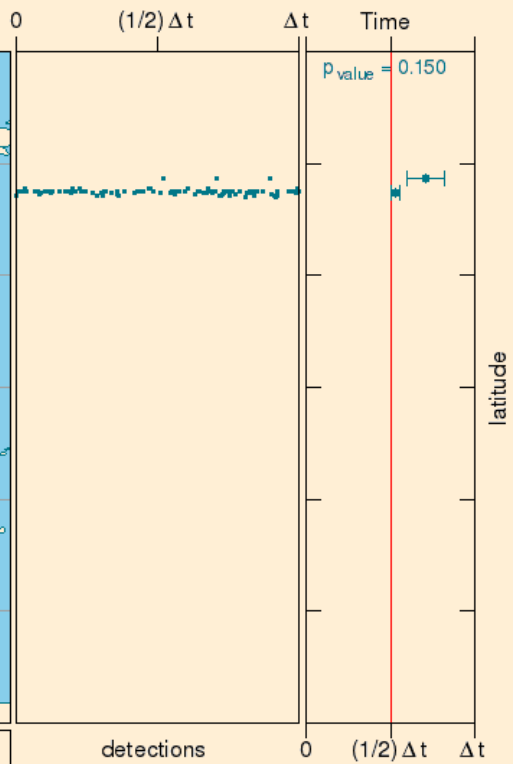
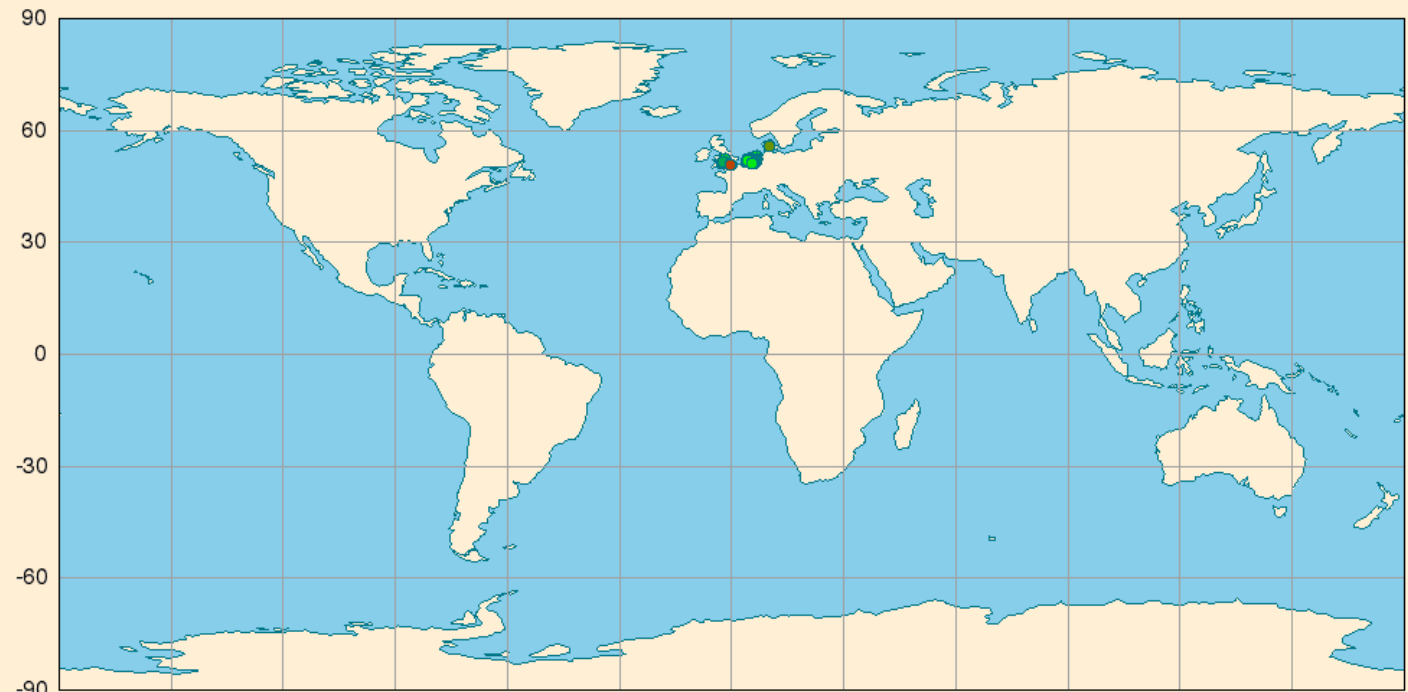
Simulation

Mean Recorded Time

, $\Delta t = 2.0$ sec, $p_{\text{value}} = 0.0000003710$



0 $(1/4)\Delta t$ $(1/2)\Delta t$ $(3/4)\Delta t$ Δt



Real data analysis

Summary

Status

- Full chain operating
- Time-clustering algorithm
- HiSPARC data processing
- Automated map production

Outlook

- + On-line access
- + More sophisticated analysis
- + Mobile application
- + Connection to Dark Universe Welcome

Thank you for the attention and visit us on
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Cosmic-Ray Extremely Distributed Observatory (CREDO)

ables a strategy for a global analysis of cosmic-ray data to reach the sensitivity to extremely extended cosmic-ray phenomena, them super-preshowers, invisible for individual detectors or observatories. So far, the cosmic-ray research has been oriented detecting single air showers only, while the search for ensembles of cosmic-ray events induced by super-preshowers is a scientific terra incognita.

[Read More](#)