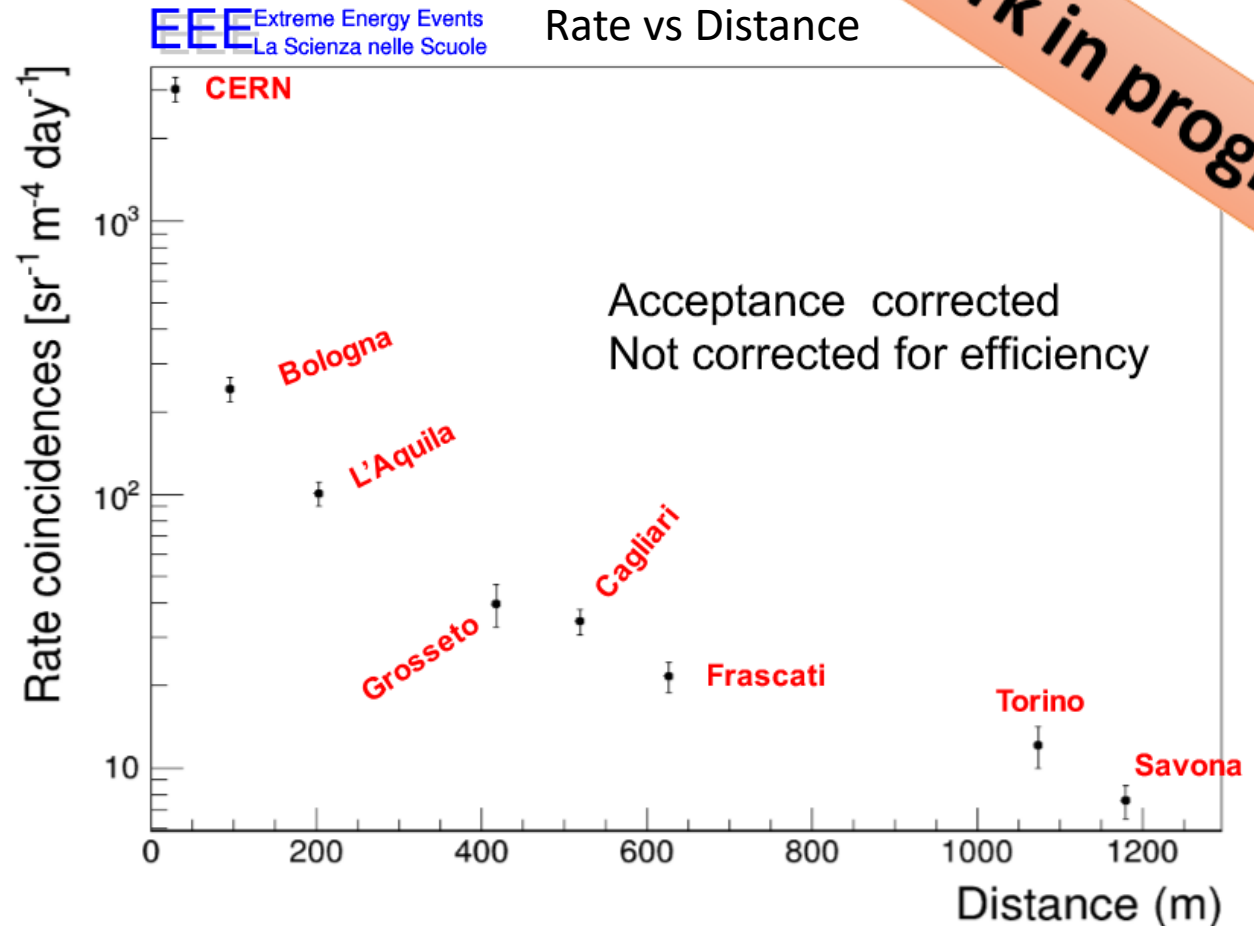# Coincidences update

People: C. Cicalò, F. Coccetti, D. De Gruttola, M. Garbini, S. Grazzi, F. Noferini, L. Perasso, F. Pilo
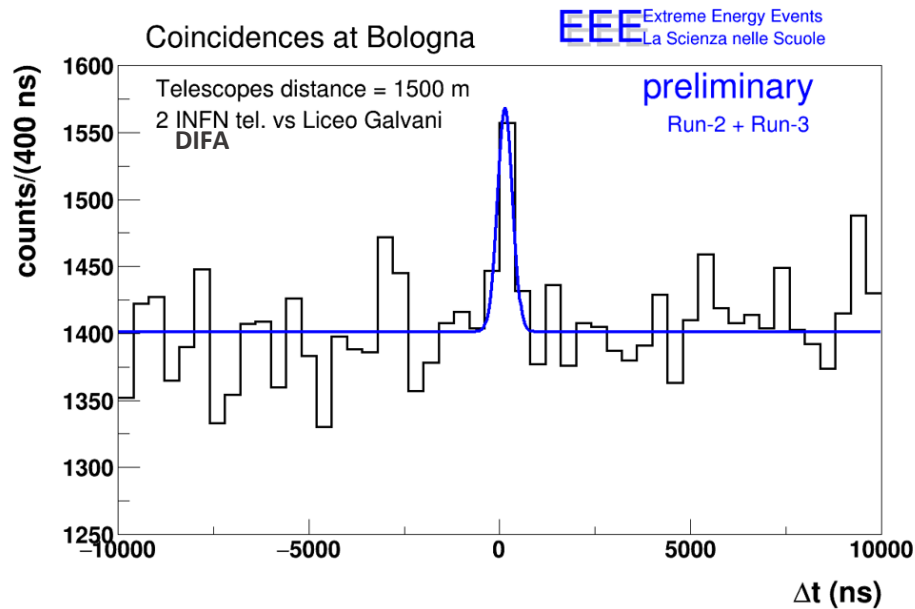
1

Where we are

EEE already published a paper on coincidences (EPJ Plus 128, 148) in 2012 up to 650 m.

A new paper is in preparation **to extend the measurement up to 1200 m** (hopefully to be published by the end of this year).

work in progress

EEE Extreme Energy Events
La Scienza nelle Scuole

Rate vs Distance

Acceptance corrected
Not corrected for efficiency

CERN
Bologna
L'Aquila
Grosseto
Cagliari
Frascati
Torino
Savona

Rate coincidences [sr^{-1} m^{-4} day^{-1}]

Distance (m)

First hint of coincidences at 1.5 km

Coincidences at Bologna
Telescopes distance = 1500 m
2 INFN tel. vs Liceo Galvani DIFA

EEE Extreme Energy Events
La Scienza nelle Scuole

preliminary
Run-2 + Run-3

2 telescopes at 100 m
INFN CNAF DIFA
1500 m
2100 m
1990 m

… Run-3 is ongoing and the new statistics will allow to reach larger distances …

Goal: Add some points in the CR energy spectrum

We started to use the Corsika simulations to see if we are able to extract the information of coincidences vs distance to reconstruct (statistically) the energy distribution.

Organization for the paper

A big effort is required to manage simulation and finalize the analysis.

→ I proposed to split to 2 smaller groups:

- Paper preparation

- Analysis finalization

This choice was driven by the need to guarantee at least few persons on each topic (with a regular activity on that) after of a period of inactivity.

Paper preparation

Paper preparation:

M. Garbini, L. Perasso (?), S. Grazzi (*)

Link to github (protected):
https://github.com/centrofermi/e3papers/tree/master/coincidences

Analysis:

F. Noferini, F. Coccetti, S. Grazzi (*)

Schedule

Analysis:

- Finalization of the rate vs distance plot → by the end of Run-3 to add LODI, SALE, BOLO(1.5 km)?

- MC → Acceptance and templates to extract the energies → time has to be quantified

- Systematic errors → come later

Paper

The paper preparation must go ahead in parallel

On the simulation

Fabrizio produced a set of Corsika shower simulations at different energies (at CNAF).

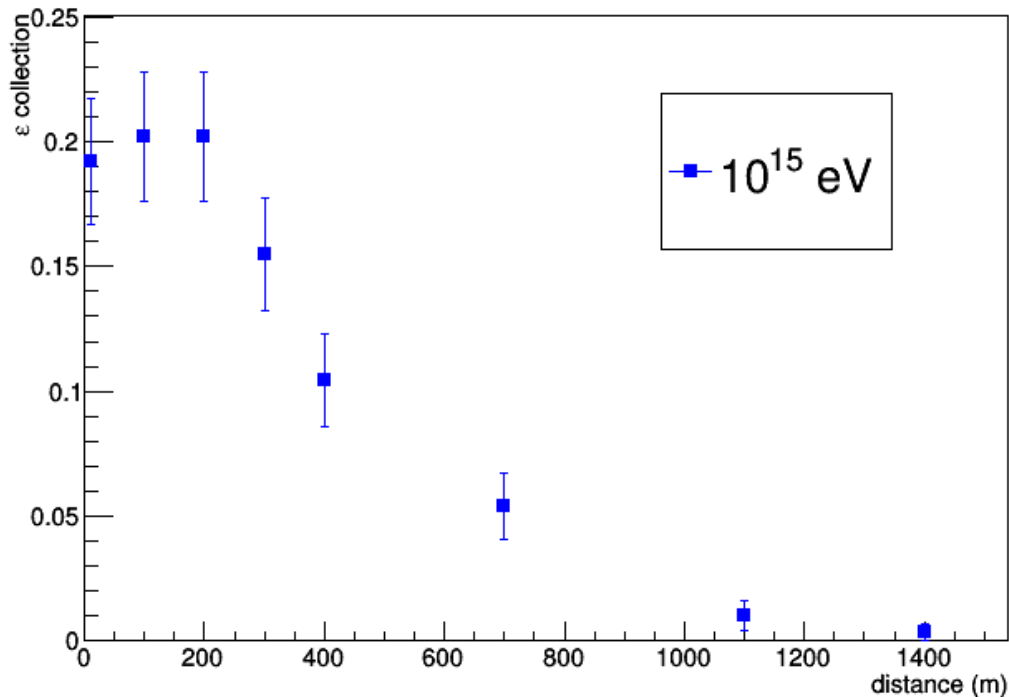We are developing a code using them as input.

We can already:

- rotate and shift the events to re-use the same shower more times

- Simulate telescopes displacement

We are close to have an output for the simulation in the same format as DST

Work in progress (still code debugging ongoing)

Collection efficiency for coincidences at a given distance (area=1 Km^2)

This is a qualitative example of a template we can produce with Corsika (only one shower, θ fixed, ϕ-rotated and shifted 4000 times was used here for a test)

Core coordinates

■ Where telescopes were placed (area 1 m^2)