



Thunderstorm chasing using measuring cars equipped with multiple sensors

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EUROPEAN UNION
European Structural and Investing Funds
Operational Programme Research,
Development and Education



INSTITUTE OF ATMOSPHERIC PHYSICS
CAS



Nuclear Physics Institute of the CAS
public research institution

Measurement cars

Motivation:
More frequent
in situ
thunderstorm measurement



Car's equipment

Antennas

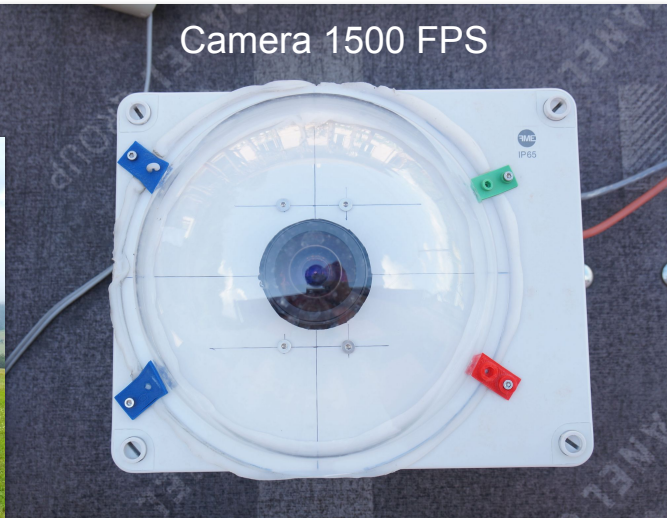
~400 MHz



EFM

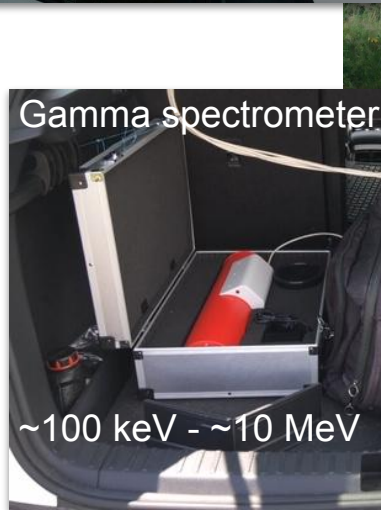


Camera 1500 FPS



Gamma spectrometer

~100 keV - ~10 MeV



~100 kHz

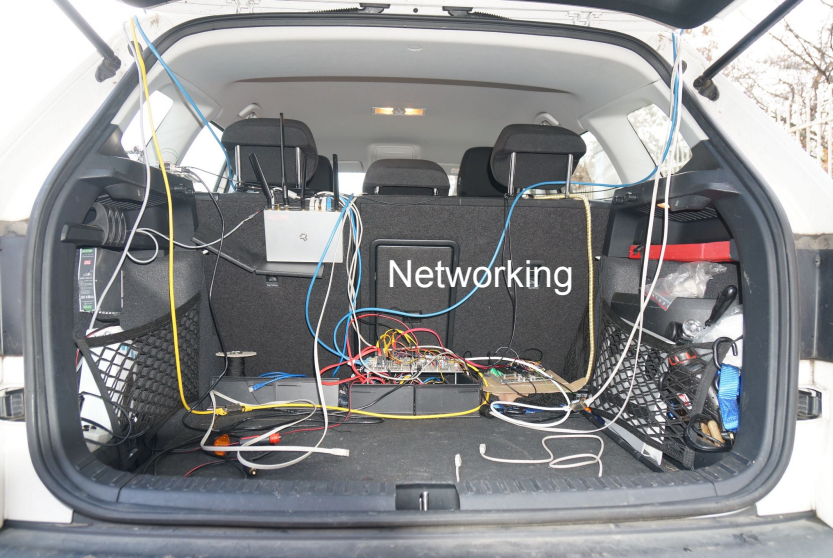


~50 MHz

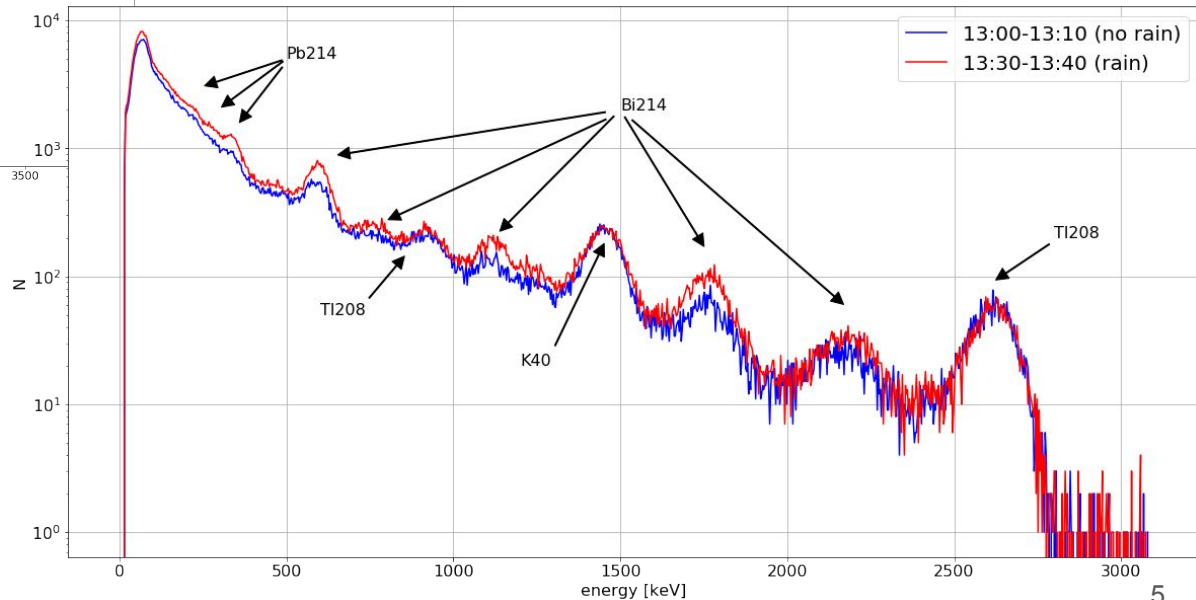
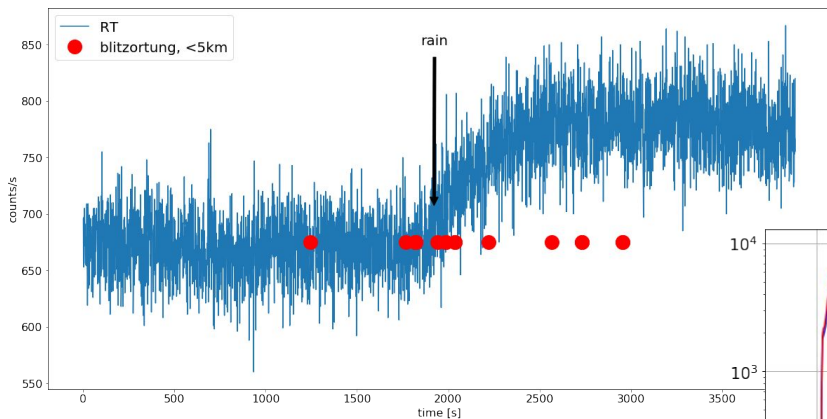
Distrometer
Anemometer



Car's equipment



Ionising Radiation measurement



~ 100 thunderstorms / 3 years*

~ 10 lightning / storm / site

*In the central Europe

Where and When ?

Fast Motion Camera



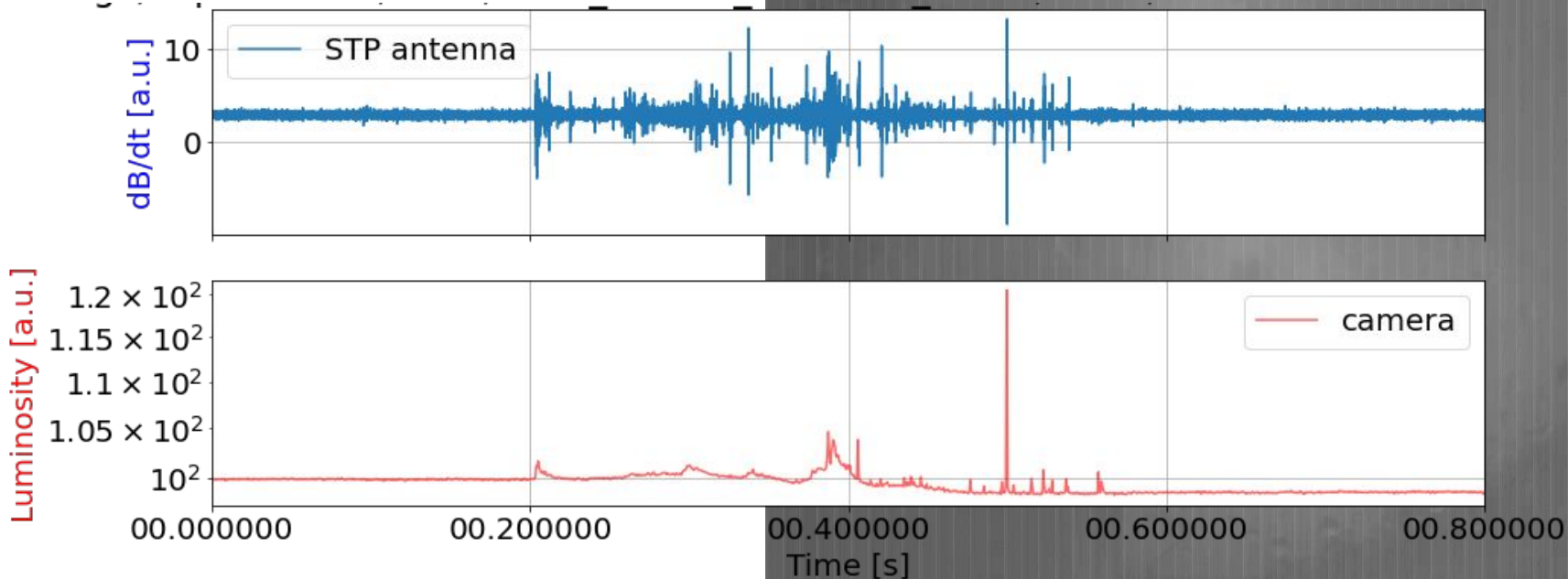
000012/013284 59=1/1 T=-8.799+5120s

Lightning capture

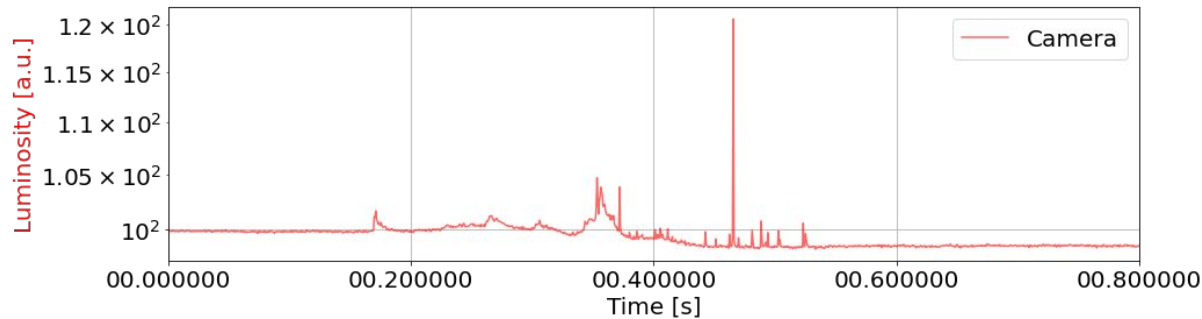
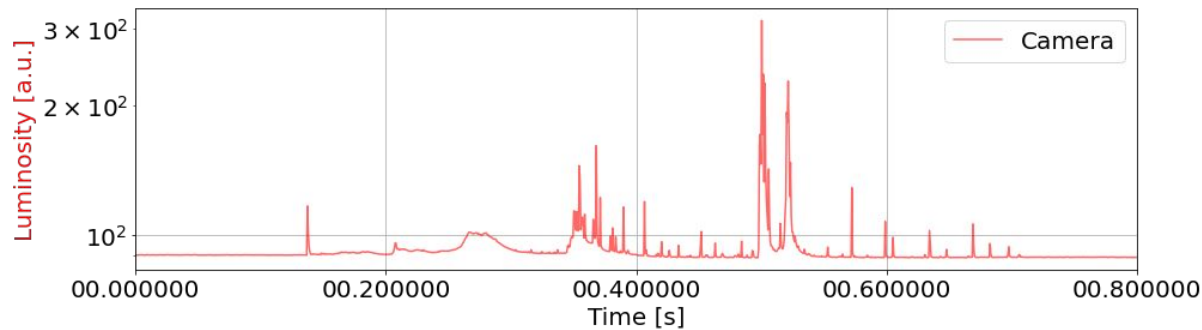
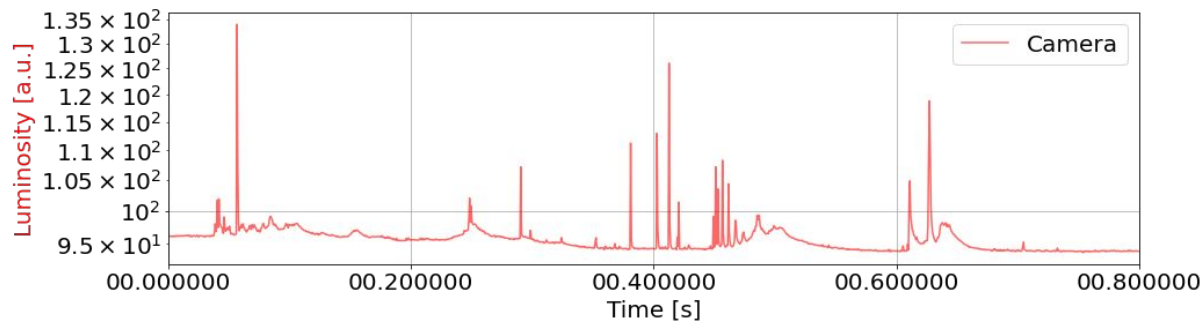
<https://youtu.be/Fn8Si4xM5xc>

Lightning capture

<https://youtu.be/Fn8Si4xM5xc>



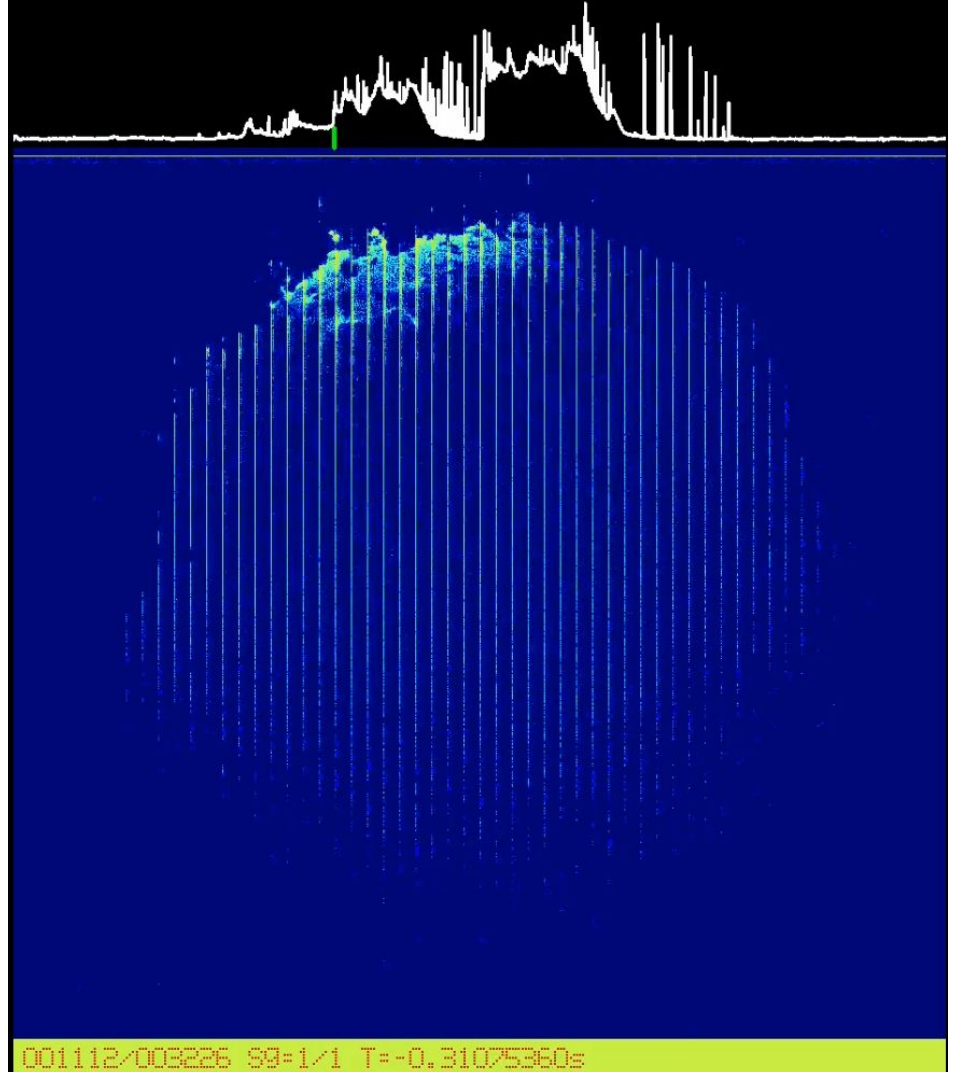
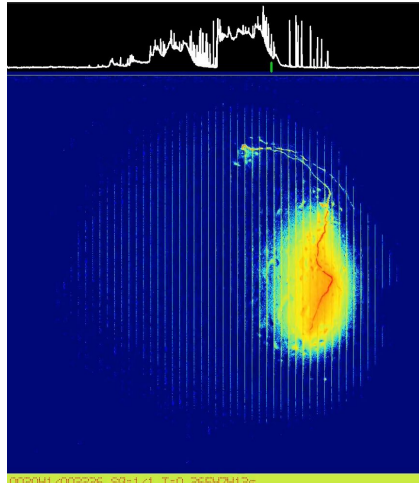
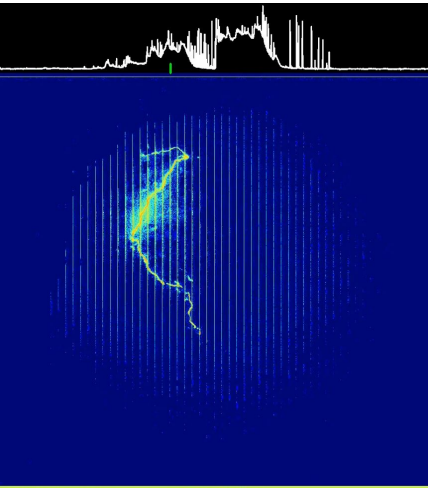
Similar evolution



IC lightning

<https://youtu.be/xM8ugRq-oV4>

duration = 1 s



Where and When ?

< 10 % CG lightning

Lightning lasts long

~300 ms

Lightning are huge and horizontally spread

Estimation of horizontal length of lightning > 15 km

=> Horizontal gradient of electric field

Recoil leaders

are brighter than leaders (< 1 ms)

