

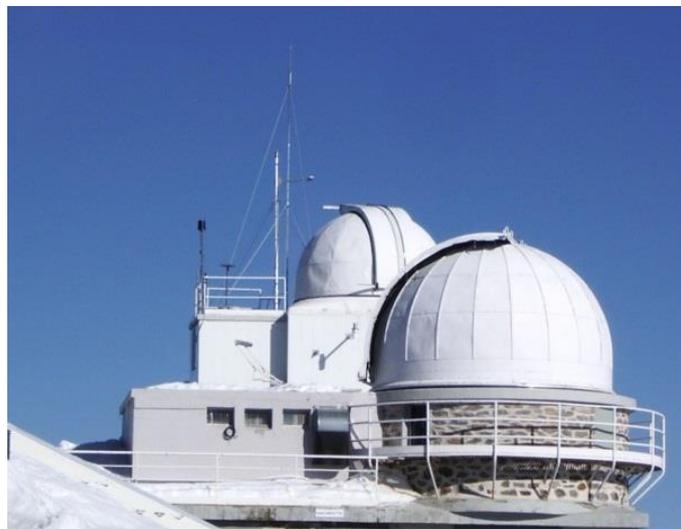
FRANCE TEST FACILITY

– Pic du Midi -

The observatory of the Pic du Midi de Bigorre (France) been regularly lightning strikes (about 20 impacts per year). Overall lightning Protection (Direct Lightning and Surge Protection) has been proposed to the Pic du Midi Technical staff. The investment of this in-situ test is about 350 k euros in 3 years.

There are two parts and two objectives:

- The intermediate cable car station called Taoulet Station
- The tourism and scientific station of the Pic du Midi



Tourism and scientific station of the Pic du Midi (France)

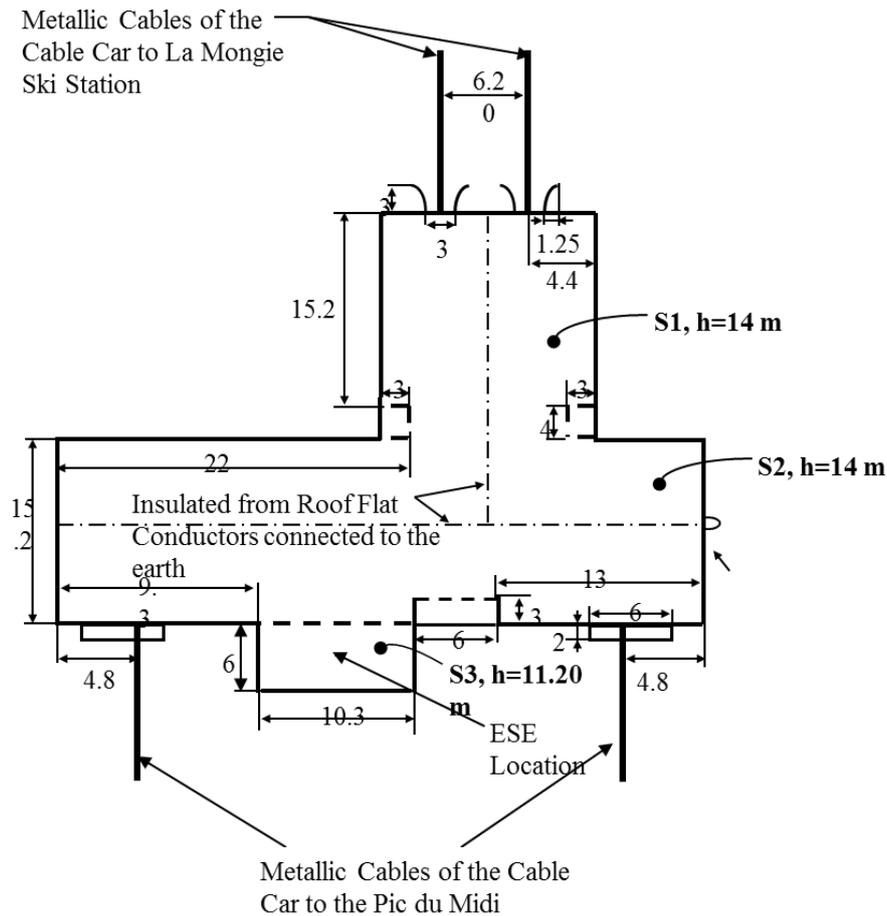


Intermediate cable car station of the Taoulet

The aim of the In-situ Test installed on the Taoulet Cable Car Station is to verify the radius of protection of an ESE in natural conditions.

Experiment description: The building is in limit of protection insured by an ESE lightning rod, voluntarily installed not centered on the building. A conductor was installed 3cm above the roof using insulated fixings (Copper Flat Conductor 30 * 2 mm). This conductor routes in the lightning protection area insured by the ESE. Three lightning counters (one electromechanical and two electronic with memory) are positioned on the down conductors of each protection systems. These counters are installed in order to check that lightning focuses on the ESE lightning rod and not on the roof conductor.

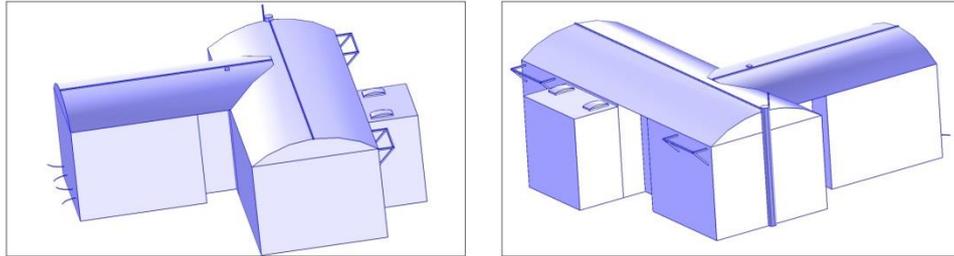
Roof Plan of the Site Experiments:



These experiments are used also to check in extreme weather conditions ageing of the equipment.

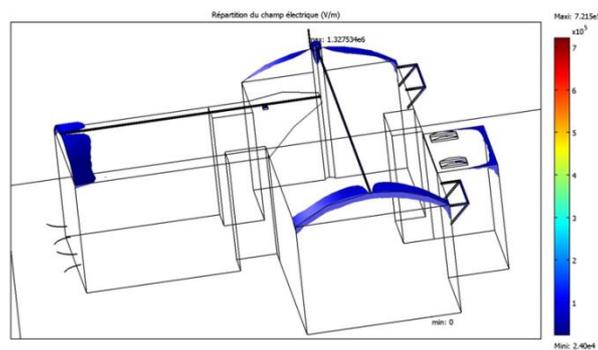
Lightning Modeling experiments:

A Patented Software was developing to do a Lightning Modeling of the Building exposure. The aim of this tool is to indicate the Building's Lightning Exposed areas to an electrical field. This needs to draw the Building in 3D.

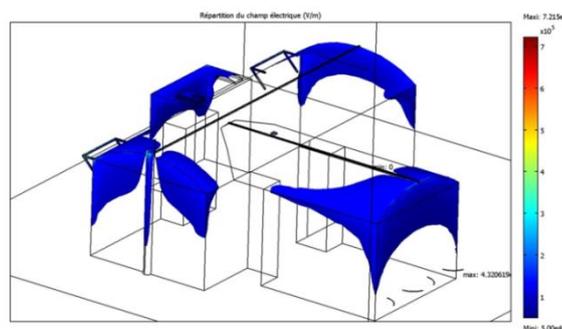


Building's modelization

The Software is able to indicate the Building's Lightning Exposed areas for a vertical leader (Vertical electrical field apply to the building):



But it is also able to indicate the Building's Lightning Exposed areas for an oblique leader (Oblique electrical field apply to the building):



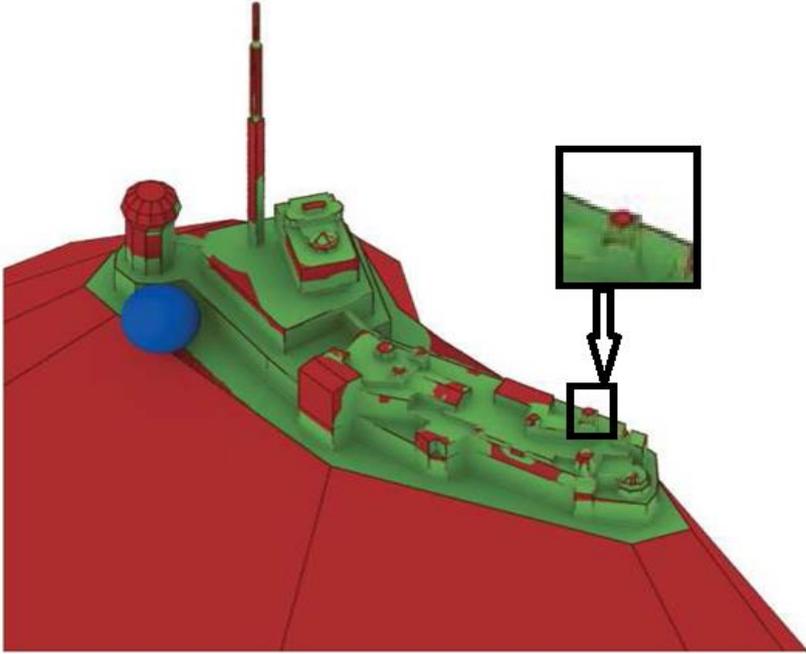
Overall Lightning Protection of the Tourism and scientific station of the Pic du Midi (France)

The aim of this second in-situ experiment is the Protection of the public terrace. For that, we install an ESE lightning rod with a large coverage area (60 μ s of efficiency) located on the 55cm telescope dome. The ESE lightning rod installed more than 15 years ago was struck despite the dominant position of the TV telecom Tower (Height: 109m). We also want in this experiment increase the general knowledge about natural lightning current. On the Down Conductor of the ESE was installed a current probe to record the forms of lightning currents. We installed 3 cameras to record Lightning attachment phenomena, one of these is a high speed camera (3000 frames by seconds). An electric Field Mill records the electrical field above the site.



Tourism and scientific station of the Pic du Midi with the location of the experiment.

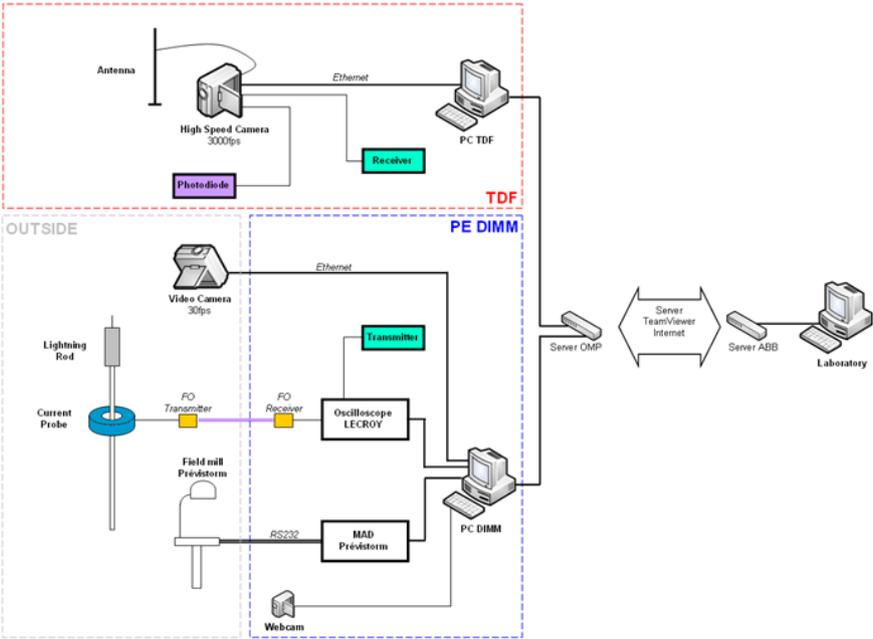
Computer modeling of protected (green part) and unprotected areas (red part) based on electrogeometrical model:

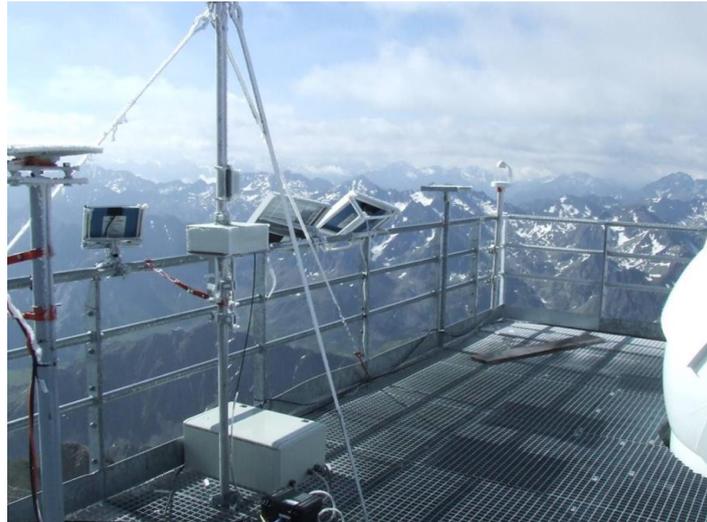


With the computerized analysis of the site we clearly show that the 55cm Telescope Dome is not a protected area. The top of the dome is in red that mean a possible lightning impact on it.

Installation system synopsis:

This experiment is monitoring 30 km away in a laboratory through optical fiber high speed Internet Network.

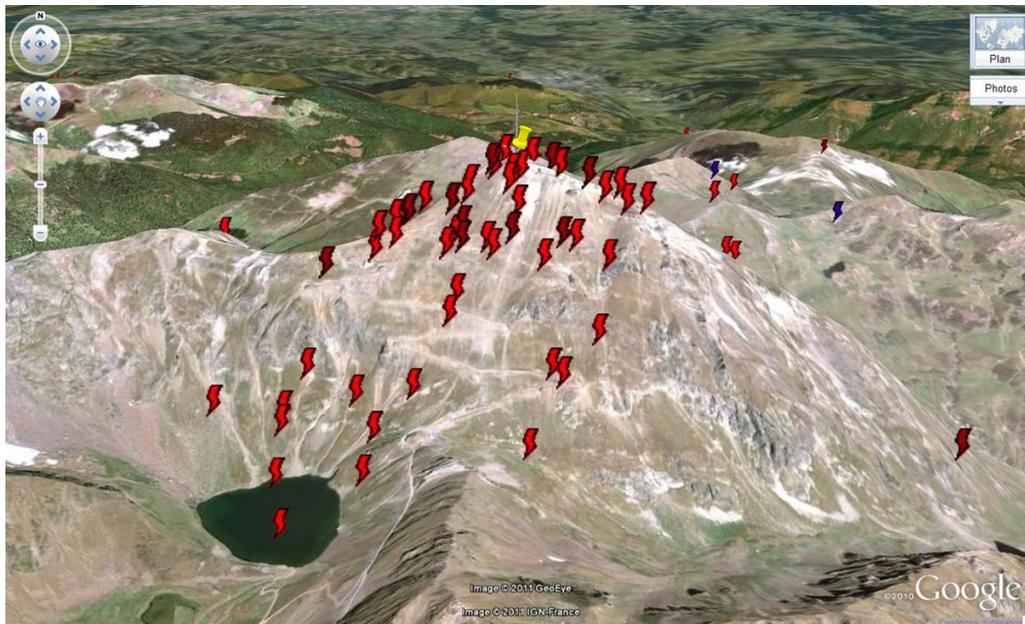




Electrical Field Mill and Current Probe on the platform.

A technical room located under the Platform hosts the electronic recording equipment and computer connected to Internet to send the data to a laboratory in the plant.

A Scientists Partnerships with METEORAGE permit to cross information related to the Lightning Impacts Location.



Recorded impacts during the summer 2011.

The last results of this In-Situ Test experiment were published in a paper during the SIPDA 2013 conference in Brazil.