



Liceo San Giuseppe Calasanzio Carcare

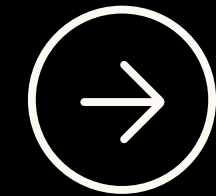
EEE PROJECT PROPOSAL FOR THE COSMIC BOX CONTEST

EEE project a. s. 2025/2026

Run coordination meeting 29/10/2025



TODAY'S AGENDA



- 1 Premises
- 2 Muons and their study
- 3 The school
- 4 The history of the building
- 5 Our proposal
- 6 The structure of the building
- 7 Construction materials
- 8 Brief overview of the project
- 9 Errors, an introduction





A COSMIC BOX TO STUDY COSMIC RAYS ATTENUATION IN OUR SCHOOL IN ORDER TO CALIBRATE OUR EEE DETECTOR

THE REASON BEHIND THE PROJECT



The detector

It is currently inactive, waiting to be operative again after a long pause since the Covid-19 pandemic

Its location

Placed at ground floor (aula 10) and fixed there, the two stories (aula 21 and aula 34) above it are surely going to interfere with its measurements



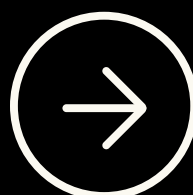
The proposal

Envisioning a future usage of the detector, we'd like to calibrate it accounting for any interference.

We want to compare the interference which our detector is subject to compare it with other measurements made at different floors in the same building and outside in order to better calibrate our detector



THE HISTORY OF THE BUILDING



The foundation

In 1621 the College of Pious Schools was founded, adjacent to the church of Anthony the Great, built in the same period as part of the monastic complex

The XIX century

During the 19th century the school saw a period of greatness, having also been the learning place for important Risorgimento figures such as Goffredo Mameli and Cesare Abba

The evolution of the building

The original 17th century structure has been left largely unchanged, but new stories have been added, all constructed with different techniques and materials. Even today, as we are speaking, the building is undergoing renovation works

ABOUT THE SCHOOL



The State High School “S.G. Calasanzio” in Carcare (Savona) has a long tradition that began in 1621 with the College of the Pious Schools, founded by St. Joseph Calasanz.

It became a State High School in 1962.

Today, the school has 414 students, 55 teachers, and 22 classes divided into three programs:

- Classical High School
- Scientific High School
- Linguistic High School (Esabac curriculum)

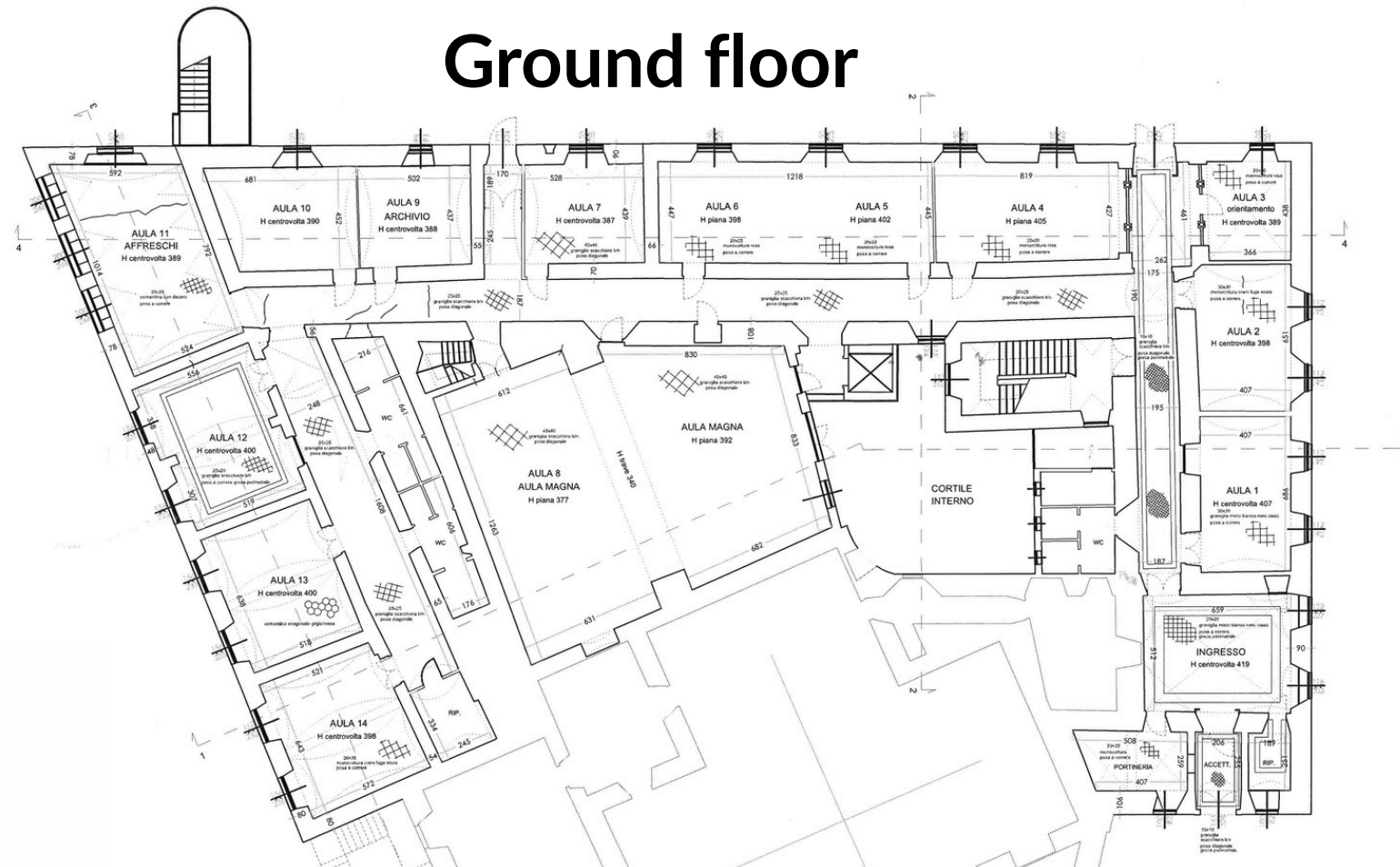
The Institute includes several facilities:

a classical library, computer and science labs (chemistry, physics), two multimedia language labs, a drawing room, a gym, an Aula Magna, and a thematic library on history and philosophy.

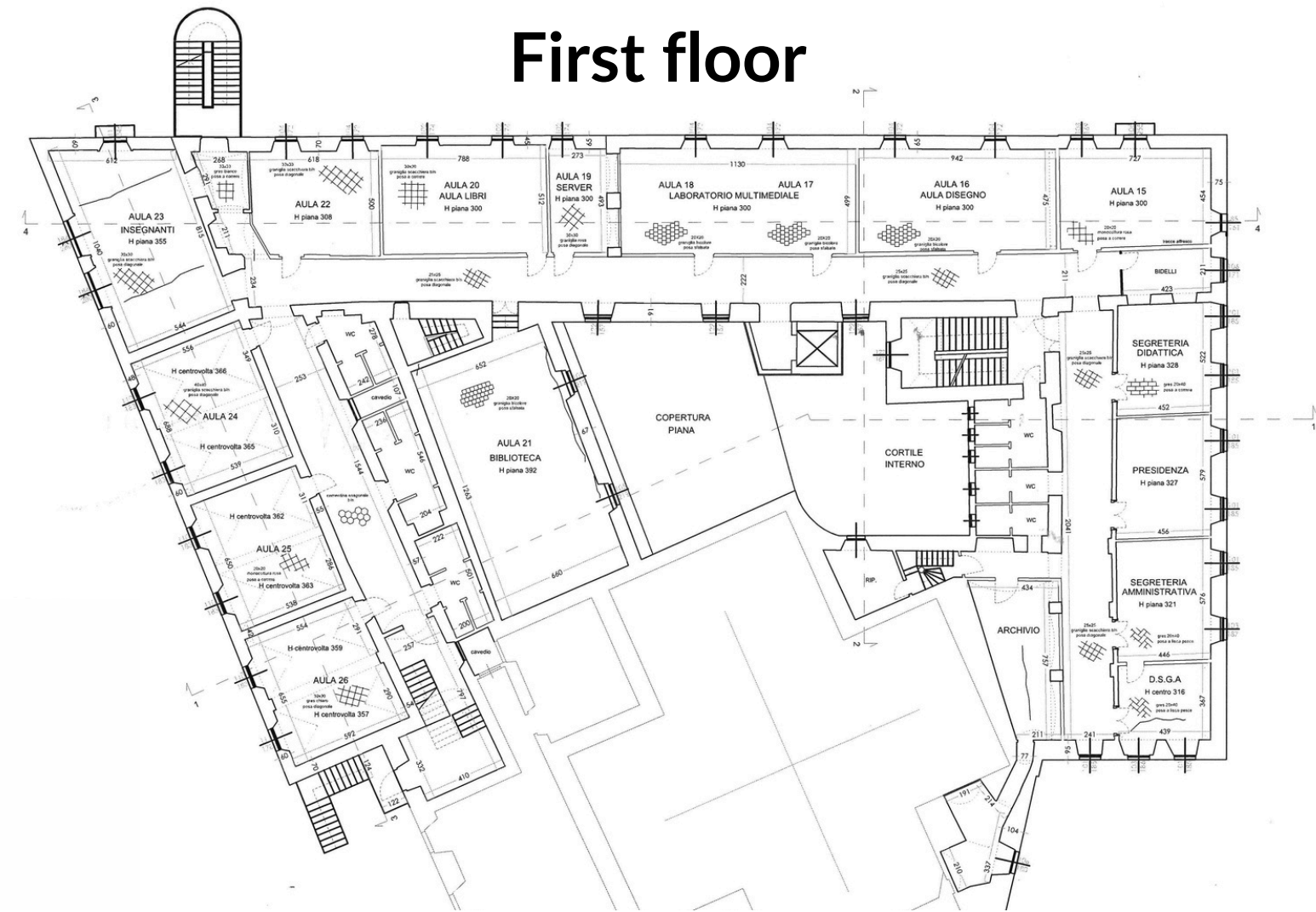


The building

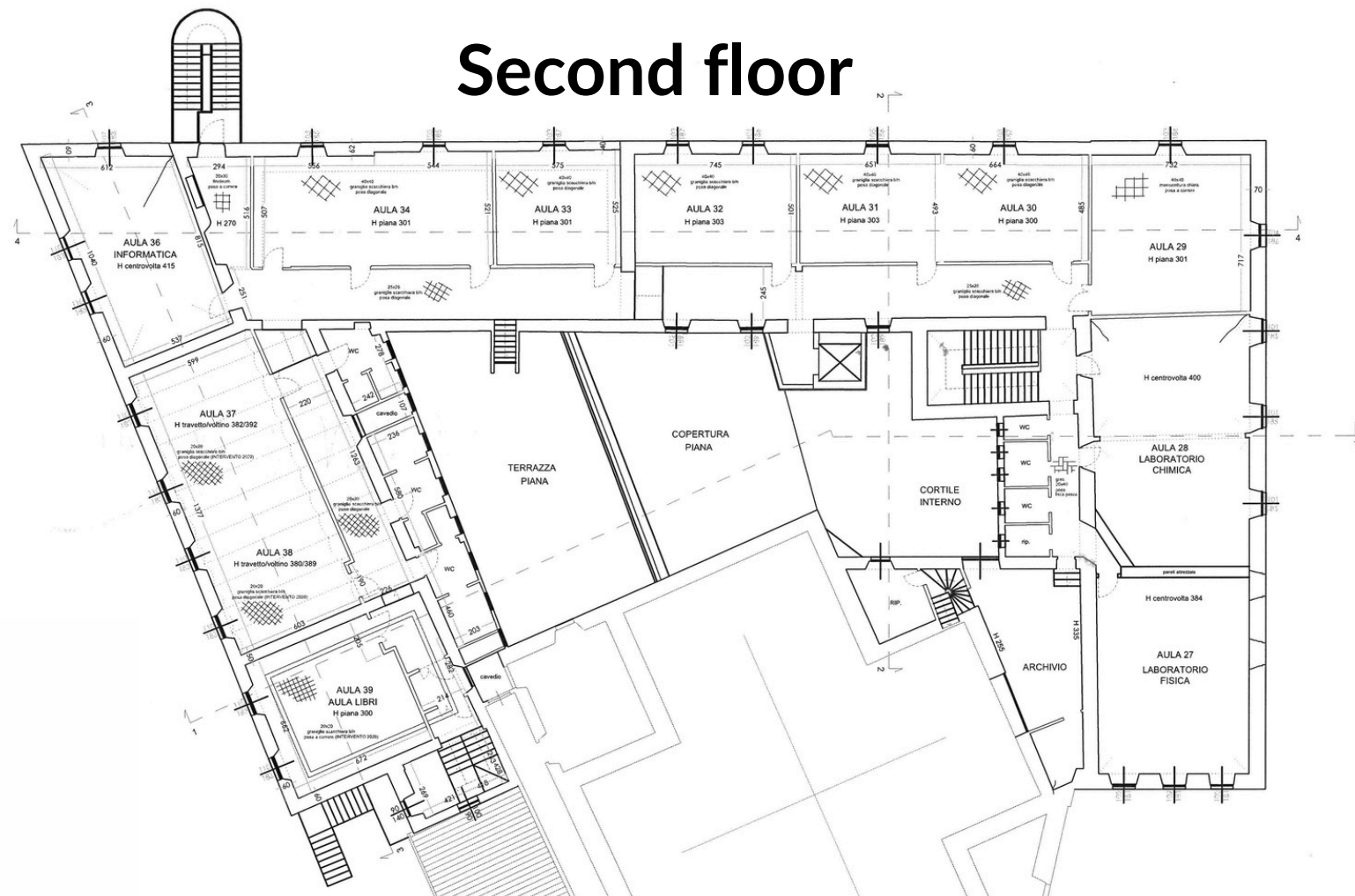
Ground floor



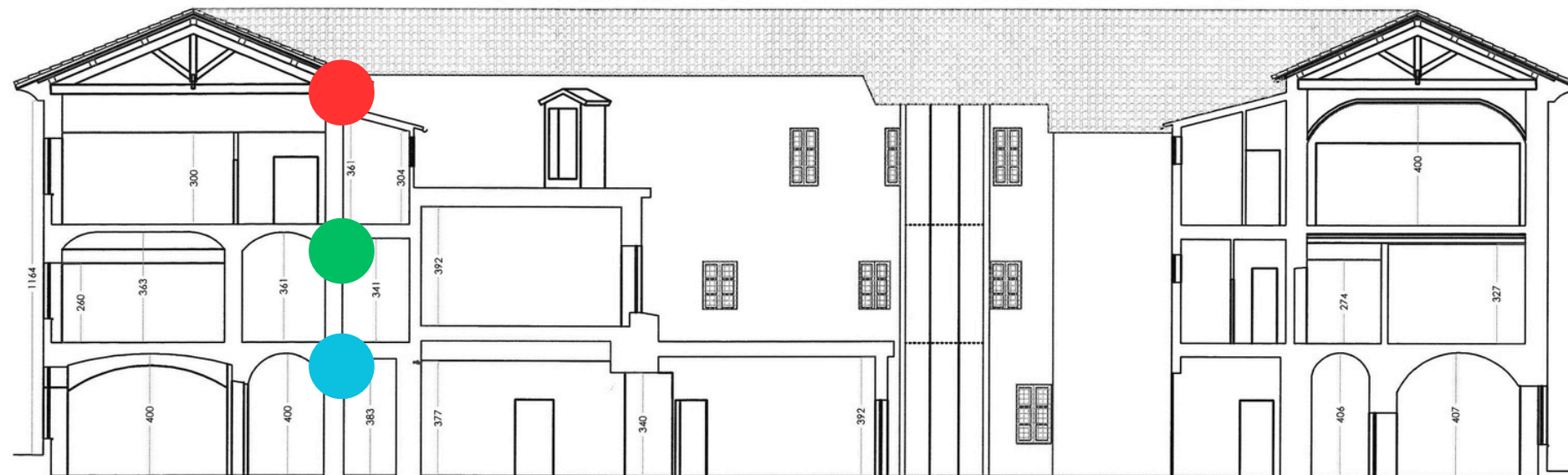
First floor



Second floor



The walls gradually become thinner between floors, with the ground one having the widest. Interference is also going to be due to this factor



SEZIONE 1-1

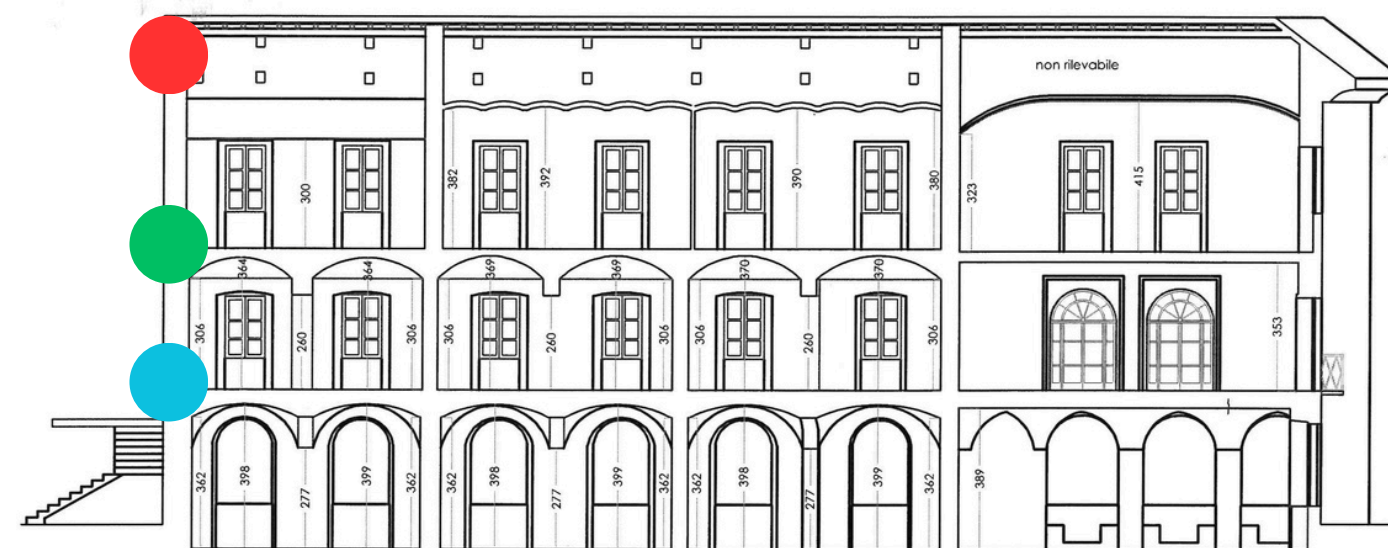


SEZIONE 2-2

Ground/first floor ●

First/second floor ●

Attic and roof ●

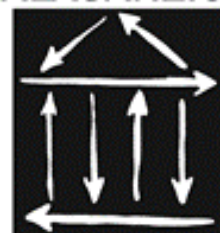


SEZIONE 3-3



SEZIONE 4-4

IL CALASANZIO



liceo classico e scientifico



 Liceo Calasanzio Carcare

THE CONSTRUCTION MATERIALS



Given the long history of the building, the different floors vary wildly based on the time of construction. There are differences both in the materials used and the width of the peripheral walls, which are almost the widest at the ground floor but a lot narrower at the highest one

Ground/first floor ●

- Full bricks (18 cm)
- Embankment in various materials (varying with, 20/120 cm)
- Lime layer (6 cm)
- Grit pavement

First/second floor ●

- Wood reinforced with steel bars
- Plank floor
- Concrete layer (10 cm height)

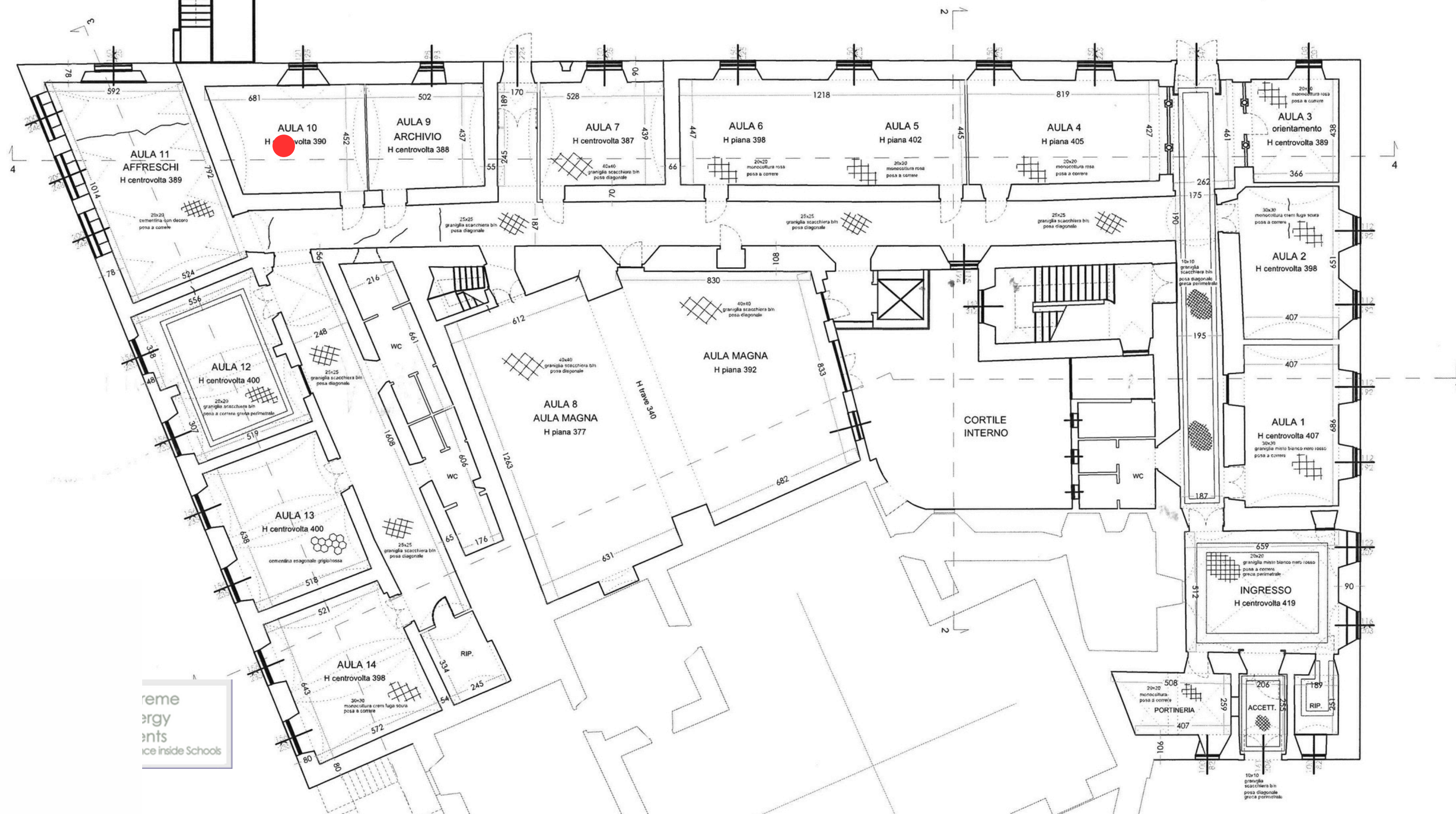
Attic and roof ●

- Calcium silicate layer (2/3 cm height)
- Free space (150 cm height)
- Wooden roof frame
- Bitumen sheath (2 cm height)
- Brick roof shingles

Ground floor

● Location of the detector

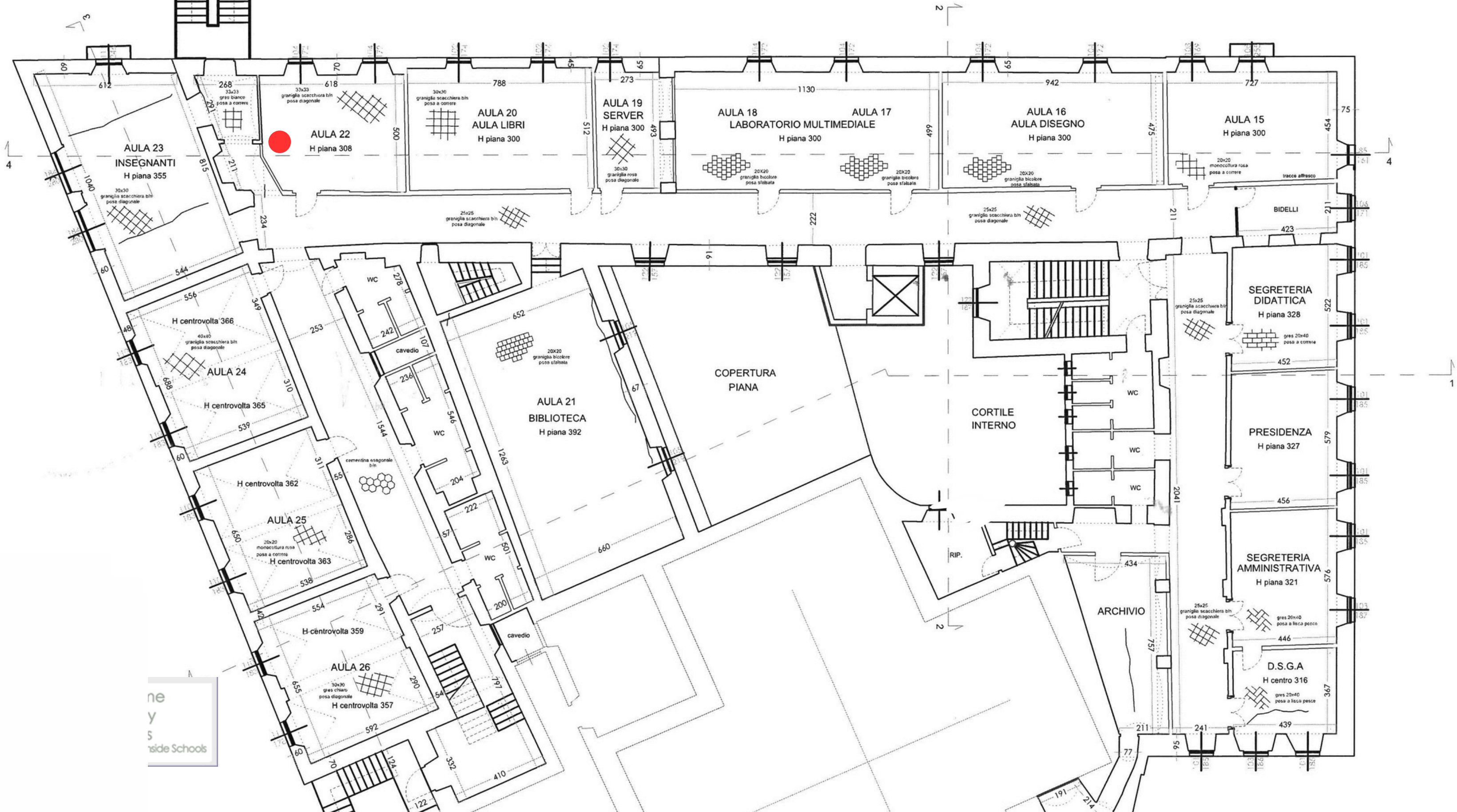
scale: 1:200 cm



First floor

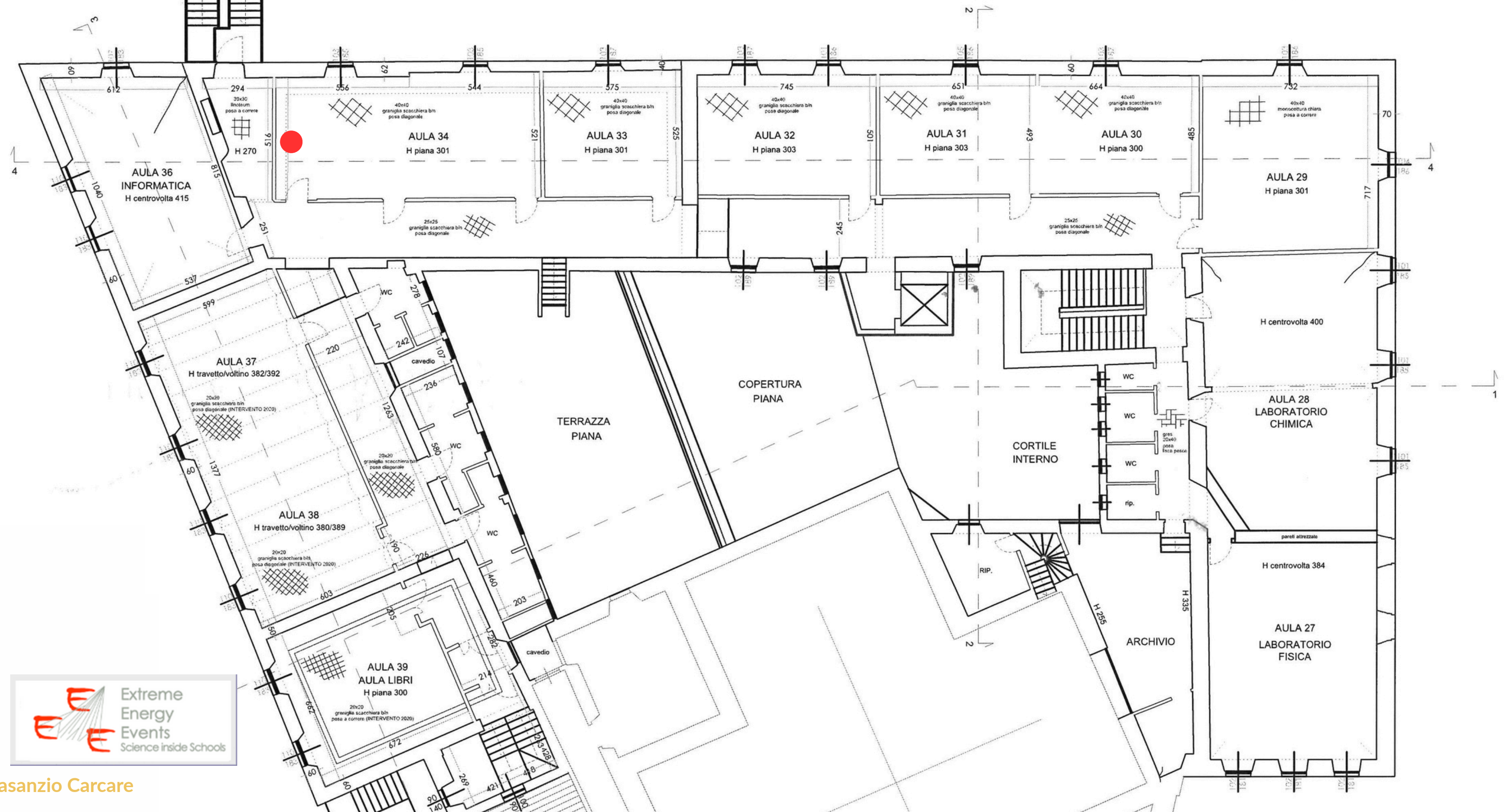
● Location of the detector

scale: 1:200 cm



● **Location of the detector**

scale: 1:200 cm



THE OBJECTIVES

Muon flux

Determining muon flux in the building and comparing it with theoretical models

Scientific research

Improving the students' understanding of scientific research and its quality

Theory and practice

Comparing theoretical models and actual data and real environments

Observation

Foster students' learning of scientific matters through theoretical models and data observation

Team work

Encouraging team work and collaboration between students

Data analysis

Mastering Root and Excel as instruments to analyze data

STAGES OF THE PROJECT



preliminary phase

References for ground level muon rates are going to be found.

The efficiency of the chamber “e” is going to be found through floor level measurements

measurements

We are going to take measurements at the different floors of the school, at least 20 60 min measurements for each one of them. Another set of measurements is going to be taken outside, for reference purposes

data analysis

Data will be analyzed through Root and Excel, and special attention will be placed on errors

publication

The results may be published in a scientific article redacted by the students.

They are also going to be disclosed to the public in Run Coordination Meetings and “Notte del Liceo”



$$N = 3600 \text{ s} \times 0,5 \text{ Hz} = 1800$$

$$\sqrt{N}/N = 2,3\%.$$

ERRORS

Measurements suggest a 0.5 Hz rate of measurements at sea level.

Through this datum, applying the poissonian error model to 1 hour long sessions, we can see that the error rate would be at around 2.3%.

This low rate would allow us to ignore all other error origins, as time and surface should be irrelevant when compared to the poissonian error, since the statistical error would be of the same magnitude as systematic errors, which we evaluate to be around 5%.





THANK YOU

for your time and attention

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