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# Report on the massive MIMO channel measurement campaign

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## ABSTRACT

This document describes the measurement campaign that was carried out for the article: *A New Gradual Resource Allocation Technique for Massive MIMO-NOMA*. The campaign took place on the campus of the University of Lille, called Cité Scientifique, in France.

**Keywords:** Massive MIMO, channel, measurements.

## 1. INTRODUCTION

The measurements were carried out with the maMIMOSA channel sounder, all of the technical details of which can be found in references.<sup>1-3</sup>

The transmitter (Tx) is equipped with an  $8 \times 8$  vertical planar patch antenna array, and the receiver (Rx) with a single EM-6116 omni-directional antenna. The Tx is placed on a platform in the P4 building of the campus, on the 4th floor, 10 m high. As for the Rx, it was moved to 650 different positions within a 300 m radius of the Tx, in order to emulate a cell of radius 300 m with randomly deployed mobile users. At each position of the Rx, the channel matrix of dimension  $N \times M$  is measured, where  $N = 1024$  is the number of measured subcarriers, and  $M = 64$  is the number of Tx antennas.

The photos in Fig. 1 and 2 illustrate the Tx located on the platform of the P4 building. The photo in Fig. 3 shows the Tx antenna array before installation on the platform.

The photos in Fig. 4 illustrate the Rx.

The measurements were carried out indoors and outdoors, to get the most faithful possible representation of a cell. All the measurement points can be found on the five maps provided at the end of the document.

Indoors, the majority of the measurements (400) are carried out in the P3 building, facing P4 building. It is a typical office building, consisting of 4 floors with a similar configuration: a central corridor and offices on either side of the corridor. The building plan with the locations of the measurements is provided for each floor. The locations are indicated with a dot followed by the number of the Rx measurement points. Numbering starts at floor 3 up to ground floor. After the indoor part, we left the building to take measurements on the parking lot and in the vicinity of the building, within a radius of 300 m. Some measurements were taken on the ground floor of two other buildings, P2 and P7.

In the following, some of the measurement points are illustrated by photos.

The photo in Fig. 5 was taken for the measurement point .28 situated in the corridor of the 3rd floor of P3 building.

The photo in Fig. 6 was taken for the measurement point .286 located in an office of the first floor of P3 building, facing the Tx. This measure corresponds to a direct line of sight.

The photo in Fig. 7 was taken for the measurement point .499 located in the parking lot of P3 building.

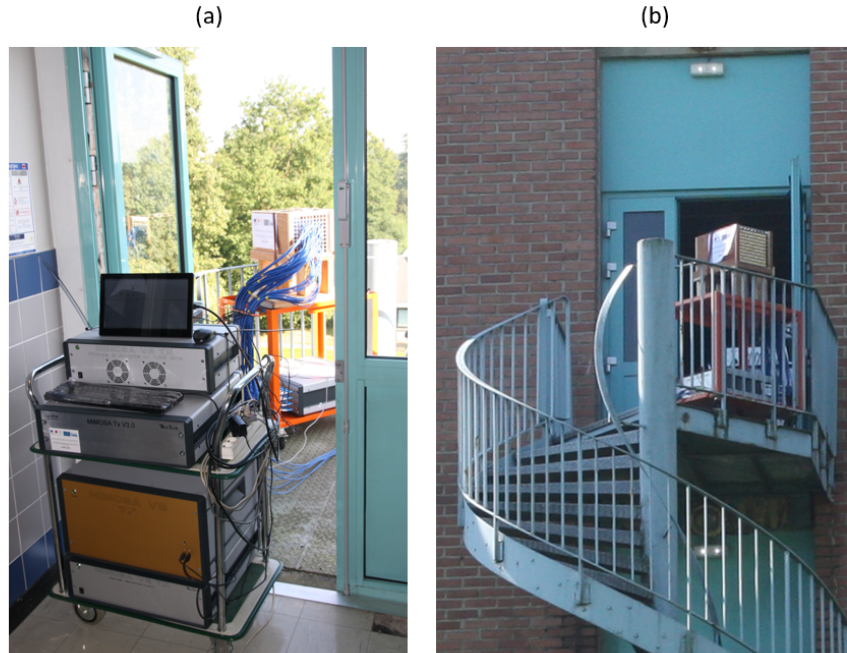


Figure 1. (a) back of Tx, (b) front of Tx

## REFERENCES

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- [3] Gaillot, D., Laly, P., Dahmouni, N., Delbarre, G., Van den Bossche, M., Vermeeren, G., Tanghe, E., Simon, E., Joseph, W., Martens, L., et al., “Measurement of the V2I massive radio channel with the MaMIMOSA sounder in a suburban environment,” in *[2021 15th European Conference on Antennas and Propagation (EuCAP)]*, 1–4, IEEE (2021).



Figure 2. Tx on the P4 building platform



Figure 3. Tx antenna array



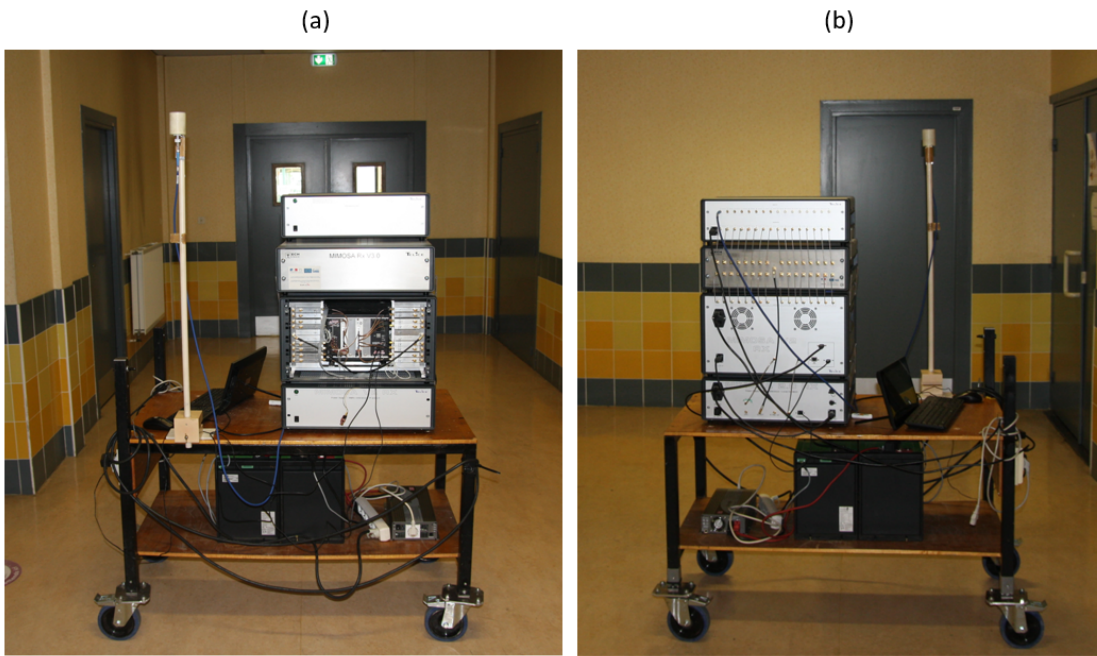


Figure 4. (a) front of Rx, (b) back of Rx



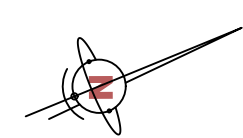
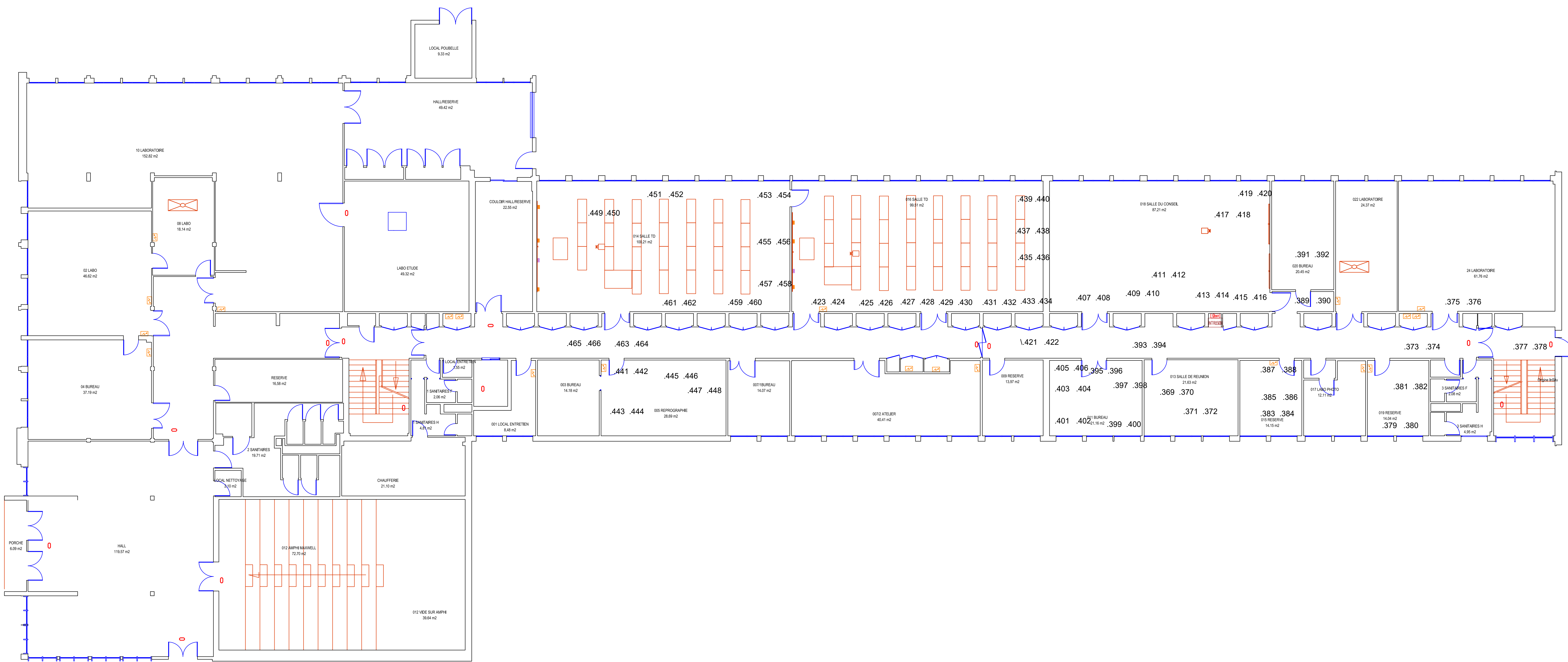
Figure 5. Rx at the measurement point .28



Figure 6. Rx at the measurement point .286

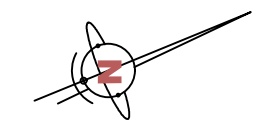
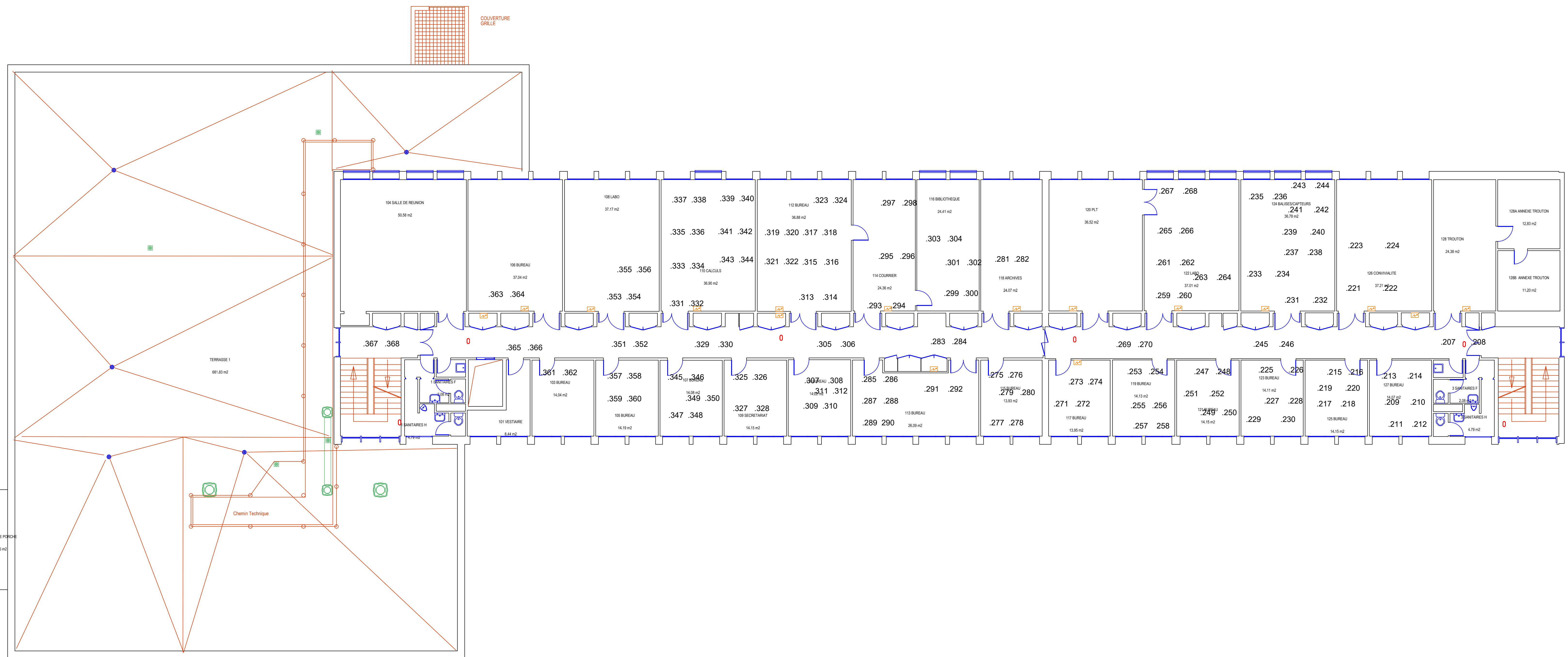


Figure 7. Rx at the measurement point .499



<b>P3</b>		
	Echelle: 1/100ème Nom Fichier: CCS047 - P3 Bâtiment: P3	Date Impression: 06/09/2018 UNIVERSITE LILLE 1 Sciences et Technologies Cité Scientifique 59655 VILLENEUVE D'ASQ
<b>Plan Numéro</b> 10730		<b>PLAN DE</b> <b>RDC</b>
Université Lille1 Sciences et technologies Service P.C.E.T Pôle Patrimoine Cité Scientifique 59655 VILLENEUVE D'ASQ CEDEX Tél: 03 20 43 68 24 Fax: 03 20 33 70 00 Email: matthieu.depin@univ-lille1.fr		

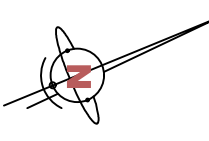
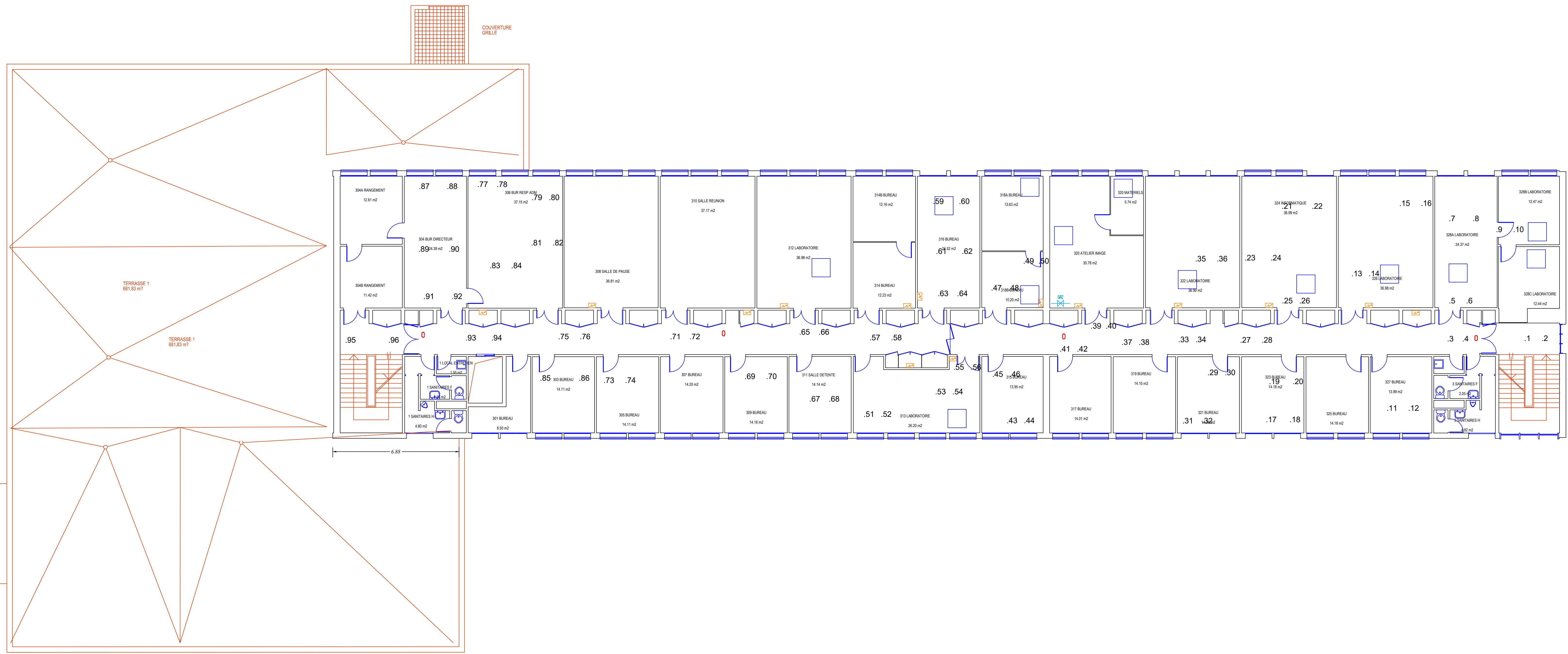




<b>P3</b>		
Université de Lille	Échelle: 1/100ème	
Nom Fichier: CCS047 - P3		Date Impression: 10/07/2018
Bâtiment: P3 UNIVERSITÉ LILLE 1 Sciences et Technologies Cité Scientifique 59655 VILLENEUVE D'ASCQ		
<b>Plan Numéro</b>	<b>PLAN DE 1ER ETAGE</b>	
10731		
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<b>P3</b>		
	Echelle: 1/100ème Nom Fichier: CCS047 - P3 Bâtiment: P3	Date Impression: 10/07/2018 UNIVERSITE LILLE 1 Sciences et Technologies Cité Scientifique 59655 VILLENEUVE D'ASCQ
Plan Numéro <b>10733</b>	<b>PLAN DE 3EME ETAGE</b>	
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