Supplementary Materials S1. Drawings

Current Appendix presents 2D drawings of the enclosed spaces and detailed views.

S1.1. University Classroom A206– Scenario 1: During class with students.

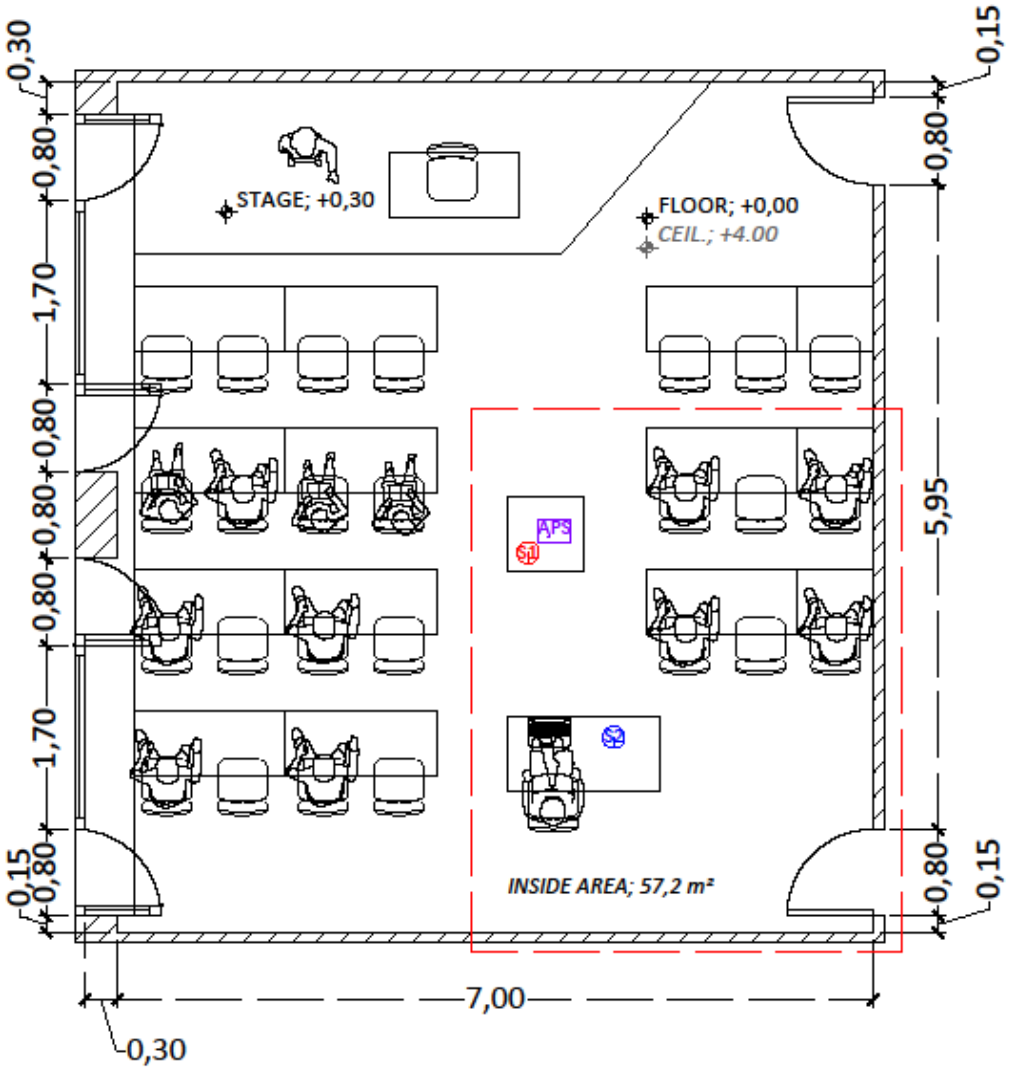

Figure S1. General view.

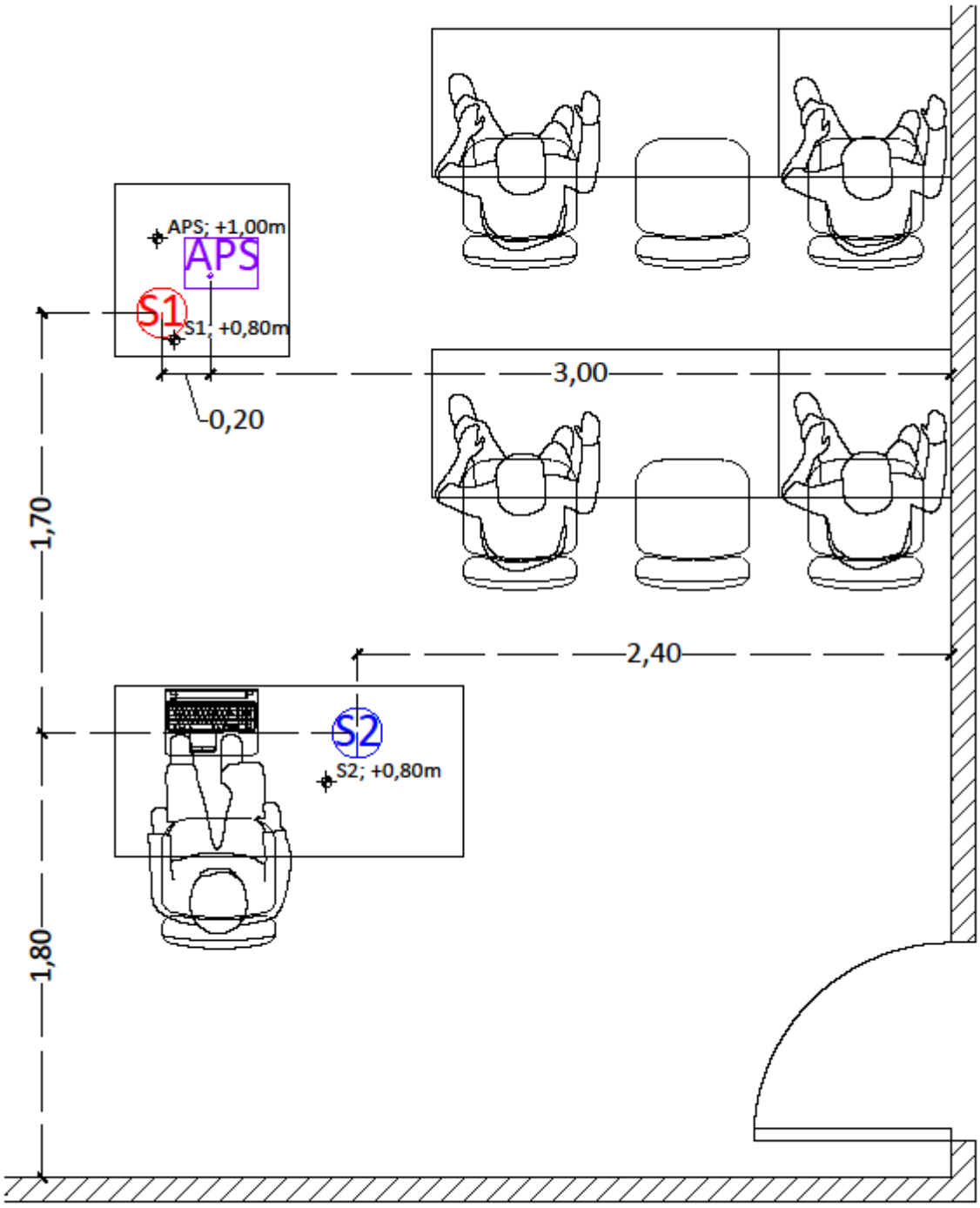

Figure S2. Detail view.

S1.2. University Classroom A206– Scenario 2: Empty class with one people partial stay.

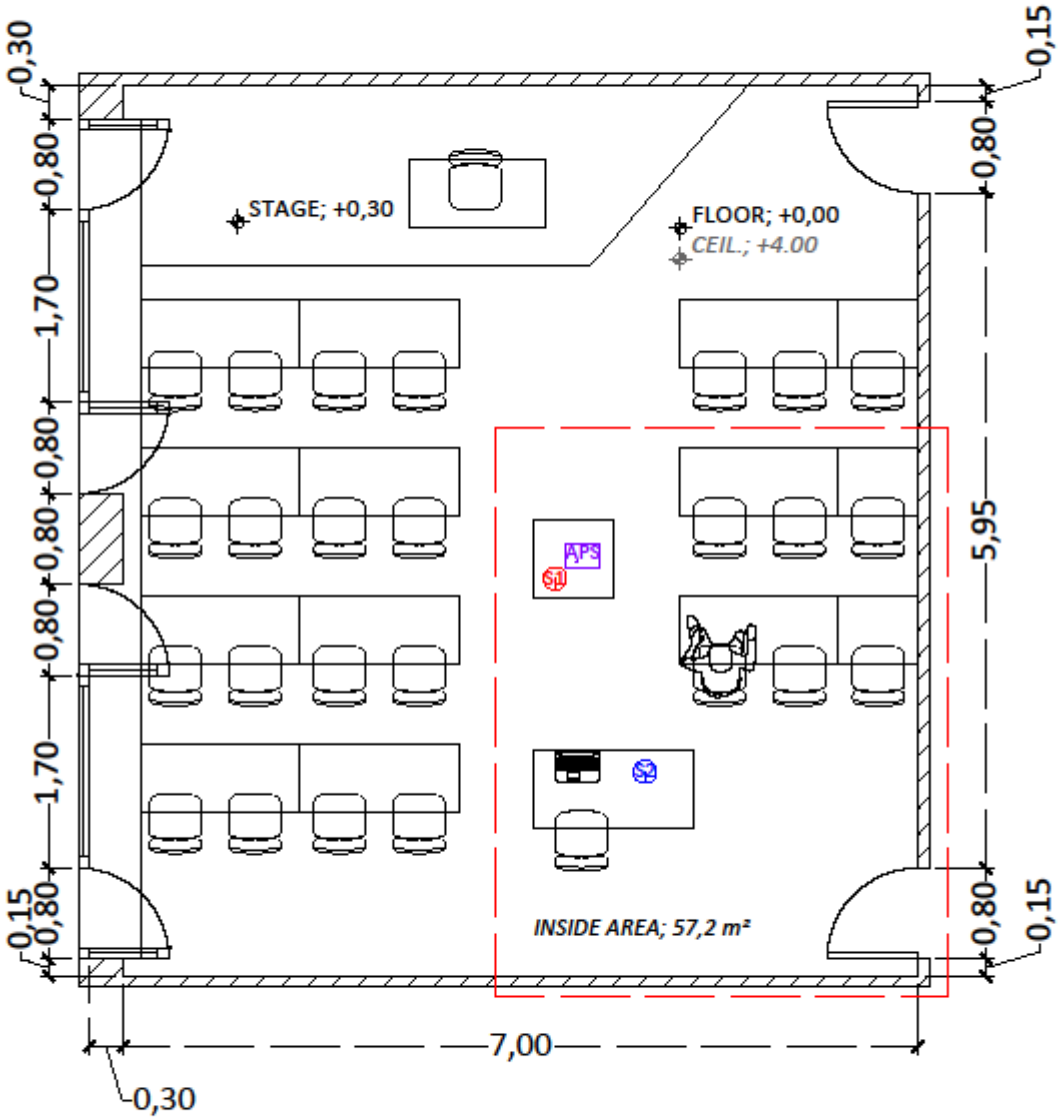

Figure S3. General view.

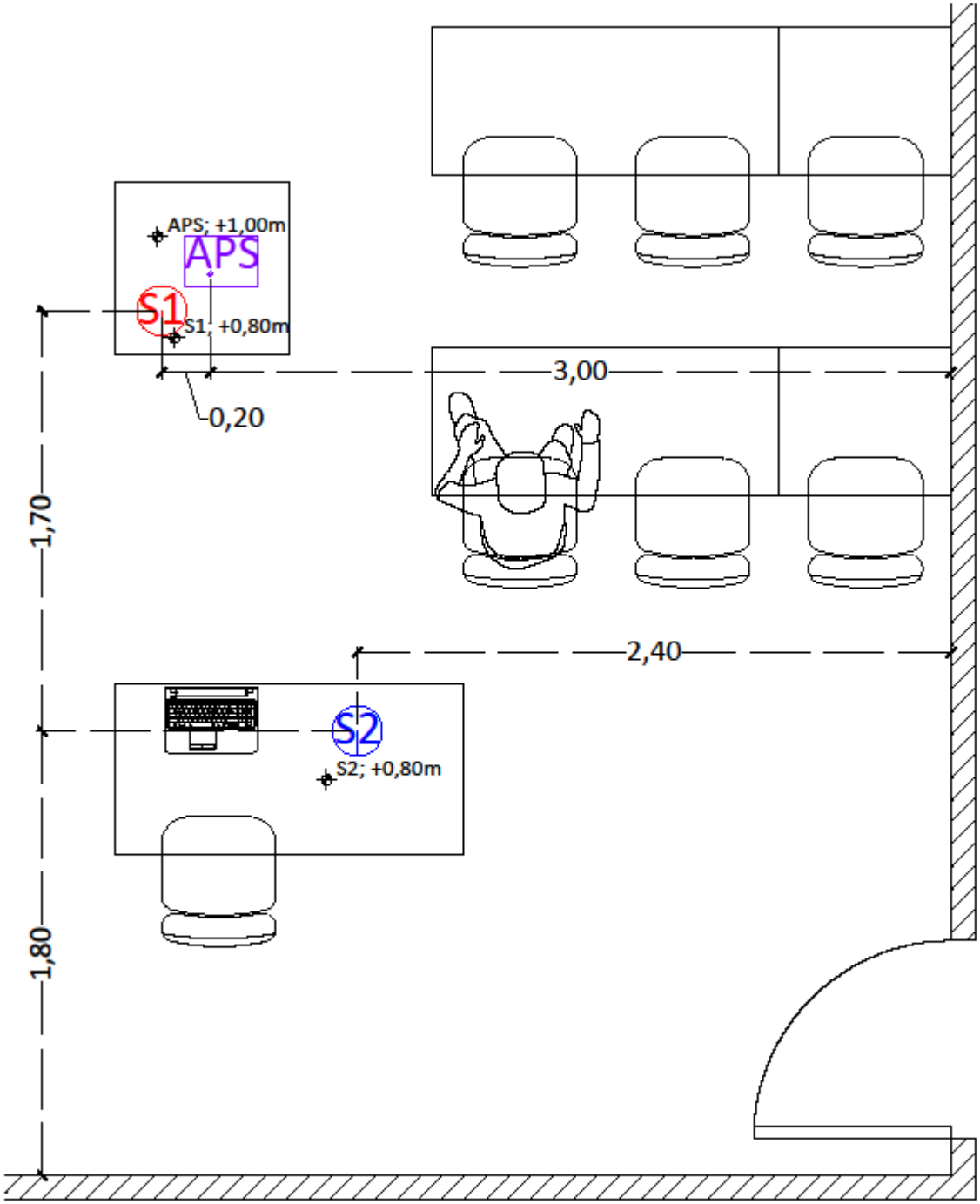

Figure S4. Detail view.

S1.3. Ignacio Aldecoa Library – Children area.

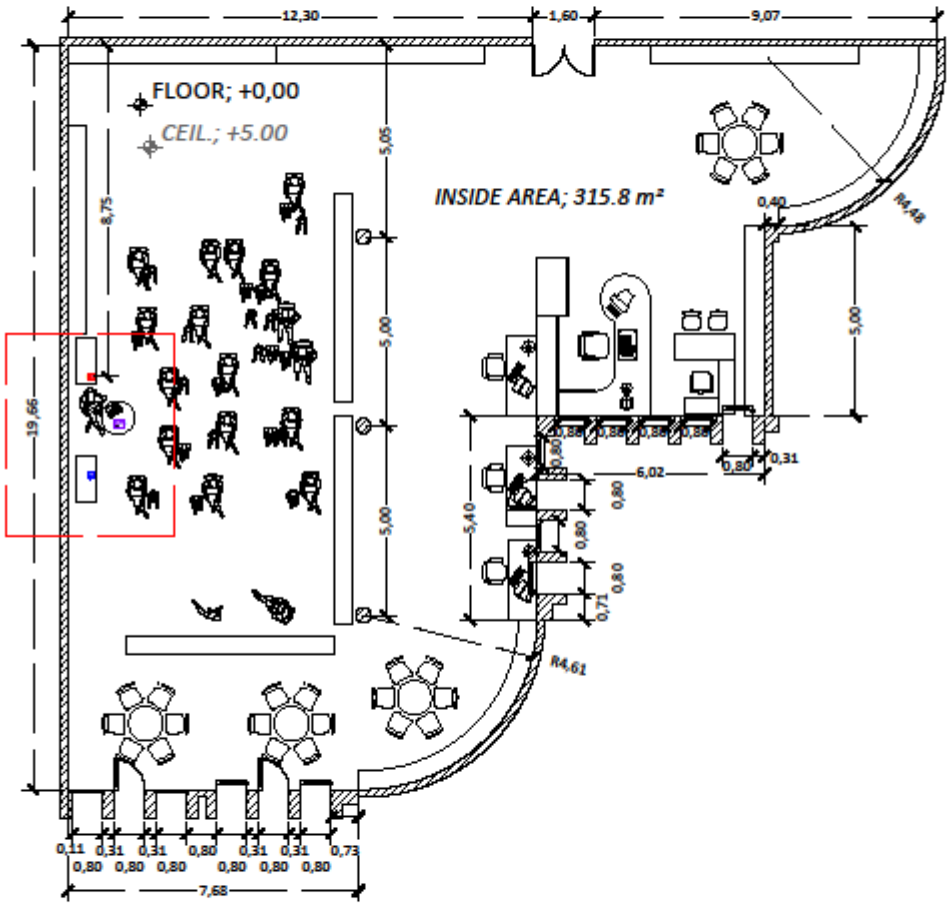

Figure S5. General view.

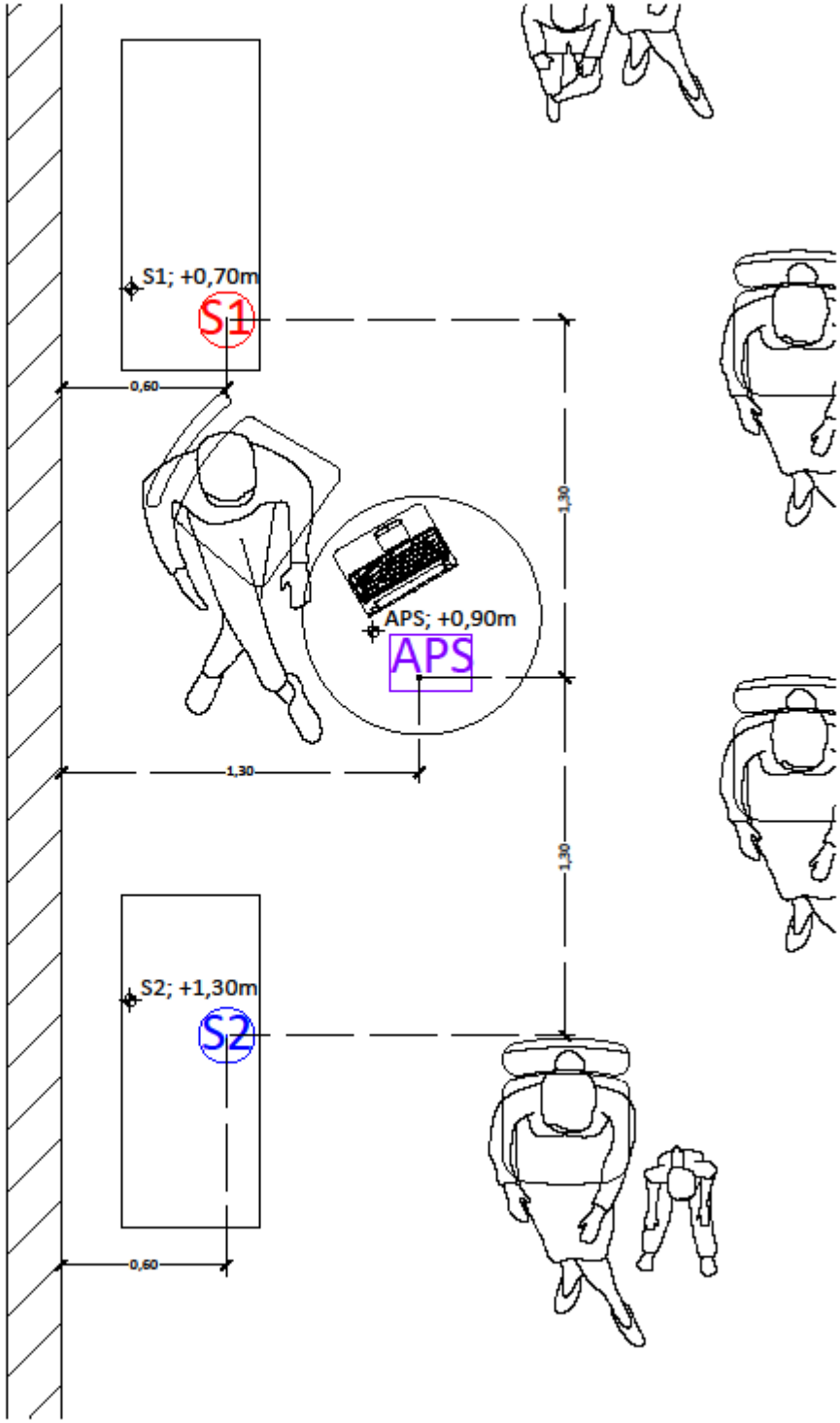

Figure S6. Detail view.

S1.4. Ignacio Aldecoa Library – Assembly Hall

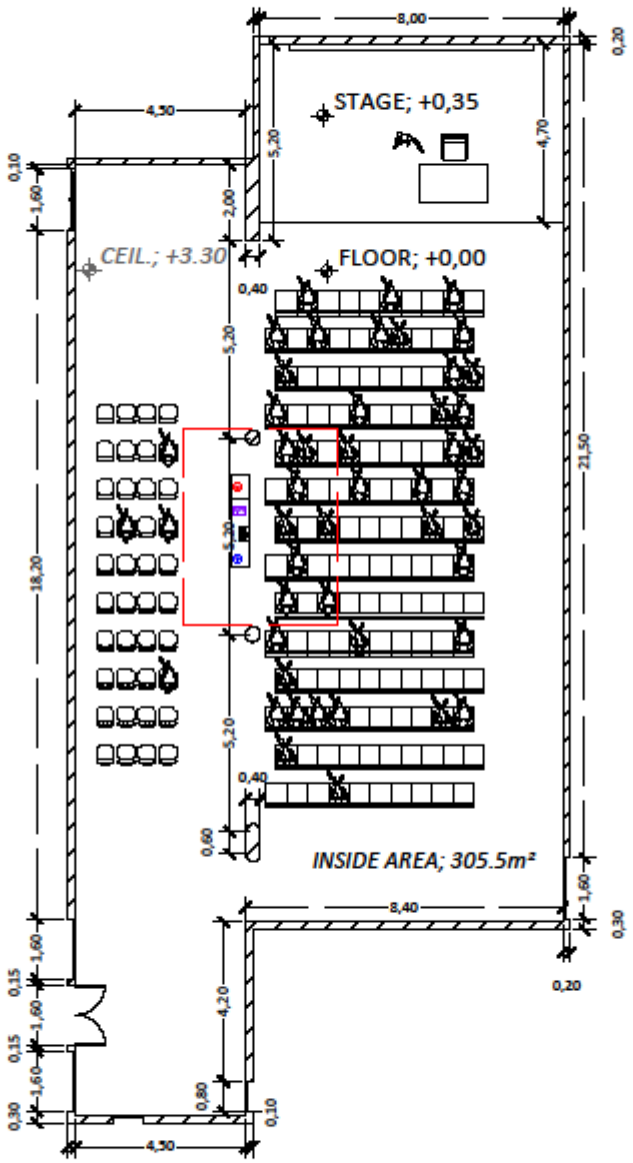

Figure S7. General view.

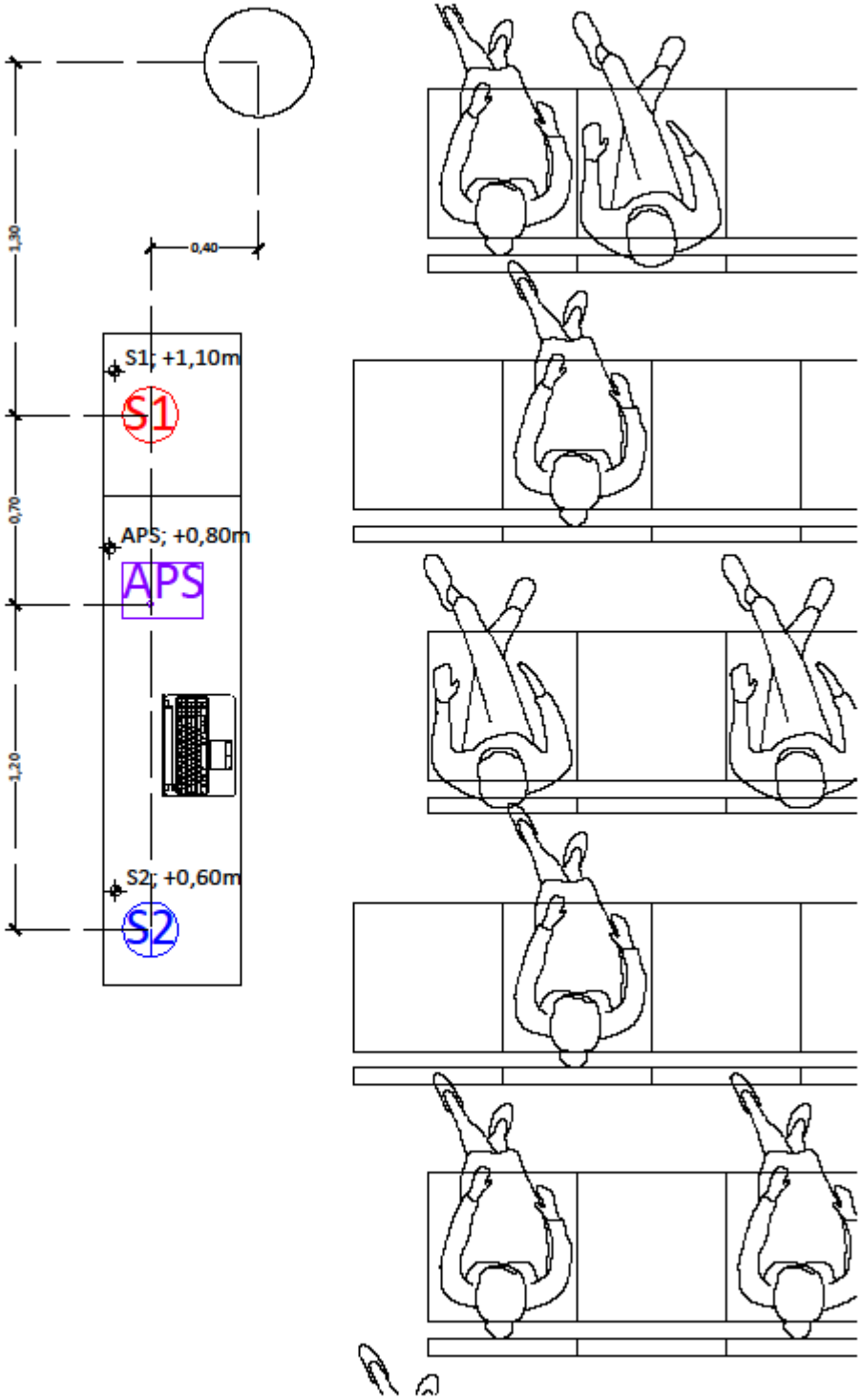

Figure S8. Detail view.

S1.5. Ignacio Aldecoa Library – Conference Room.

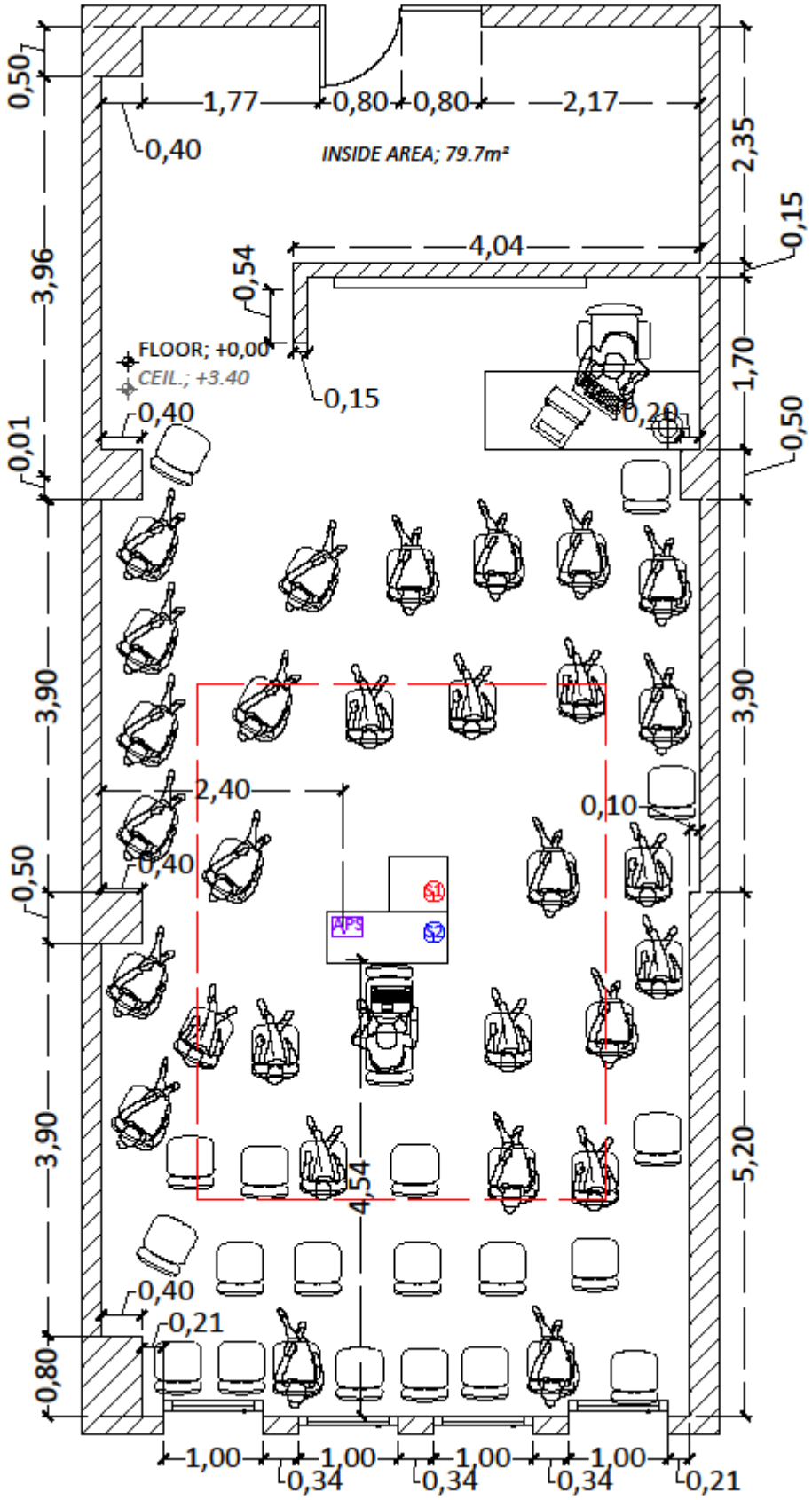

Figure S9. General view.

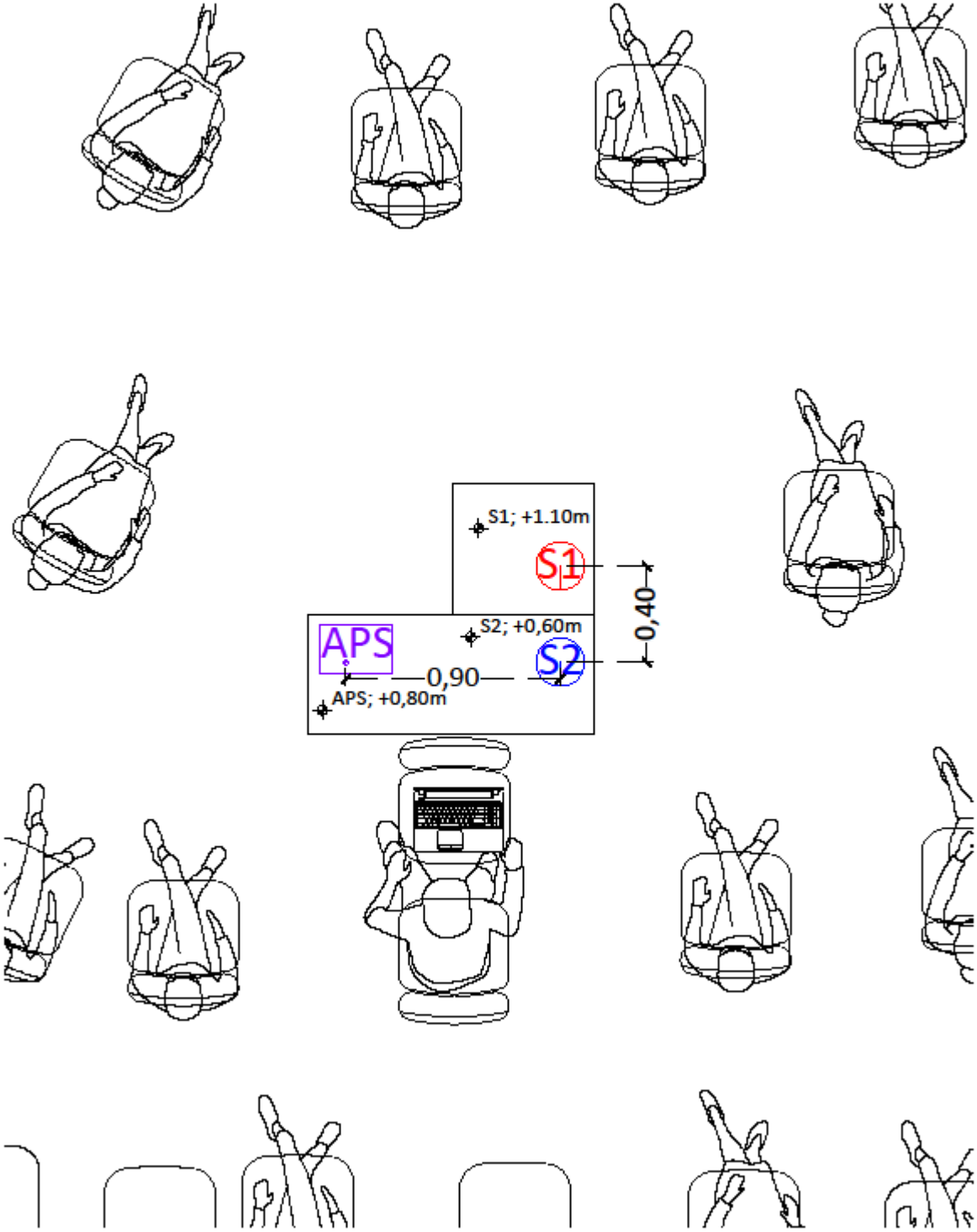

Figure S10. Detail view.

S1.6. Mendizorroza sports facilities – Training Room

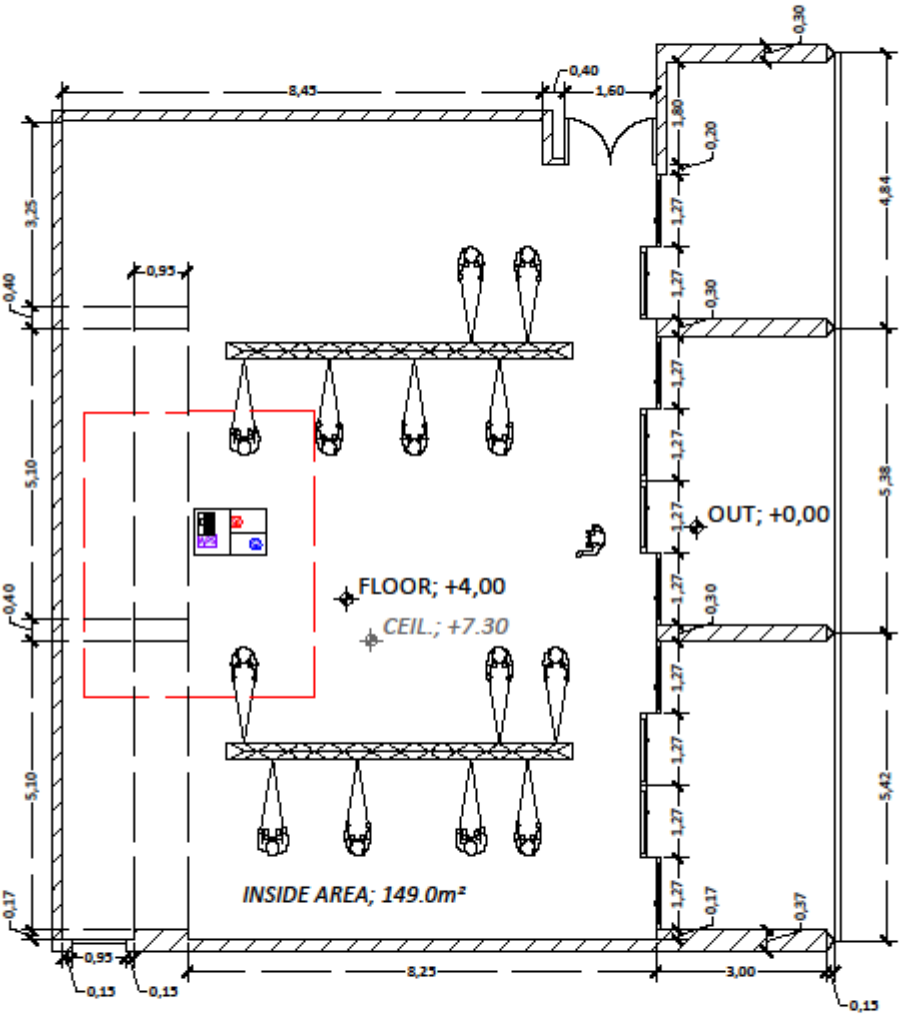

Figure S11. General view.

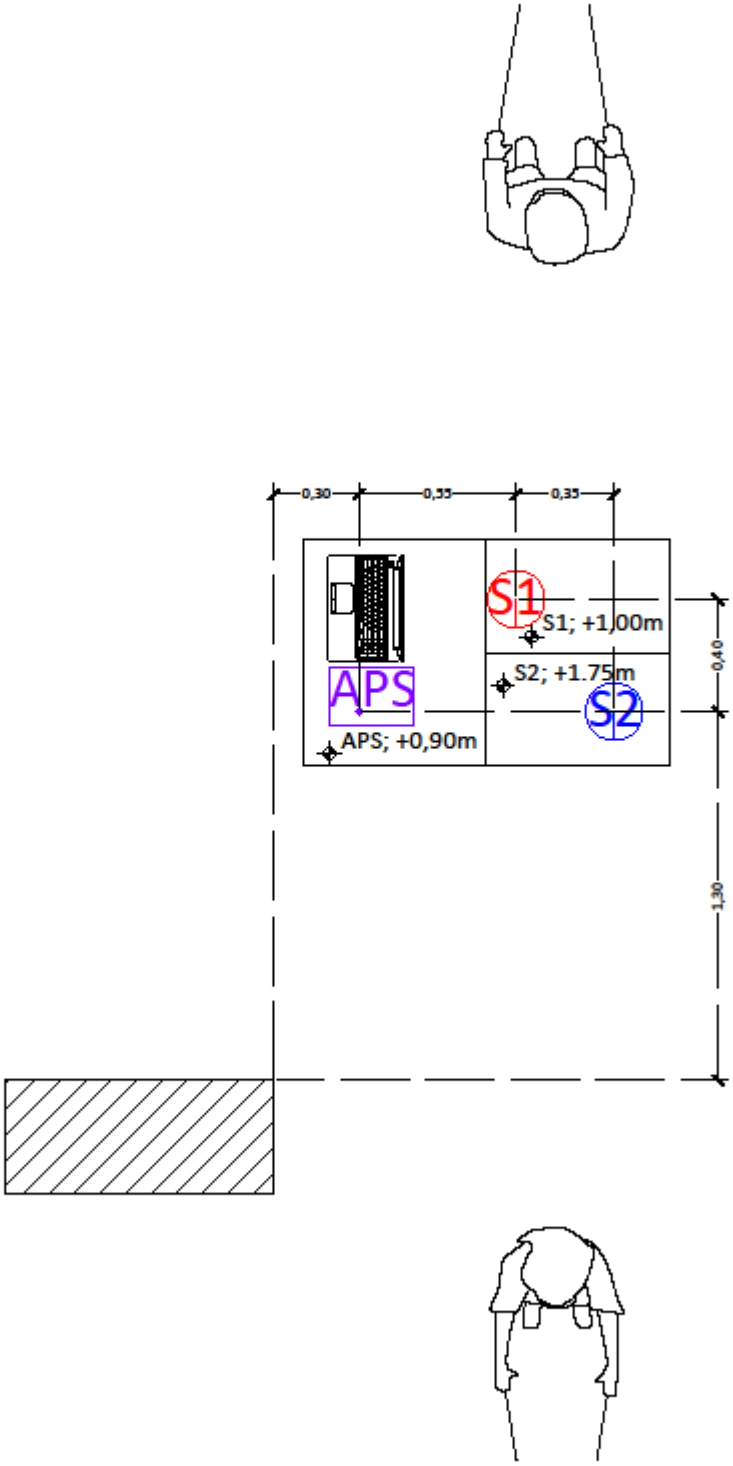

Figure S12. Detail view.

S1.7. Mendizorroza sports facilities – Spinning Room

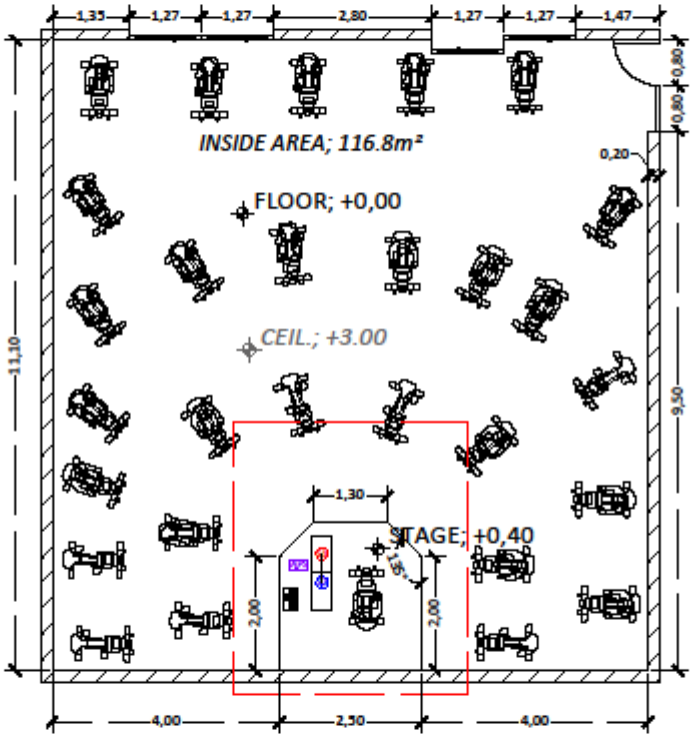

Figure S13. General view.

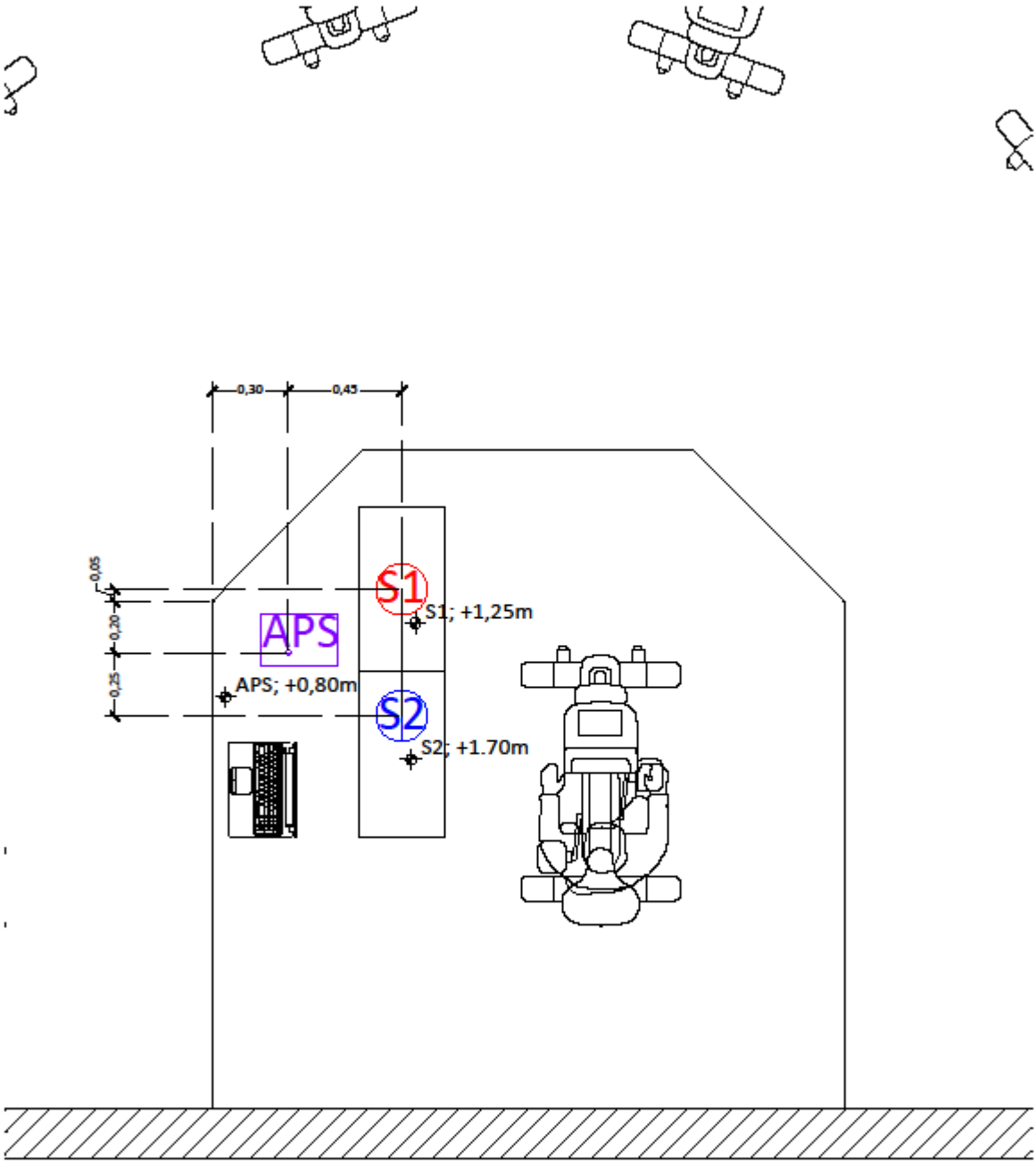

Figure S14. Detail view.

Supplementary Materials S2. Rest of graphics

In the current Appendix Figure S15, Figure S16, Figure S17, Figure S18, Figure S19, Figure S20 and Figure S21, present cumulative particle mass concentration (CPM_i) in percentage (%) for all sizes detected by the APS. In this figure four selected sizes are presented coloured, which correspond to i=0.723, 2.458, 5.048 and 10.370. Also PNC and PM_{20} are plotted to explain other effect of interest. Also PM_{20} and PNC curves are plotted along with them to assess for relationship and interactions between them.

In addition, outdoor environmental conditions are presented in case of further research to be done or to compare with any of ones included in this article and/or if further analysis wants to be performed on its basis.

S2.1. University Classroom A206– Scenario 1: During class with students

Figure. B.1 1 presents all PM_i, PNC and PM_{20} inside the classroom. It should be mentioned that all the peaks and valleys in the PM_i curves were detected by PM_{20} curve. However, they were not so evidently identified. Eventually, by adding PNC curve on top of them it was seen there was neither direct relationship between PM_i and PNC curves. However, relation between this data is addressed as it happened for the record and in order to resume the results in the timeline. As soon as measurement started, all windows and doors were closed. Valleys in both PNC and PM_{20} had place while PM_i of particles smaller or equal to 2.458μm suffered a reduction wave and the ones in the range between 2.458μm and 7.234μm saw an increase wave wave. Then, one more alumni entered the room and windows were opened during following 16min. Peak in PNC and valley in PM_{20} had place while PM_i of particles smaller or equal to 2.458μm saw an increase wave and the ones in the range between 2.458μm and 7.234μm suffered a reduction wave. After it, and once again, all was closed during 20min. Valley in PNC and peak in PM_{20} had place while PM_i of particles smaller or equal to 2.458μm suffered a reduction wave and the ones in the range between 2.458μm and 7.234μm saw an increase wave. At this time, all windows and doors were opened. Peak in PNC and valley in PM_{20} had place while PM_i of particles smaller or equal to 2.458μm saw an increase wave and the ones in the range between 2.458μm and 7.234μm suffered a reduction wave. Just before closing again, already mentioned alumni left the room. Again, during another 20min interval in all closed stage, valley in PNC and peak in PM_{20} had while PM_i of particles smaller or equal to 2.458μm suffered a reduction wave and the ones in the range between 2.458μm and 7.234μm saw an increase wave. After that interval finished, only doors were opened until the end of the class. During this 30min interval, valley in PM_{20} and continuous increase wave in PNC had place while PM_i of particles smaller or equal to 2.458μm saw an increase wave and the ones in the range between 2.458μm and 7.234μm suffered a reduction wave. During the back to the calm stage performed, and for 25min after the class ended, measurement continued in an all closed stage with the room empty. In this interval, valley and decrease in PNC and valley with small increase in PM_{20} had place while PM_i of particles smaller or equal to 3.278μm saw an increase wave and the ones in the range between 3.278μm and 7.234μm suffered a reduction wave.

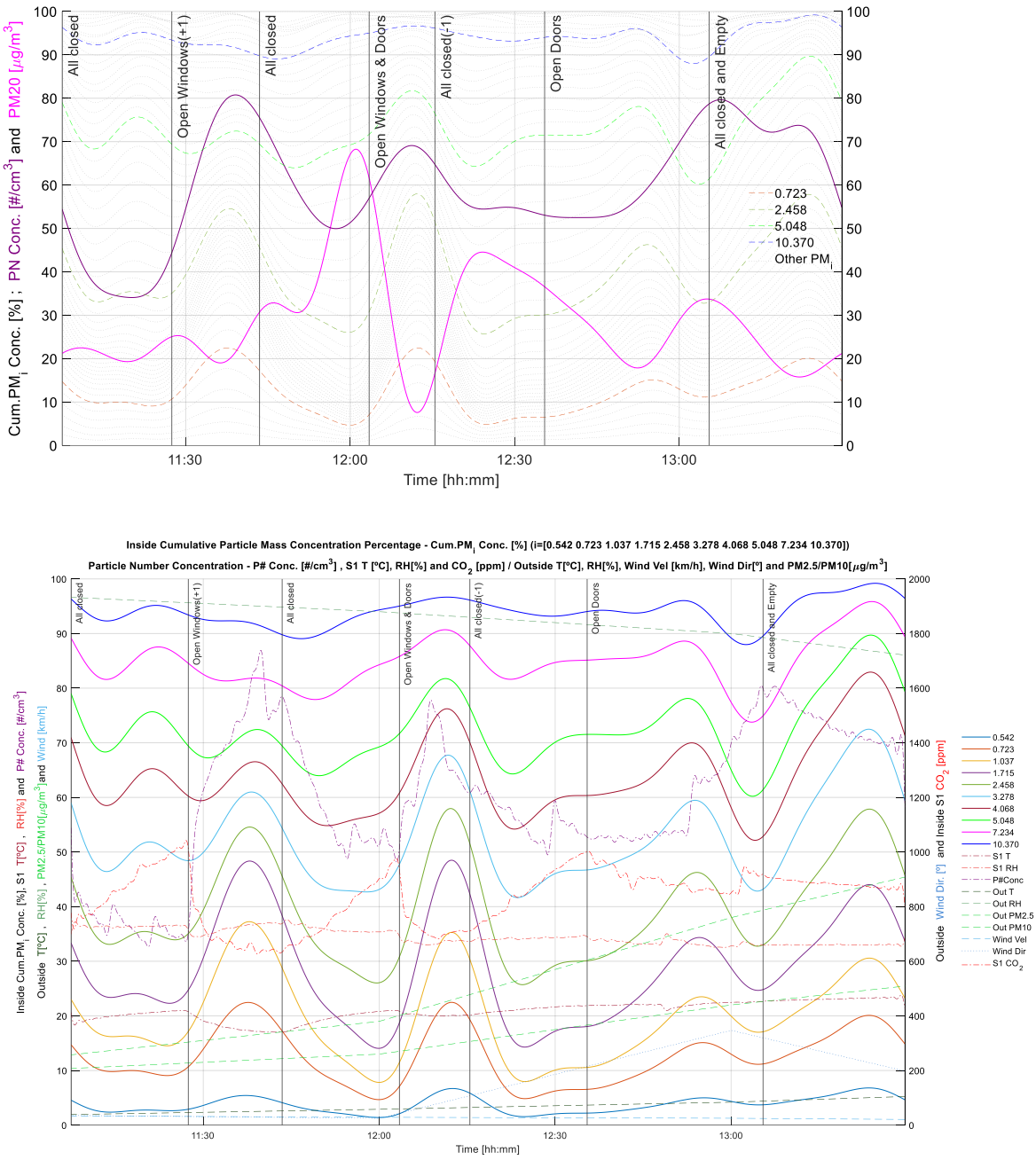

Figure S15. Cum. PM$_i$ Conc. [%], PN Conc. [#/cm^3] and PM$_{20}$ [µg/m^3] including Outdoor environment conditions along with Outdoor PM Concentrations for PM$_{2.5}$ and PM$_{10}$.

S2.2. University Classroom A206–Scenario 2: Empty class with one people partial stay.

Figure S16 presents all PM_i, PNC and PM_{20} inside the classroom. It should be mentioned that all the peaks and valleys in the PM_i curves were detected by PM_{20} curve. However, they were not so evidently identified. Eventually, by adding PNC curve on top of them it was seen there was neither direct relationship between PM_i and PNC curves. However, relation between this data is addressed as it happened for the record and in order to resume the results in the timeline. As soon as measurement started, all windows and doors were closed. Valley in PNC and peak in PM_{20} had place while PM_i of particles in the range 0.542μm to 1.715μm suffered a reduction wave and the ones in the range between 1.715μm and 4.068μm saw an increase wave. Then, one alumni entered the room and windows were opened during following 16min. Peak in PNC and valley in PM_{20} had place while PM_i of particles in the range 0.542μm to 1.715μm saw an increase wave and the ones in the range between 1.715μm and 4.068μm suffered a reduction wave. After it, and once again, all was closed during 20min. Valleys in both PNC and PM_{20} had place while PM_i of particles in the range 0.542μm to 1.715μm suffered a reduction and the ones in the range between 1.715μm and 4.068μm saw an increase. At this time, all windows and doors were opened. Peaks in both PNC and PM_{20} had place while PM_i of particles in the range 0.542μm to 1.715μm suffered a reduction wave and the ones in the range between 1.715μm and 4.068μm saw an increase wave. Just before closing again, the unique alumni left the room. Again, during another 20min interval in all closed stage, reduction in both PNC and PM_{20} had place, being the PNC one in a wavy way. At the same time, PM_i of particles in the range 0.542μm to 1.715μm saw two tiny increase waves and the ones in the range between 1.715μm and 4.068μm suffered two reduction waves. All of the oscillated in the same way than PNC curve did it. After that interval finished, only doors were opened until the end of the class. During this 30min interval, increase in PM_{20} and continuous increase in PNC had place while PM_i of particles in the range 0.542μm to 1.715μm saw an increase and the ones in the range between 1.715μm and 4.068μm suffered a reduction. During the back to the calm stage performed, and for 25min after the class ended, measurement continued in an all closed stage with the room empty. In this interval, valley and decrease in PNC and valley with small increase at the end in PM_{20} had place while PM_i of particles in the range 0.542μm to 1.715μm saw an increase wave and the ones in the range between 1.715μm and 4.068μm suffered a reduction wave.

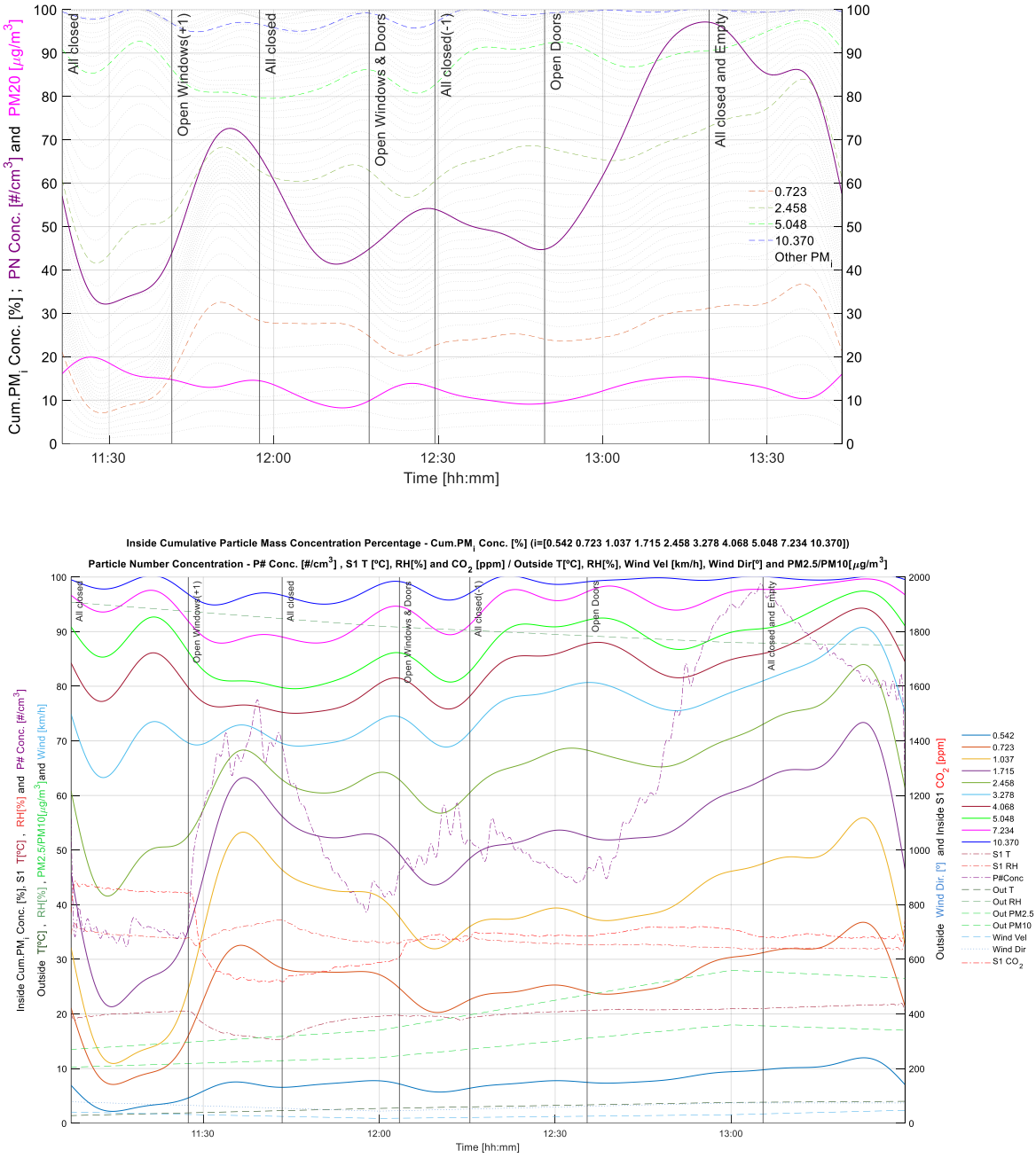

Figure S16. Cum. PM_i Conc. [%], PN Conc. [#/cm^3] and PM_{20} [μg/m^3] including Outdoor environment conditions along with Outdoor PM Concentrations for $PM_{2.5}$ and PM_{10}.

S2.3. Ignacio Aldecoa Library – Children area.

Figure S17 presents all PM_i, PNC and PM_{20} inside the children area. It should be mentioned that all the peaks and valleys in the PM_i curves were detected by PM_{20} curve. However, they were not so evidently identified. Eventually, by adding PNC curve on top of them it was seen there was neither direct relationship between PM_i and PNC curves. However, relation between this data is addressed as it happened for the record and in order to resume the results in the timeline. Once measurement started, only one of the doors was maintained opened keeping the other one closed for the rest of the time until the end of the measurement. At this time, with seven windows partially opened, valley in PNC and peak in PM_{20} had place while PM_i of particles smaller than 7.234μm suffered a reduction wave and the ones above 7.234μm saw an increase wave. At this time, parents and children started entering the room and sitting in the floor during 14min. Valley in PNC and constant increase in PM_{20} had place while PM_i of particles smaller than 5.048μm suffered a reduction wave and the ones above 5.048μm saw an increase wave. Then, show started and 7min after three of the partially opened windows were fully opened for another 10min, during these intervals valley in PNC and constant increase in PM_{20} had place while PM_i of particles smaller than 5.048μm suffered a reduction wave and the ones above 5.048μm saw an increase wave. Again, at this moment those three windows were closed during 23min interval. Decrease in PNC and valley and peak in PM_{20} had place while PM_i of particles smaller than 5.048μm suffered two reduction waves and the ones above 5.048μm saw two increase waves. When this interval finished, those three windows were opened again until the end of the show, also people started singing, mostly for the last 6min of the show. Constant increase in PNC and valley and peak in PM_{20} had place while PM_i of particles smaller than 5.048μm suffered a reduction wave and the ones above 5.048μm suffered a reduction wave at the first part of this interval and at the las part saw an increase wave. In order to finish the measurement, a back to the calm stage was performed, and for 23min after the show was ended measurement continued as it was, regarding ventilation. In this interval, in which people left for the first minutes, constant increase and a decrease at the end in PNC and a decrease with a valley and a peak in the middle in PM_{20} had place while PM_i of particles smaller than 7.234μm presented first an increase wave and then a reduction while the ones above 7.234μm presented the opposite.

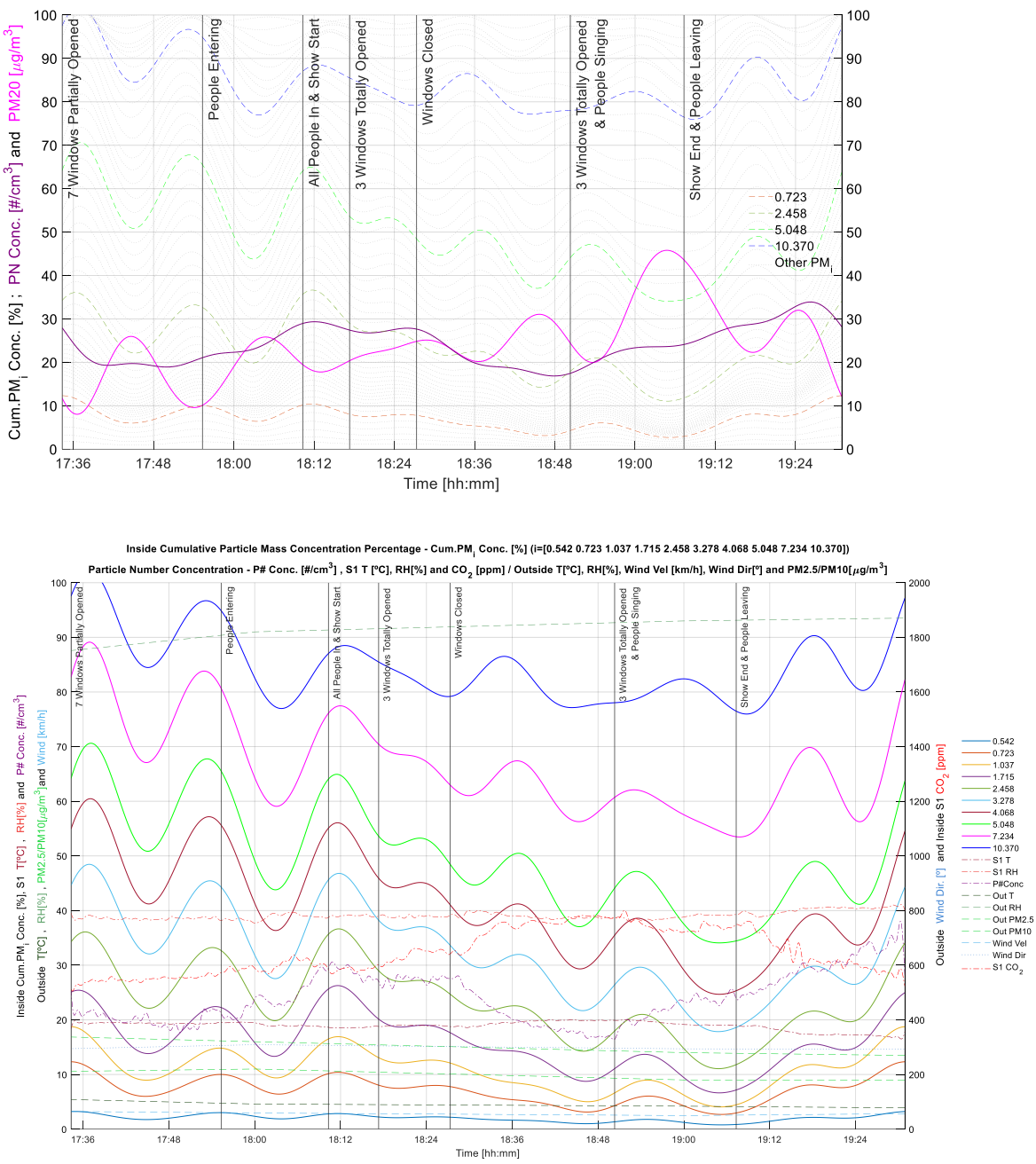

Figure S17. Cum. PM$_i$ Conc. [%], PN Conc. [#/cm^3] and PM$_{20}$ [µg/m^3] including Outdoor environment conditions along with Outdoor PM Concentrations for PM$_{2.5}$ and PM$_{10}$.

S2.4. Ignacio Aldecoa Library – Assembly Hall.

Figure S18 presents all PM_i, PNC and PM_{20} inside the assembly hall. It should be mentioned that all the peaks and valleys in the PM_i curves were detected by PM_{20} curve. However, they were not so evidently identified. Eventually, by adding PNC curve on top of them it was seen there was neither direct relationship between PM_i and PNC curves. However, relation between this data is addressed as it happened for the record and in order to resume the results in the timeline. Once measurement started, in 9min peaks in both PNC and PM_{20} had place while PM_i of smaller than 5.048μm suffered a reduction wave and the ones above 5.048μm saw an increase wave. At this time, 11 more people had entered the area. Conference started and door was closed at the same time. During the following 23min constant decrease in both PNC and PM_{20} had place while PM_i of particles smaller than 5.048μm saw an increase wave and the ones above 5.048μm suffered a reduction wave. Then, 5 more people entered and during the following 1hour and 5min conference continued stable in ventilation and people inside the area where constant decrease in PNC and stabilization of PM_{20} had place while PM_i of particles opposite behaviour is more notable presented by comparing curves for particles in the range of 7.234μm to 10.370μm versus the range of range of 7.234μm to 10.370μm Again, while one curve saw an increase wave the other one suffered a reduction wave. At this time, 5 people left, and after 15min both PNC and PM_{20} went slightly up and then back to their previous values. Then, again, 4 more people left, and after 8min PNC maintained stable and PM_{20} started going up. PM_i of particles smaller than 5.048μm suffered a reduction wave and the ones above 5.048μm saw an increase wave for the first 14 min, and the opposite occurred for the following 8min until the end of the stage. In order to finish the measurement, a back to the calm stage was performed, and for 20min after conference ended measurement continued as it was, regarding ventilation. In this interval, in which people left in a few minutes, increases in both PNC and PM_{20} had place while PM_i of particles smaller than 5.048μm suffered a reduction wave and the ones above 5.048μm saw an increase wave at the first minutes and the opposite occurred at the end of the measurement part.

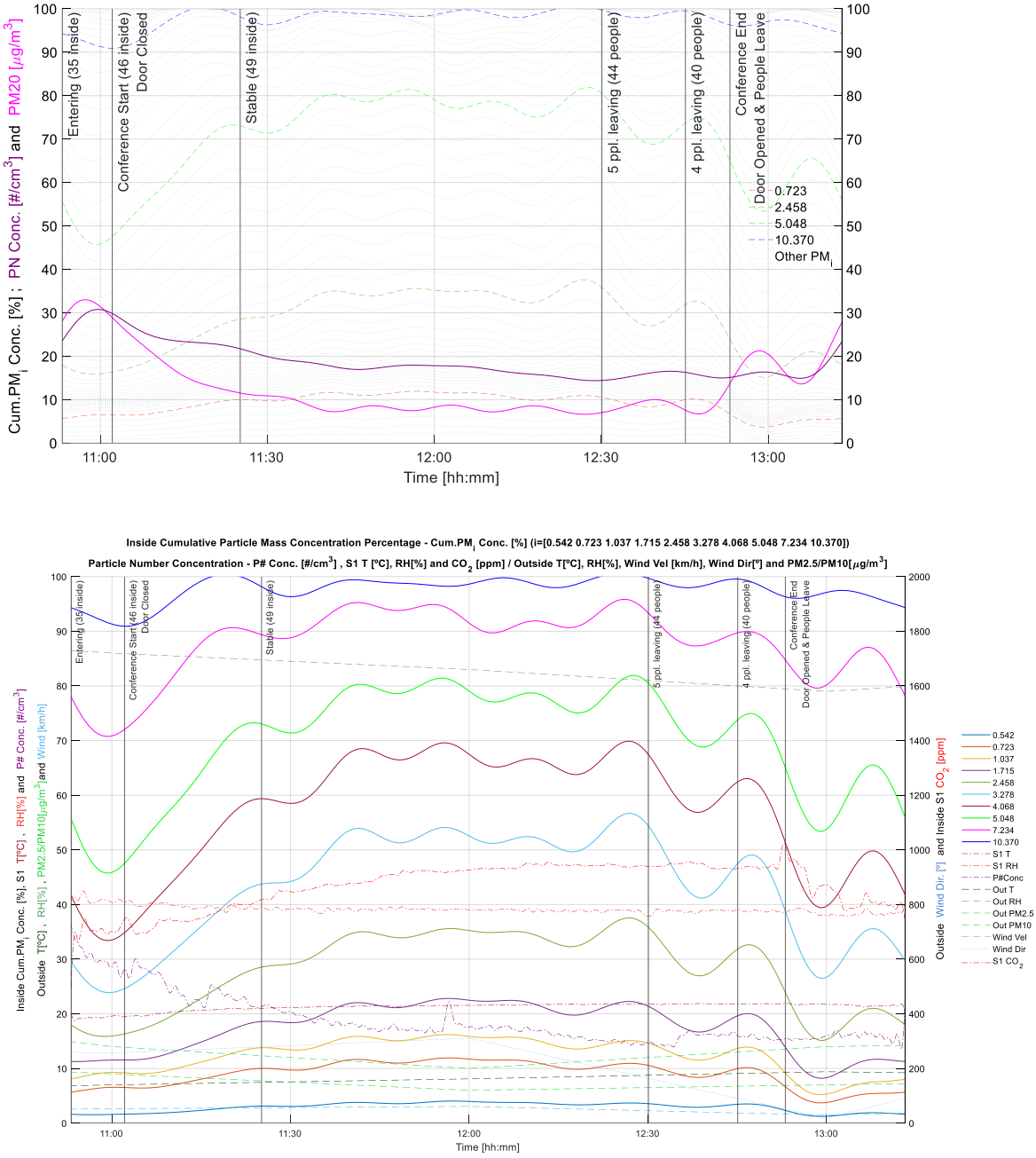

Figure S18. Cum. PM$_i$ Conc. [%], PN Conc. [#/cm^3] and PM$_{20}$ [µg/m^3] including Outdoor environment conditions along with Outdoor PM Concentrations for PM$_{2.5}$ and PM$_{10}$.

S2.5. Ignacio Aldecoa Library – Conference Room.

Figure S19 presents all PM_i, PNC and PM_{20} inside the conference room. It should be mentioned that all the peaks and valleys in the PM_i curves were detected by PM_{20} curve. However, they were not so evidently identified. Eventually, by adding PNC curve on top of them it was seen there was neither direct relationship between PM_i and PNC curves. However, relation between this data is addressed as it happened for the record and in order to resume the results in the timeline. Once measurement started, door was closed for 4min. At this time, 4 more people entered the area in 4min, at this moment valley in PNC had place while PM_{20} presented an increase. Opposite behaviour of PM_i curves was not evident at this point. Then, 2 more people entered and 4min after two windows were partially opened. At this moment, both PNC and PM_{20} presented a constant increase, while still opposite behaviour of PM_i curves was not evident. At this moment, 10 more people entered the area and in another 10min peaks in both PNC and PM_{20} had place while PM_i of particles smaller than 5.048μm suffered a reduction wave and the ones above 5.048μm saw an increase wave. Then, 15 more people entered and conference started. For the following 1hour and 25min conference continued stable in terms of ventilation and people inside the area. During it, valleys in PNC and PM_{20} had place while opposite behaviour of PM_i curves is more evident by comparing the range between 2.458μm and 3.278μm versus the range between 5.048μm and 7.234μm. In order to finish the measurement, a back to the calm stage was performed, and for 26min after conference ended and people left measurement continued as it was, regarding ventilation. In this interval, in which people left in a few minutes, PM_{20} presented both peak and then valley while PNC presented a peak while again opposite behaviour of PM_i curves was not evident.

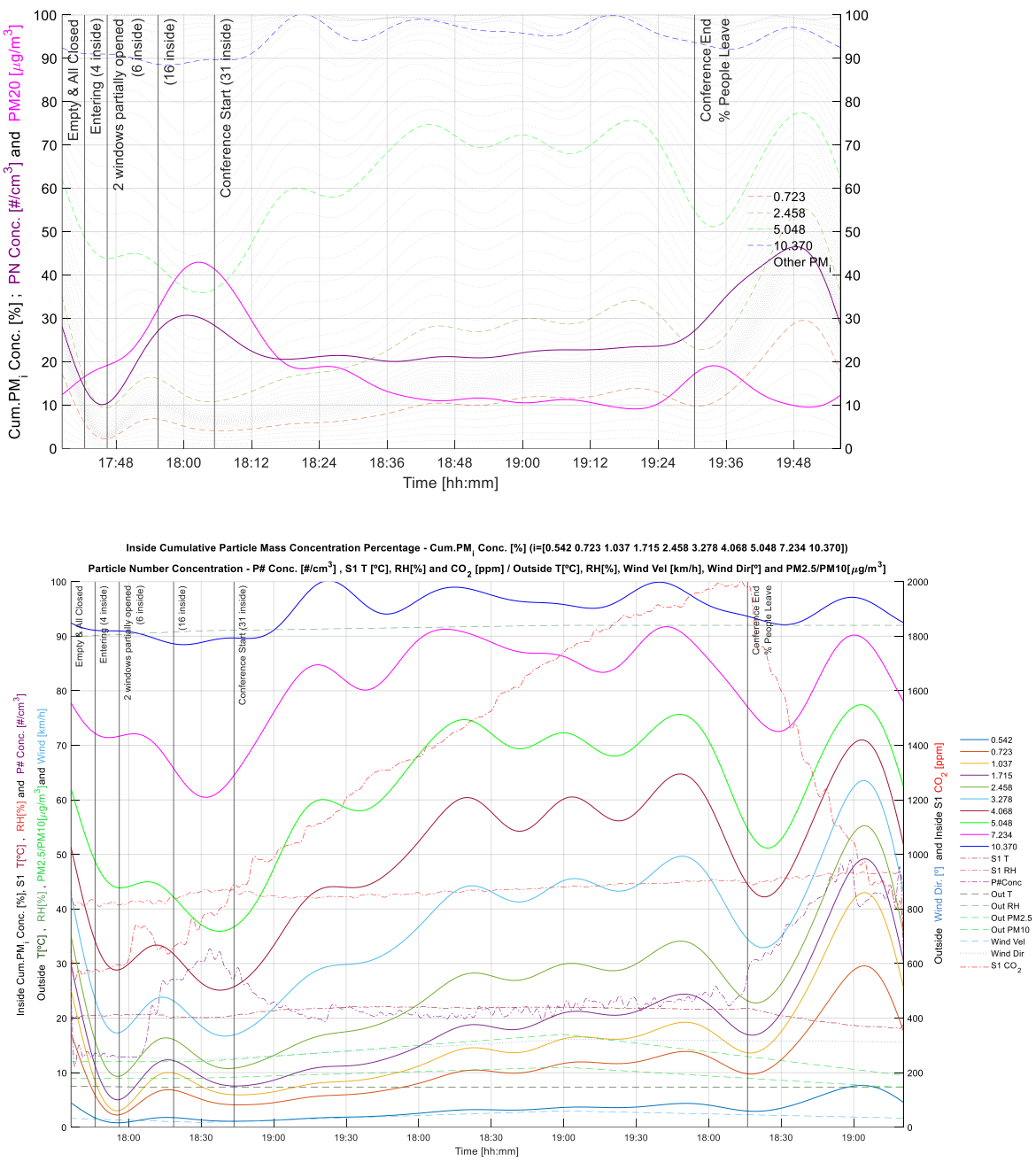

Figure S19. Cum. PM$_i$ Conc. [%], PN Conc. [#/cm^3] and PM$_{20}$ [µg/m^3] including Outdoor environment conditions along with Outdoor PM Concentrations for PM$_{2.5}$ and PM$_{10}$.

S2.6. Mendizorroza sports facilities – Training Room.

Figure S20 presents all PM_i, PNC and PM_{20} inside the training room. It should be mentioned that all the peaks and valleys in the PM_i curves were detected by PM_{20} curve. However, they were not so evidently identified. Eventually, by adding PNC curve on top of them it was seen there was neither direct relationship between PM_i and PNC curves. However, relation between this data is addressed as it happened for the record and in order to resume the results in the timeline. As commented before, PNC maintained during the whole measurement within a stable level and without notable variation. Once measurement started, door kept opening and closing each time people entered the room, and PM_{20} presented a constant increase while PM_i of particles smaller than 4.068μm saw a couple of increase waves and the ones above 4.068μm suffered a pair of reduction waves. At this time, training class started, and for the following 60min room continued stable in terms of ventilation and number of people inside the area. PM_{20} presented three valleys with their correspondent peaks while PM_i of particles smaller than 4.068μm saw three increase waves and the ones above 4.068μm suffered three reduction waves. At this moment class ended, door was opened and people left, for the following 15min PM_{20} presented a constant decrease while PM_i of particles smaller than 4.068μm suffered a reduction wave and the ones above 4.068μm saw an increase wave. In order to finish the measurement, a back to the calm stage was performed, and for 15min door was closed and again PM_{20} presented a constant decrease while PM_i of particles smaller than 4.068μm suffered a reduction wave and the ones above 4.068μm saw an increase wave.

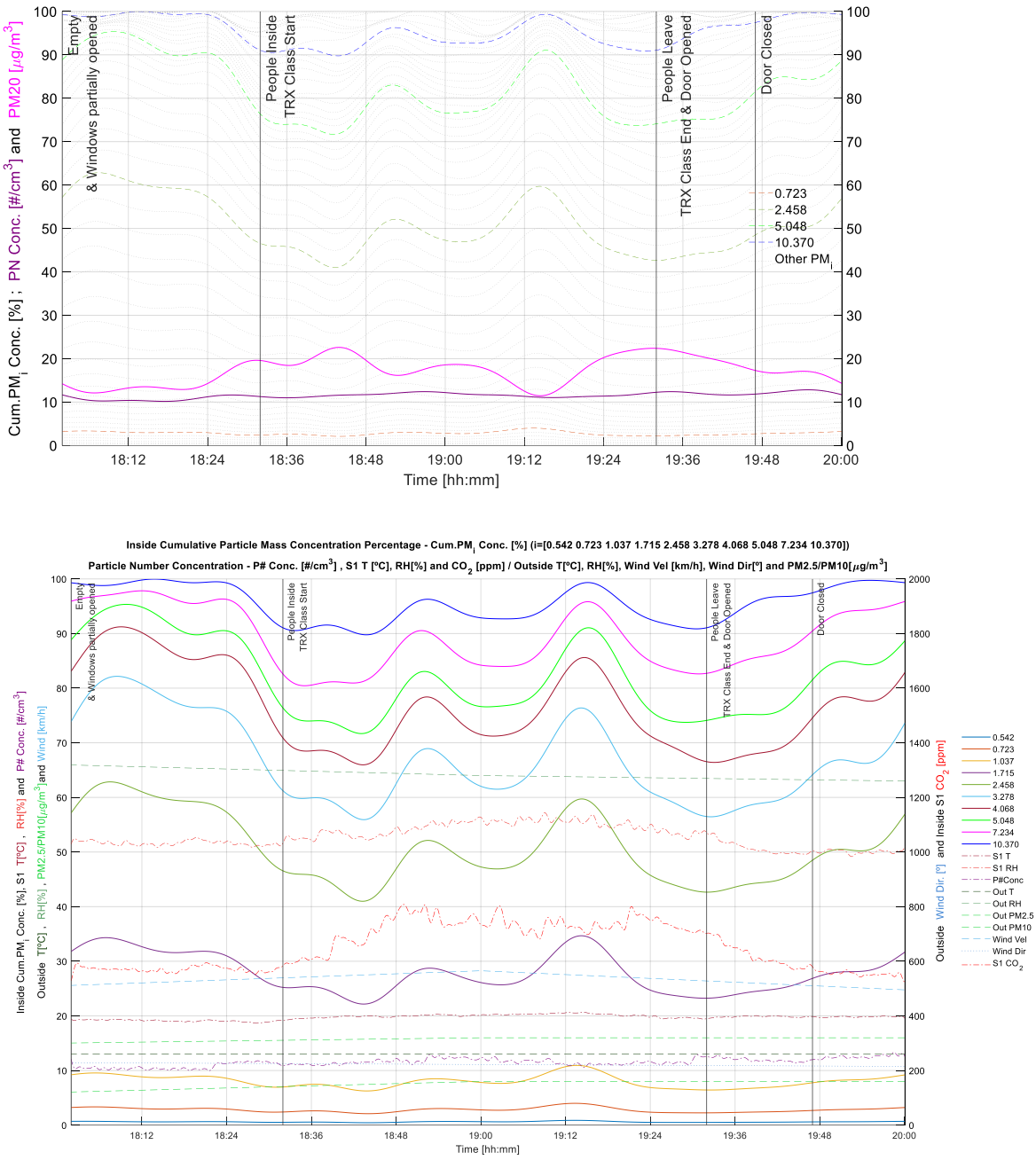

Figure S20. Cum. PM$_i$ Conc. [%], PN Conc. [#/cm^3] and PM$_{20}$ [µg/m^3] including Outdoor environment conditions along with Outdoor PM Concentrations for PM$_{2.5}$ and PM$_{10}$.

S2.7. Mendizorroza sports facilities – Spinning Room.

Figure S21 presents all PM_i, PNC and PM_{20} inside the spinnig room. It should be mentioned that all the peaks and valleys in the PM_i curves were detected by PM_{20} curve. However, they were not so evidently identified. Eventually, by adding PNC curve on top of them it was seen there was neither direct relationship between PM_i and PNC curves. However, relation between this data is addressed as it happened for the record and in order to resume the results in the timeline. PNC and PM_{20} maintained without notable variation until the class was ended. Once measurement started, door kept opening and closing each time people entered the room, and PM20 presented a constant increase while PMi of particles smaller than 2.458μm saw a couple of increase waves and the ones above 2.458μm suffered a pair of reduction waves. At this time, training class started, and for the following 60min room continued stable in terms of ventilation and number of people inside the area. PM_{20} presented three valleys with their correspondent peaks while PM_i of particles smaller than 2.458μm saw three increase waves and the ones above 2.458μm suffered three reduction waves. Once measurement started, people gradually entered the room until the class started. After a starting reduction both PM_{20} and PNC presented a slight and constant increase while PM_i of particles smaller than 2.458μm suffered a pair of reduction waves and the ones above 2.458μm saw a couple of increase waves. At this time, training class started, and for the following 41min room continued stable in terms of ventilation and number of people inside the area. However, 18min after window was partially opened. During this period both PM_{20} and PNC presented an increase while just at the end of the interval PM_i of particles smaller than 2.458μm suffered the start of a reduction wave and the ones above 2.458μm saw the start of an increase wave. At this moment class ended and stretching had place for the following 13min, PM_{20} and PNC presented a peak while PM_i of particles smaller than 2.458μm suffered a reduction wave and the ones above 2.458μm saw an increase wave. In order to finish the measurement, a back to the calm stage was performed, and in 35min PM_{20} and PNC presented a decrease while PM_i of particles smaller than 2.458μm presented a reduction tendency and the ones above 2.458μm presented an increase tendency.

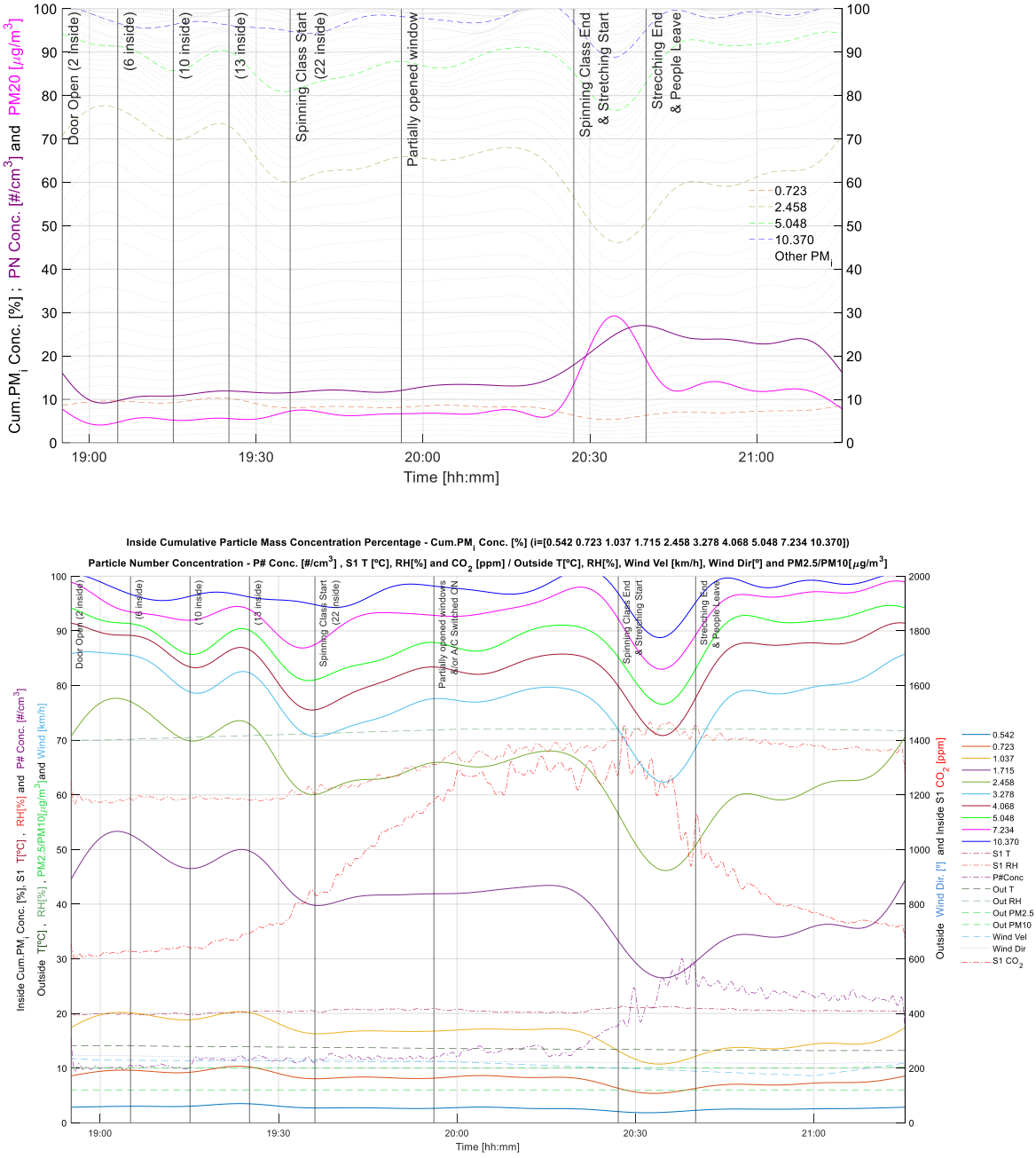

Figure S21. Cum. PM$_i$ Conc. [%], PN Conc. [#/cm^3] and PM$_{20}$ [µg/m^3] including Outdoor environment conditions along with Outdoor PM Concentrations for PM$_{2.5}$ and PM$_{10}$.