



## **INTERNSHIP - Investigations on the factors influencing the quality of acoustic measurements for the calibration of sound reinforcement systems (H/F)**

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Major Player in the live sound, L-ACOUSTICS® is designing and manufacturing sound systems with the highest, most consistent and predictable performance levels, packaged as complete systems and adhering to universal standards. Our systems are used in major music festivals, live events and opera houses around the world.

The scientific outreach department oversees framing the principles developed by R & D, formatting and presenting them to ensure their outreach within the various concerned communities. The department also contributes to the group's product strategy at the system level and ensures their usability in practical conditions.

Sound reinforcement systems are used for many applications including indoor music concerts, outdoor festivals, or sound reinforcement in sport facilities, convention centers, houses of worship, etc. Regardless of the type of application, the calibration of the system through acoustic measurements is always needed. Many questions arise about the appropriate methodology to adopt for measuring, aligning, and tuning the loudspeaker systems on-site. These aspects are crucial to guarantee the quality of the system calibration and the final sound quality experienced by the audience.

### **Missions :**

The goal of the proposed internship is to investigate some of the factors that can impact the quality of indoor or outdoor acoustic measurements. Three main aspects need to be studied:

- the impact of noise (stationary or impulsive) on the measurement quality,
- the impact of the room acoustics on the measurement method (e.g. length of sweep sine),
- the reliability of outdoor measurements when non-stationary phenomena such as wind or change in temperature occur. Investigations will be both theoretical (literature review) and practical (measurements, numerical simulations).

The first task will consist in establishing a thorough literature review on the factors that can impact the quality and reliability of indoor and outdoor acoustic measurements (i.e. impact of stationary or impulsive noise, impact of reverberation time and room modes, impact of atmospheric conditions).

Then, acoustic measurements will be conducted in parallel with basic acoustic simulations (using Matlab and/or COMSOL) for quantifying the importance of the above-mentioned phenomena.

The work will be documented and should lead to the definition of guidelines for good-practices based on the findings of the internship.

### **Education and Required Skills :**

- The successful applicant should prepare a M.Sc. (last year) in Acoustics or closely related fields.
- Excellent theoretical background in Acoustics and Signal Processing, with good understanding of Room Acoustics
- Experience with acoustic measurements
- Good coding skills using Matlab, experience with COMSOL
- Good communication skills (French and/or English)
- Internship 4-6 months minimum

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