

# JJCAAS 2023

Estimation de directivités acoustiques  
à l'aide d'antennes non-sphériques de microphones

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## Why ?

- ▶ Room acoustic design (classrooms, non-amplified venues, ..),
- ▶ Virtual acoustics.



## Challenges

|                           |                    |              |
|---------------------------|--------------------|--------------|
| Source type               | Controlled         | Uncontrolled |
| Repeatable                | Yes                | No           |
| Fine spatial resolution   | Cumbersome         | Expensive    |
| Fine frequency resolution | Computational cost |              |

# Voice directivity measurements in the literature

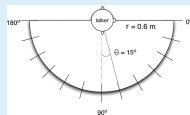
## Repeatable sources



Flanagan 1960

All in all, limited results ..

## 2D measurement setups



Monson, Hunter, and Story 2012

## Spatial interpolation



Pörschmann and Arend 2021

## Constraints

- ▶ Human voice is not repeatable  $\Rightarrow$  single-shot measurements !
- ▶ Need for a high resolution 3D microphone array :
  1. Mems microphones are cheap and reliable,
  2. Placing hundreds of them uniformly on a sphere is still cumbersome ...
  3. Let's use non-spherical structures !

## Simulations

- ▶ The method recovers the acoustic fields on a sphere,
- ▶ Numerical tests validate its performance,
- ▶ Experimental discrepancies are taken into account.

## WIP : experimental tests ..

