

TEBE – Applied Acoustics group

Research activities and planning

DENERG – Department of Energy, Politecnico di Torino, Italy

April 2018

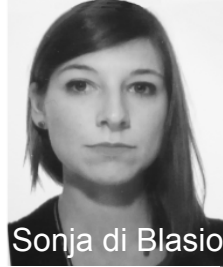


[Research activity]

- The research activity is mainly in the framework of **architectural and building acoustics**.
- The common thread is the **acoustic comfort** indoor and outdoor in everyday life, at home, at the workplace and in the environments for leisure and recreation.
- **Laboratory and in-field measurements, simulations, administration of questionnaires and listening tests** characterize the work methodology in this field of research.

Involvement researchers and PhD students

- Arianna Astolfi Associate Professor
- Marco Masoero Full Professor
- Louena Shtrepi Researcher
- Giuseppina Puglisi Post-doc fellow
- Doriana Dal Palù Post-doc fellow
- Antonella Castellana Post-doc fellow
- Federico Casassa Post-doc fellow
- Sonja di Blasio PhD candidate in Management, Production and Design
- Cristina Calleri PhD candidate in Architecture, History and Project
- Alessio Atzori PhD candidate in Metrology: Measuring Science and Techniques



Involved researchers and PhD students



Research collaborations in Italy and abroad

- **INRiM**, National Institute of Metrological Research:

- ✓ *Alessandro Schiavi, Andrea Prato*

- **Università di Torino**

- ✓ Department of Surgical Sciences:
Roberto Albera, Giancarlo Pecorari

- ✓ Department of Neurosciences:
Tiziana Sacco, Benedetto Sacchetti

- **Università di Ferrara**, Engineering Department:

- ✓ *Nicola Prodi*

- **Michigan State University**, Department of Communicative Sciences and Disorders, *Eric Hunter*

- **University of Illinois, Urbana-Champaign**, Department of Speech and Hearing Science, *Pasquale Bottalico*

- **Katholieke Universiteit Leuven**, Laboratory Acoustics and Thermal Physics, *Monika Rychtáriková*

- **University College of London**, Acoustics group, *Jian Kang, Francesco Aletta*

- **University of Oldenburg**, Department of Medical Physics and Acoustics, *Birger Kollmeier, Anna Warzybok*

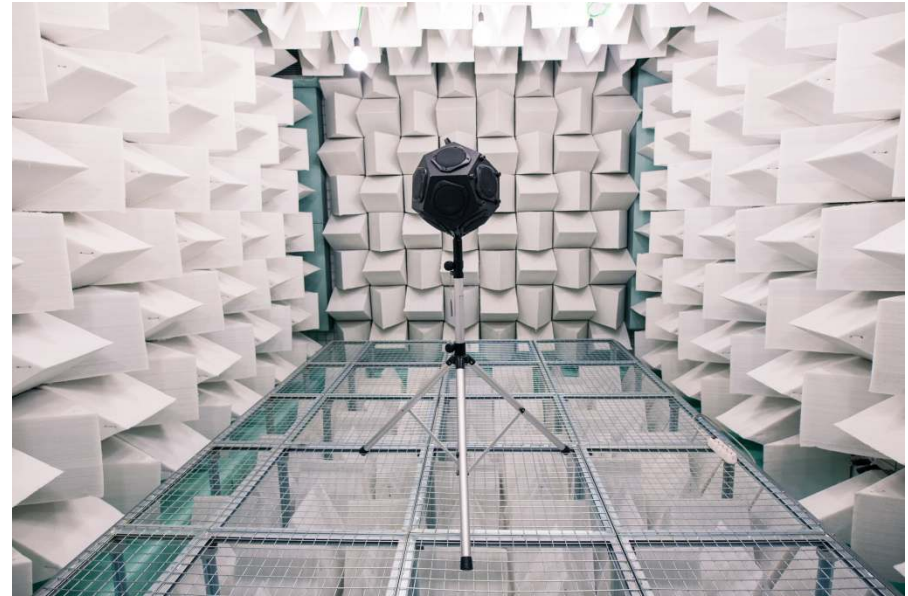
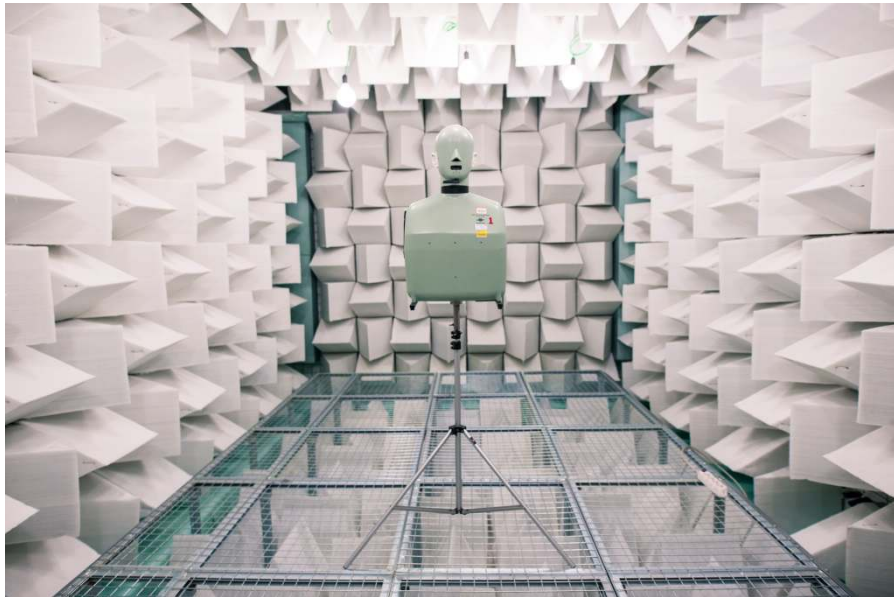
- **RWTH - ITA** (Institut für Technische Akustik, Aachen, Germany), *Martin Guski, Michael Vorländer*

- **IRCAM** (Institut de Recherche et Coordination Acoustique/ Musique, Paris, France), *Patrick Susini, Olivier Houix*

Projects_acquired in the last two years

- **FONDAZIONE CRT**, Ricerca e Istruzione Richieste Ordinarie, **Io Ascolto 1** (2015), **Io Ascolto 2** (2016), **Io Ascolto 3** (2017) “Visual-auditory training in the early years of schooling for the strengthening of the phonological skills at the base of learning to read in acoustically treated classrooms.”
- **CEMEX** (2016), “Characterization of **the sound insulation properties of double walls made of concrete**”.
- **CEMEX** (2017), “Design, testing and in-field application of new lightweight panels made of concrete for **sound absorption and diffusion**”.
- **CEMEX** (2017), “Detailed design, construction supervision and testing of a **full-scale prototype building for in-field sound insulation measurements**”.
- **ONLECO** and **BSA** (2017), “Design and in-field validation of the **S&N-S Light desk prototype**”.

Facilities_anechoic chamber



Facilities_1:5 scale Reverberation Room

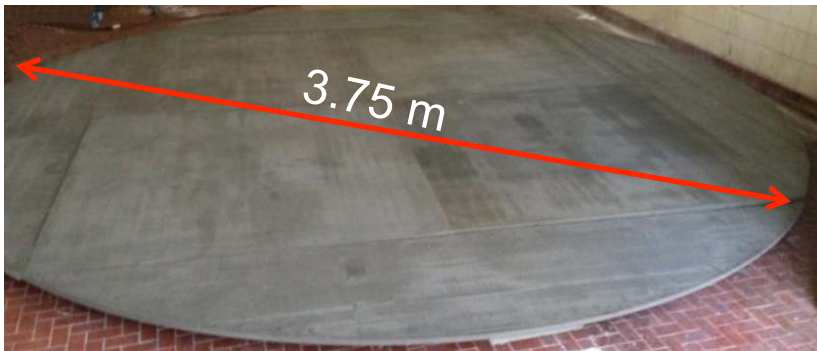
1:5 scale model of the reverberation room of INRIM



Sound scattering measurements

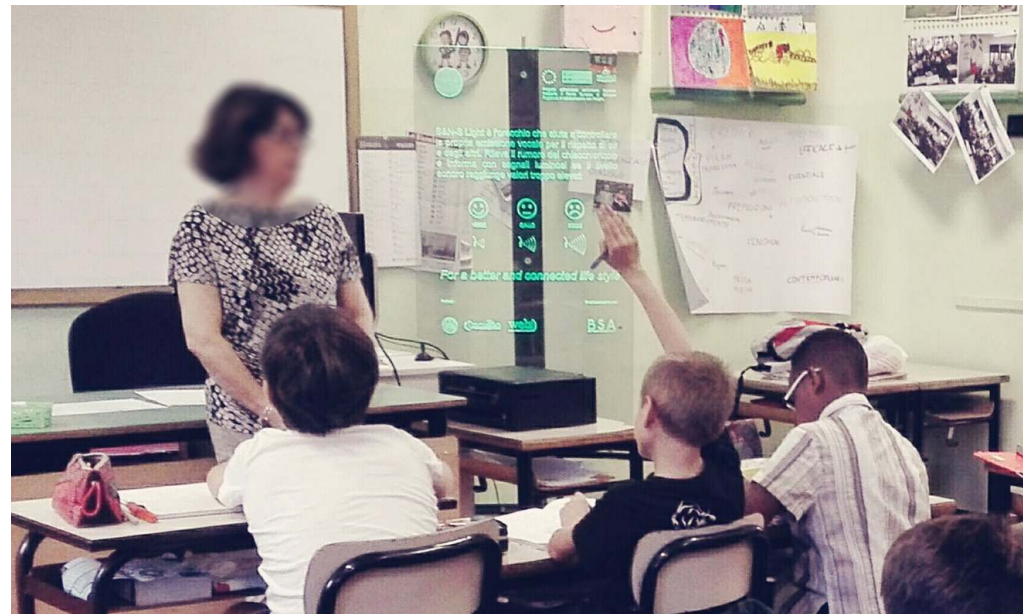
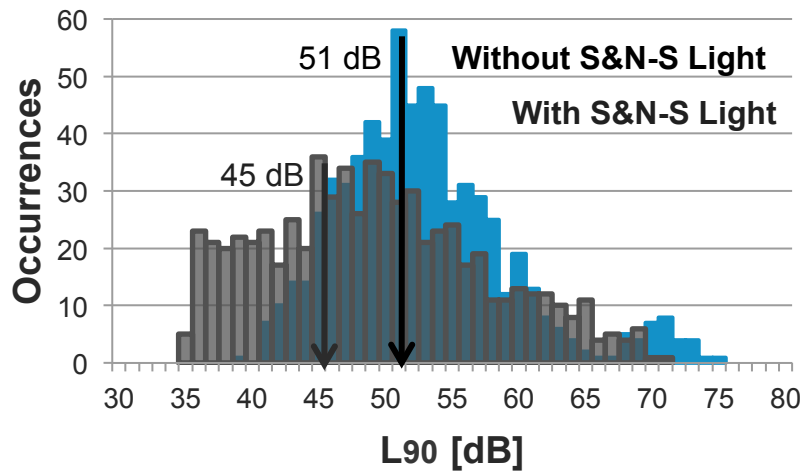


Sound absorption measurements



Full scale rotating plate (reverberation room of INRIM)

Devices_ S&NS Light



Devices and methods_ **Sounbe**

SounBe®

The tool and method allow to:

1. **Compare sounds** of different **material samples**, match them **with descriptors (Von Bismarck adjectives)** and point out suggestions and hints to improve the **product global quality**
2. Create a **database** in which every sound is indexed by its generators (**material – shape – gesture**) and assigned **descriptor**



- Italian patent n. 1403809

- European patent application filed 2nd September 2013 n. 12707918.4

Awards

- ✧ 3 Grants for Young Researchers, Euronoise 2018;
- ✧ New Orleans Best Student Paper Award, ASA Meeting 2017;
- ✧ 2 Grants for Young Researchers, Acoustics' 2017;
- ✧ Newman Medalist by the Robert Bradford Newman Student Award Fund, ASA, 2015, 2017 and 2018;
- ✧ EA Best Paper and presentation Award 2016, Euroregio 2016;
- ✧ "2016 Quality Award for excellent PhD Students" by Politecnico di Torino;
- ✧ Certificate of Honorable Mention at the 45th Annual Voice Symposium, Philadelphia, USA, 2016;
- ✧ Best Ph.D. thesis on acoustics by Italian Acoustical Association (AIA), Premio Gino Sacerdote 2014, 2016;
- ✧ Best master degree thesis on acoustics by AIA, Premio Amedeo Giacomini 2012, 2016;
- ✧ Young Scientist Conference Attendance Grants at AIA Conference, Premio Italo Barducci 2005, 2009, 2013, 2015;
- ✧ EAA (European Acoustics Association) Young Researcher Grant, Forum Acusticum 2014, Krakow.
- ✧ Student Grant Internoise 2013, Innsbruck;
- ✧ Best Papers Award at The International Symposium in Room Acoustics (ISRA 2013);
- ✧ EEA Best Paper and presentation Award 2012, Euronoise 2012;
- ✧ Young Scientist Grant for Inter-Noise 2012;
- ✧ ICA Young Scientist Grant 19th ICA, 2007.

Research topic A



A. Classroom Acoustics

1. **Effects of classroom acoustics on speech intelligibility and cognitive performances**
2. **Classroom acoustics design** for speech intelligibility
3. **Prevention of dyslexia** through acoustics

In collaboration with: T. Sacco, A. Prato, A. Schiavi, A. Warzybok, B. Kollmeier, N. Prodi

Research topic B



B. Voice behavior of voice professionals

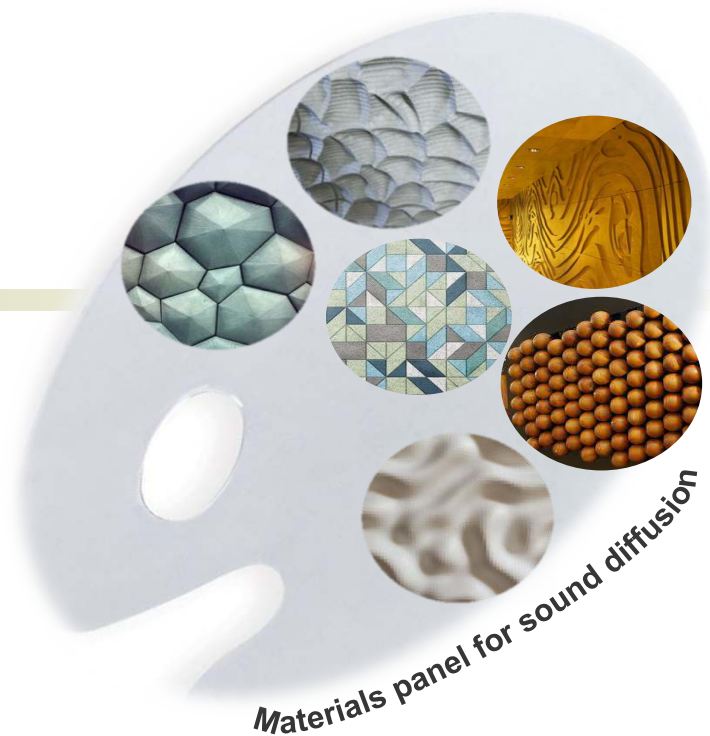
1. **Voice use in longitudinal observations**
2. Relationships between **voice use and room acoustics**
3. Voice monitoring for **diagnostic and rehabilitation purposes**
4. Vocal **behaviour of singers**

In collaboration with: Alessio Carullo, Alberto Vallan, Roberto Albera, Giancarlo Pecorari, Pasquale Bottalico, Eric Hunter, Lady Catherine Cantor Cutiva

Research topic C



Materials for sound absorption



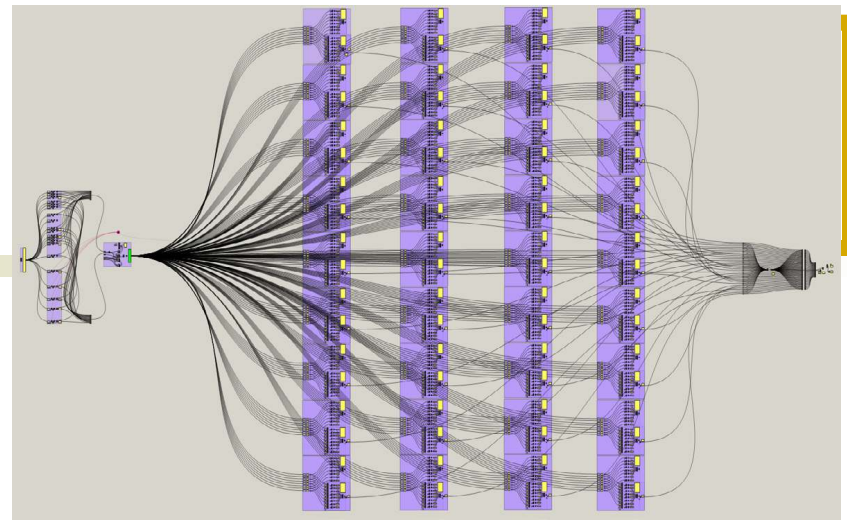
- C. Sound Scattering and Absorption properties of new surfaces
1. **Accuracy of random-incidence scattering coefficient** measurement in full-scale and scaled reverberation room
 2. Design and testing of **new panels for sound absorption and diffusion** made of **concrete and wood**
 3. Design and testing of **new panels** for sound absorption made of **materials derived from recycling of mattresses**

Research topic D



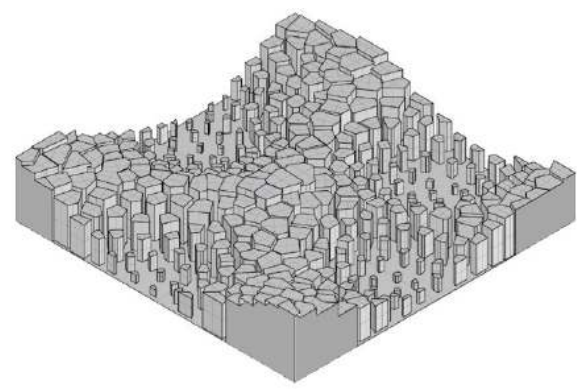
- D. Objective and perceptual assessment of the scattered sound field
 1. **Objective assessment of the scattered sound field** in simulated and real concert halls
 2. Evaluation of the **perceptual effects of diffusive surfaces** through listening tests

Research topic H



H. Acoustic Performance Based Design

1. Acoustic optimization of urban façades shapes and materials for decreasing noise level on their outdoor surface
2. Acoustic optimisation of surfaces for sound diffusion



Research topic I

Names	Verbs	Numerals	Nouns	Adjectives
Sofia	compra (buys)	due (two)	scatole (boxes)	azzurro (light blue)
Marco	vuole (wants)	poche (few)	matite (pencils)	piccolo (small)
Anna	prende (takes)	quattro (four)	tazze (mugs)	normali (normal)
Sara	dipinge (paints)	cinque (five)	pietre (stones)	nuove (new)
Chiara	vede (sees)	molte (many)	tavole (desks)	belle (nice)
Maria	cerca (looks for)	sette (seven)	palle (balls)	bianche (white)
Luca	trascina (drags)	otto (eight)	machine (cars)	grandi (big)
Andrea	regala (donates)	nove (nine)	sedie (chairs)	utili (useful)
Matteo	possiede (owns)	dieci (ten)	bottiglie (bottles)	nere (black)
Simone	manda (sends)	venti (twenty)	porte (doors)	rosse (red)

- I. Speech intelligibility testing for normal hearing and hearing impaired
 1. Validation of the **Italian Matrix sentence test (ITAMatrix)**, which is accurate **for diagnostic and research purposes** for adults and children
 2. **Ecological protocols** for the assessment of hearing and hearing aiding outcomes



In collaboration with: Birger Kollmeier, Anna Warzybok, Roberto Albera

[Future collaborations...]

We are looking forward to a cooperation on our research themes and this meeting could be a starting point for new ideas...

Thank you for your kind attention!

