



THE UNIVERSITY  
OF ARIZONA

NewFoS

NEW FRONTIERS OF SOUND  
SCIENCE AND TECHNOLOGY CENTER



# Stakeholder meeting

*NewFoS: Accelerating Innovation,  
Education, and Collaboration to  
Unlock the Full Potential of Topological  
Acoustics for Global Impact*



# Welcome!

**Greetings,**



Welcome to the New Frontiers of Science Science Technology Center (NewFoS) Stakeholder Meeting!

This meeting represents a unique opportunity to celebrate collaboration, innovation, and the remarkable progress we've achieved together. Your role is essential in fostering meaningful partnerships and advancing the mission of NewFoS.

Throughout the day, you will have the opportunity to connect with fellow stakeholders, students, staff and researchers through interactive sessions, poster presentations, and collaborative brainstorming activities. Your insights and expertise are vital to shaping the future of our initiatives and tackling global challenges through science and innovation.

Your contribution is an invaluable asset to this collaborative effort, and we are eager to learn from your expertise and perspectives during this event. Together, we can continue building a legacy of transformative solutions and impactful advancements in topological acoustics (TA).

Thank you for your ongoing support of NewFoS. Welcome to our home—we look forward to an inspiring and productive day!

Warm regards,

A handwritten signature in black ink that reads "P. Deymier".

**Pierre Deymier**  
Director of NewFoS

# Overview

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# Keith Runge



Dr. Keith Runge is the Knowledge Transfer Director for the New Frontiers of Sound (NewFoS) Science and Technology Center at the University of Arizona. With a Ph.D. in Physics from the University of Florida and over 20 years of industry experience, he founded and operated BWD Associates, LLC before joining NewFoS. Alongside Araceli Hernández Granados, Dr. Runge is organizing this stakeholder meeting to advance the center's mission. He leads efforts to achieve NewFoS's three key Knowledge Transfer objectives: integrating research and education among members, translating breakthroughs into technologies with industry, and informing society and policymakers to address critical needs.

# Sara Chavarria



Dr. Sara Chavarria is one of the co-Principal Investigators of the New Frontiers of Sound (NewFoS) Science and Technology Center. She directs NewFoS's education and broadening participation (E&BP) initiatives, drawing on extensive NSF-funded program experience to promote equitable STEM access. The NewFoS E&BP program integrates research with education and outreach through six activities, including a convergence education program and a mentoring ecosystem. These efforts: Develop context-based Topological Acoustics (TA) resources, including a TA textbook and digital tools, enable TA knowledge transfer among NewFoS participants and the broader scientific community and Foster collaboration through a mentoring ecosystem rooted in diversity, equity, and inclusion. Dr. Chavarria's leadership connects cutting-edge research with meaningful opportunities for underserved communities.

**Andrea Alù, CUNY**

Dr. Andrea Alù, Distinguished Professor and founding director of the Photonics Initiative at CUNY, is renowned for bridging physics and electrical engineering. As an Einstein Professor and co-PI of NewFoS, his groundbreaking work in photonic metamaterials has earned him the prestigious IEEE Photonics Society William Streifer Scientific Achievement Award, celebrating his transformative contributions and visionary leadership in advancing photonics.

**Chiara Daraio, Caltech**

Dr. Chiara Daraio, G. Bradford Jones Professor of Mechanical Engineering and Applied Physics at Caltech and co-PI of NewFoS, develops advanced materials for medical devices, robotics, and aerospace. Her innovations in acoustic imaging and thermal sensing bridge mechanics, materials science, and nanofabrication.

Committed to STEM diversity, Chiara mentors future innovators and has led initiatives supporting women in science.

**Massimo Ruzzene, CU Boulder**

Dr. Massimo Ruzzene, Slade Professor in Engineering, Vice Chancellor for Research and Innovation, and co-PI of NewFoS, leads research on smart materials and vibration reduction for applications in transportation and structural systems. His work on "metastructures" explores new ways to mitigate vibrations and direct waves for improved performance in noise isolation and stress wave mitigation.

# Grand Challenges Research Building



The Grand Challenges Research Building is a state-of-the-art facility designed to address society's most urgent challenges in fields such as engineering, medicine, planetary science, and optics. It proudly serves as the home of New Frontiers of Sound (NewFoS), a transformative center poised to reshape the future.

## **New Frontiers of Sound (NewFoS)**

Founded in 2023 with a \$30 million grant from the National Science Foundation, NewFoS is at the forefront of innovation, bridging research in topological acoustics to revolutionize technology, enhance daily life, and foster sustainability. The center unites leading experts from partner institutions, including the California Institute of Technology, the City University of New York, the Georgia Institute of Technology, Spelman College, the University of Alaska Fairbanks, the University of California, Los Angeles, the University of Colorado Boulder, and Wayne State University.

## **Research and Applications**

For 150 years, sound science has given rise to indispensable technologies such as loudspeakers, microphones, radio frequency (RF) devices in smartphones, sonar, and medical ultrasound imaging. Today, the emerging field of topological acoustics (TA) is revolutionizing sound science and advancing new frontiers. TA reveals that sound waves can now support quantum-like degrees of freedom—such as **geometric phase** or spin—that were previously "hidden."

NewFoS is dedicated to advancing this groundbreaking field, with applications ranging from next-generation telecommunications and medical devices to environmental sustainability. By harnessing the power of topological acoustics, NewFoS is driving technological innovation and creating a more sustainable, resilient future.

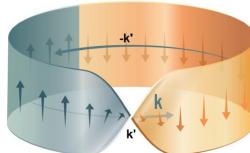
## NewFoS Locations



<https://newfos.arizona.edu/>

### NewFoS mission statement takes the form of value propositions:

- NewFoS integrates teams of researchers, educators and stakeholders to accelerate the scientific, technological and educational promises of TA and its applications in information science, telecom and sensing.
- NewFoS provides the 10-year perspective to fully realize the discoveries, technological innovations and societal impact of TA.
- NewFoS educates and trains the workforce with scale necessary to grow a new economy based on TA science and technologies.



### Legacies—technological and societal impacts.

NewFoS will have the breadth, depth, and integration for intellectual, infrastructure, technology, human, economic, and academic legacies. NewFoS' intellectual legacy will be an established, executable common scientific and technical language critical for productive transdisciplinary advances in the TA field and societal applications.

# Monday, January 13, 2025

	Time (Arizona Time)	Activity	Location	Online
Scavenger Hunt (Online option at GCRB 140)	8:00 am - 9:00 am	Check in/Light breakfast	GCRB, 1st floor	
	9:00 am - 9:15 am	Welcome and Introductions	GCRB 130	
	9:15 am - 9:30 am	Presentation: Overview of NewFoS	GCRB 130	
	9:30 am - 10:00 am	Student Lightning Talks	GCRB 130	
	10:00 am - 10:15 am	Coffee Break	GCRB, 1st floor	
	10:15 am - 10:45 am	Student Lightning Talks	GCRB 130	
	10:45 am - 11:15 am	Breakout Sessions	GCRB 130	
	11:15 am - 11:30 am	Group photo	GCRB, 1st floor	
	11:30 am - 12:00 pm	Tour NewFoS	GCRB, 6th floor	
		Debriefing of Breakout Sessions	GCRB 130	
	12:00 pm - 1:00 pm	Poster Presentations	GCRB, 1st floor	
		Lunch		
	1:00 pm - 2:00 pm	Stakeholder Panel Session	GCRB 130	
	2:00 pm - 3:00 pm	Networking	GCRB 130	
		Coffee Break	GCRB, 1st floor	
	3:00 pm - 3:30 pm	Closing Remarks	GCRB 130	
	3:30 pm - 4:15 pm	Week of Sound Event	GCRB, 1st floor	
	4:15 pm - 4:45 pm	Networking	GCRB, 1st floor	
	4:45 pm - 5:00 pm (Walk to Gentle Ben's)	Dinner at Gentle Ben's (Blue, Orange and Red Badges)	865 E University Blvd, Tucson, AZ 85719	
		Pizza Night (Green Badge)	GCRB, 6th floor	

 Activity Available Online  
 Stakeholder-Led Activity

 NewFoS-Led Activity  
 Students-Led Activity

## Meet expert leaders in the field, entrepreneurs, innovation stakeholders, and key members of the tech community

 In person

 Online



**Ava  
Butler**

Organizational  
Development  
Consultant and  
Leadership Coach



**Brian  
Adair**

Executive Director,  
Industry Engagement,  
Research  
Development, UA



**Carla  
Linebarger**

BWD ASSOCIATES, LLC



**Casey  
Carrillo**

Executive Director of  
University of Arizona  
Center for Innovation  
(UACI)



**Doug  
Hockstad**

Associate Vice  
President,  
Tech Launch Arizona, UA



**Frank  
Lederman**



**Jacquelyne  
Vega**

Office of Economic  
Initiatives | City of  
Tucson



**Jill  
Howard Allen**

Director, Industry  
Engagement, UA  
(Phoenix)



**Joel  
Berkson**

Founder and  
President of Fringe  
Metrology LLC



**Karla  
Bernal Morales**

Pima Community  
College Board of  
Governors and Vice  
President at Arizona  
Technology Council



**Ravi  
Mahajan**

Intel



**Sonia  
Vohnout**

Founder and CEO of  
OppsSpot, LLC

## Meet expert leaders in the field, entrepreneurs, innovation stakeholders, and key members of the tech community

 In person

 Online



**Wiley  
Larsen**

Technology  
Commercialization  
and Entrepreneurship,  
Arizona Commerce  
Authority (ACA)



**Anita  
Bell**

Director, UA Center for  
Innovation



**Kim  
Patten**

Associate Vice  
President for Research  
Development, UA



**Andrew  
Leaman**

Entrepreneur  
Chariot Projects



**Asiel  
Corpus**

IER-UNAM  
Mexico



**Donna  
Kocak**

L3 Harris  
Technologies



**Douglas  
Burns**

EnSCO



**Jenny  
Hoffman**

Harvard University



**Karla  
Cedano**

IER-UNAM  
Mexico



**Rachel  
Woods-Robinson**

Clean Energy Institute,  
University of Washington  
National Renewable  
Energy Laboratory (NREL)



**Victor  
W. Sparrow**

United Technologies  
Corporation Professor  
Penn State University



**Vivek  
Kapila**

**01 I-Tzu Huang, UA**

Machine learning model for classification of seismic signals from forested and non-forested areas.

**03 Akinsanmi Ige, UA**

Information encoding and encryption in acoustic analogues of qubits.

**05 Harry Mayrhofer, UA**

Geometric Phase-based Inverse Problems for the Prediction of Changes in Permafrost Properties Due to Climate Change.

**07 Bo Hu, UA**

Diagnostic Imaging for Damage Detection in Plates Based on Topological Acoustic (TA) Sensing Technique.

**09 Alan Daniel Santhosh, CUNY**

Hidden Symmetry and Duality in a Phononic Crystal.

**11 I-Ting (Andy) Ho, UA**

Shedding Light on Porosity in Additively Manufactured Parts using Nonlinear Acoustics.

**13 Abrar (Rochi) Nur-E Faiaz,  
Wayne State University**

Unlocking the Potential of Phi-bits: Advancing Quantum-Inspired Computing.

**15 Kazi Tahsin Mahmood,  
Wayne State University**

Quantum Realm in Classical Mechanics: A New Basis of Topological Computing.

**02 Bingxu Luo, UA**

Geometric phase sensing of environmental conditions using seismic noise: An application from Iceland.

**04 Young Hyun Noh, UA**

Sound-induced Disruption of Topological Biological Signals via Inhibition of  $\text{Ca}^{2+}$ -based Cell Communication.

**06 Hujie Yan, Caltech**

Rigidity in Chainmail Fabrics Consisting of Torus Knot Tessellation.

**08 David Cavalluzzi, UA**

Operations on a Mechanical System: Acoustic Analogues of Qubits.

**10 Yan Jean Wei, UCLA**

Design of a Mechanical Balun based on FBAR structures for Applications in Parametric RF Filters.

**12 Samarjith Biswas, UA**

Exploring Topological Acoustics Using Phase-Change Metamaterials

**14 Howard Yawit, UA**

Design of Surface Acoustic Wave Devices for Advanced Radio Frequency Technologies.

**01 Hujie Yan, Caltech**

Rigidity in Chainmail Fabrics Consisting of Torus Knot Tessellation.

**03 Jacob Lewton, CU Boulder**

Quasinormal Modes for Sensing in Open Systems.

**05 I-Tzu Huang, UA**

Machine learning model for classification of seismic signals from forested and non-forested areas.

**07 David Cavalluzzi, UA**

Algorithms on an Acoustic Analogue to a Quantum Computer.

**09 Panagiotis Koutsogiannakis, CU Boulder**

Reconfigurable waveguides through curvature.

**11 Ilia Kuk, UA**

Quantum Logic Gate Analogies in Nonlinear Acoustics.

**02 Howard Yawit, UA**

Design of Surface Acoustic Wave Devices for Advanced Radio Frequency Technologies.

**04 Yan Jean Wei, UCLA**

Design of a Mechanical Balun based on FBAR Structures.

**06 Akinsanmi Ige, UA**

Information encoding and encryption in acoustic analogues of qubits.

**08 Elizabeth Whitney, UA Fairbanks**

If the ground could speak, what would it say? Topological acoustics and changes in the landscape.

**10 Farrukh Najmi, UA**

Phase Change Material-based LASER Writeable/Rewriteable Surface Acoustic Wave Radio Frequency Devices by Design.

**12 Bingxu Luo, UA**

Geometric Phase Sensing on Environmental Conditions using Seismic Data.



# Notes



Q U E S T I O N S

D E T A I L S

I M P O R T A N T

S U M M A R Y



<https://newfos.arizona.edu/>

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