

Phononic Frequency Combs

- 日 時 (Date) : 2026年7月14日 (火曜日) 14:00~15:30
July 14th, 2026 (Tuesday) 14:00~15:30
参加無料, 事前申込不要 Admission free, No advanced registration required
- 場 所 (Place) : オンライン (meet.google.com/ypw-owec-pts)
On-Line (meet.google.com/ypw-owec-pts)
- 主 催 (Organizer) : 田中(秀)・塚本研究室, スマートシステム超集積化研究開発センター
S. Tanaka/Tsukamoto Laboratory, Smart System Super Integration Research Center (SIRC)
- 講 師 (Lecturer) : **Prof. Adarsh Ganesan**
Birla Institute of Technology and Science (BITS), Pilani – Dubai Campus, UAE



Adarsh Ganesan is currently an assistant professor at Birla Institute of Technology and Science (BITS), Pilani – Dubai Campus, UAE. He obtained his BE (Hons) in Electrical and Electronics Engineering from BITS Pilani in 2014 and Ph.D. in Engineering from the University of Cambridge in 2018. He carried out his postdoctoral research at the National Institute of Standards and Technology (NIST), Gaithersburg, USA from 2018-2021. After serving as an assistant professor at Ahmedabad University, India from 2021-2024, Adarsh joined the Dubai Campus of BITS Pilani in July 2024. Adarsh has been recognized for his doctoral work on phononic frequency combs by the 2017 John Winbolt Prize (Cambridge University), 2017 UK Doctoral Researcher Award, 2018 APS GSNP Student Speaker Award, 2018 IET Hudswell International Research Scholarship and 2019 BITS Alumni Association Global 30 Under 30 Award.

概 要 (Abstract) :

Phononic frequency combs (PFC) are the mechanical analogues of celebrated photonic frequency combs. These represent a newly documented physical phenomenon in the well-researched physical domain of mechanical resonators [1]. The emergence of PFC is mediated by nonlinear modal coupling. Through a series of experiments using micromechanical resonators, various physical features of PFC have been identified. These include drive parameters for comb operation, hysteresis for comb spectrum tailoring and nonlinear sensitivity to physical perturbations. My talk will describe the physics of PFC and will emphasize how these combs could be foundational to the fields of materials science, molecular science and chemical science. In that respect, I will present our first conceptual demonstrations of material combs, molecular combs and chemical combs respectively. I will also showcase our recent demonstrations of broadband PFC using optical tweezers [2] and phonon lasers [3]. The future work will be focused on the applications of PFC in sensing, communications and quantum information science.

1. Ganesan, A., Do, C. and Seshia, A., 2017. Phononic frequency comb via intrinsic three-wave mixing. *Physical review letters*, 118(3), p.033903.
2. de Jong, M.H., Ganesan, A., Cupertino, A., Gröblacher, S. and Norte, R.A., 2023. Mechanical overtone frequency combs. *Nature Communications*, 14(1), p.1458.
3. Xiao, G., Feng, Z., Kuang, T., Huang, R. et al., 2026. Ultrabroadband phonon laser frequency comb. *Advanced Photonics*, 8(2), pp.026004-026004.