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University of Miami, Physics Department Colloquium

Date: Wednesday, November 19th, 2025
Time: 4:00 pm – 5:00 pm
Location: Library, Knight Physics Building 3rd Floor

Characterizing fine-scale plankton distributions and biophysical interactions in the ocean using high resolution in situ imaging

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Abstract

Plankton constitute a substantial fraction of the aquatic biomass. Despite the small size scales at which they exist (~microns to centimeters), their relative abundance and interactions with the turbulent environment they inhabit, enables their influence in processes that occur at scales ranging from microns to several thousand kilometers. The spatial organization of planktonic species governs predator-prey encounter rates, marine aggregate formation, and light availability in the water column. Planktonic distributions in the ocean are incredibly 'patchy' (non-homogeneous), as evidenced by phenomena such as harmful algal blooms (HABs) and 'thin layers' – vertically limited aggregations of enhanced plankton concentration. Recent advances in imaging technologies have enabled direct in situ and (relatively) undisturbed measurements of planktonic organisms at high spatial and temporal resolutions, facilitating a better understanding of these phenomena. This talk will showcase how field observations using an in situ holographic microscope have enabled the characterization of planktonic thin layers and blooms in diverse environments.

Biography: Dr. Aditya Nayak is an Associate Professor in the Department of Ocean and Mechanical Engineering and the Harbor Branch Oceanographic Institute (HBOI) at Florida Atlantic University. Prior to his faculty position appointment, he completed a postdoctoral stint at HBOI from 2015-2018. Aditya received his M.S.E and PhD degrees in 2010 and 2015 respectively, from the Johns Hopkins University in Baltimore, and his B. Tech. degree from the National Institute of Technology Karnataka, Surathkal in 2007, all in Mechanical Engineering. Aditya's research interests to date have led him to explore a diverse range of subjects at the interface of oceanography and engineering, with a focus on designing and deploying in situ imaging instrumentation for characterization of microscale processes in the ocean, including studies on planktonic thin layers, harmful algal blooms, orientation of phytoplankton in flow and bottom boundary layer turbulence.