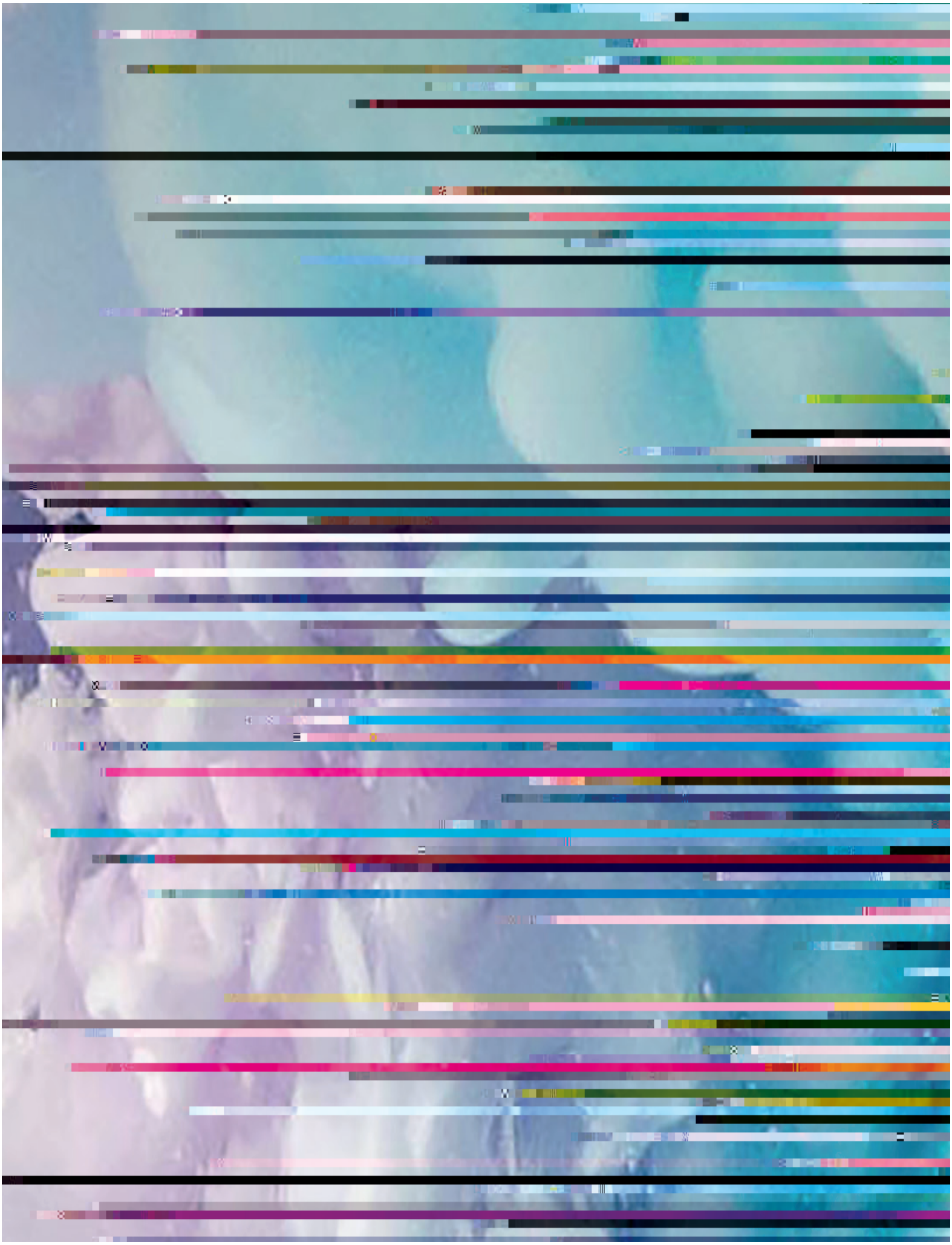

Will Stritzel

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ABSTRACT

Daily cycles in behavior and physiology, called circadian rhythms, have profound e□ects on health and well-being. Circadian rhythms emerging from local molecular clocks in the prefrontal cortex regulate learning and memory. My goal in this study was to determine if genetically encoded □uorescent proteins can produce su□cient signal in dendritic arbors and spines to measure and characterize dendritic spines accurately and reliably. I also aimed to link dendritic spine morphology with time-of-day di□erences in the learning and recall of cued conditioned fear extinction. Neurons were labeled using an intersectional viral strategy, and dendritic segments were imaged using confocal microscopy. Apical dendritic segments and spines were analyzed with Imaris image analysis so□ware. My results show that □uorescent protein signals can indeed be used to measure dendritic spines in select cases. In addition, the data suggest that circadian rhythms in fear extinction behavior may be driven, in part, by time-of-day di□erences in distal apical dendritic spine density. My work provides evidence that dendritic spine analysis can be accomplished using widely available transgenic techniques and points to one mechanism by which circadian rhythms regulate extinction behavior.

LAY SUMMARY

Circadian rhythms are daily patterns in behavior and physiology. □e timing of when to sleep, eat, exercise, and many more behaviors, is

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ABSTRACT

Aaron Mutchler

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ABSTRACT

□e Deep Underground Neutrino Experiment (DUNE) is a new cutting-edge experiment that will be fundamental in the study of neutrino oscillations and physics beyond the standard model. DUNE will be the □agship neutrino experiment, with the longest neutrino beamline of 1300 kilometers, using state-of-the-art near and far detectors to measure neutrino □avor at the start and end of the beam. In the near

LAY SUMMARY

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ABSTRACT

□e focus of this thesis is surface area isotherms obtained using a Langmuir-Blodget trough which are used to qualitatively determine

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ABSTRACT

□e medial gastrocnemius, an important calf muscle, plays a role when dancers seek to maintain balance. In order to balance, the somatosensory, visual, and vestibular systems work in conjunction to control muscle activity. □e activation of skeletal muscles can be

LAY SUMMARY

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2022