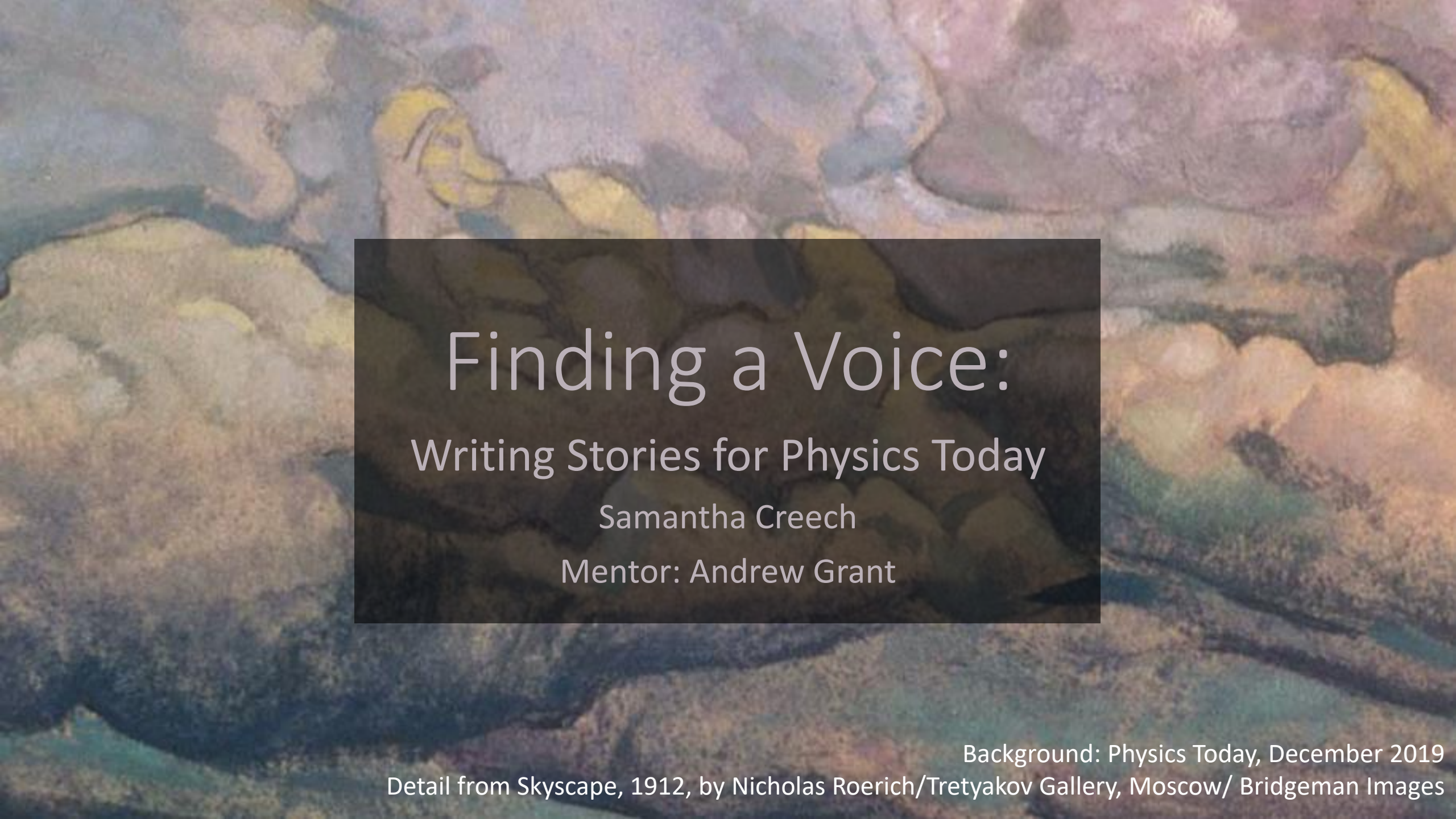


Finding a Voice:

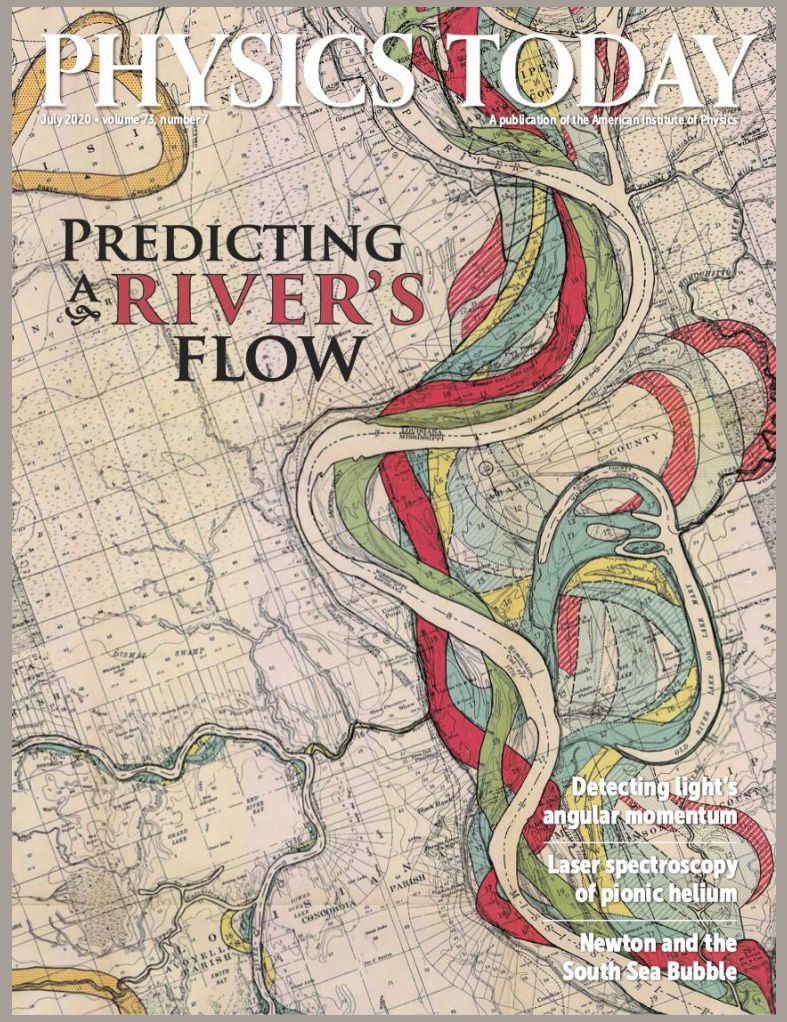
Writing Stories for Physics Today

Samantha Creech

Mentor: Andrew Grant

Background: Physics Today, December 2019
Detail from Skyscape, 1912, by Nicholas Roerich/Tretyakov Gallery, Moscow/ Bridgeman Images

Print:



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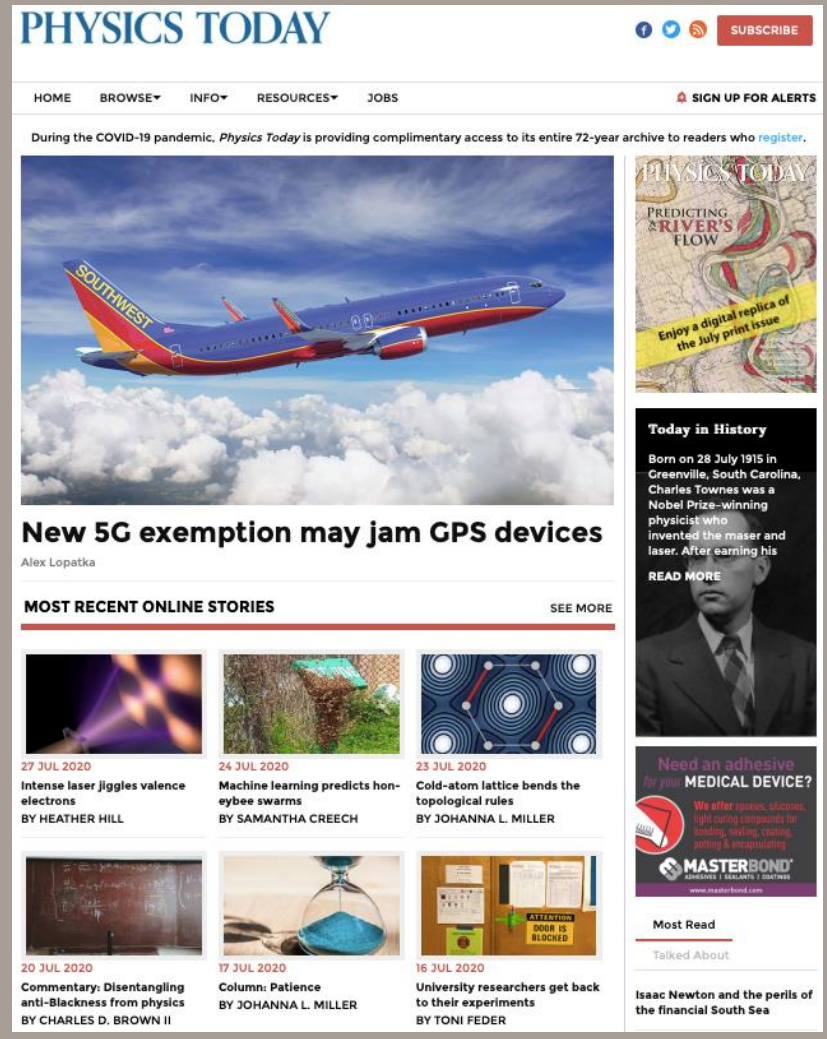
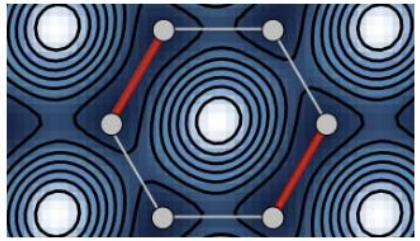


The Pitch

- Timely
- New
- Important (to the audience)



Cold-atom lattice bends the topological rules

In a periodically driven system, exotic phases can arise that have no static counterparts.

BY JOHANNA L. MILLER 23 Jul 2020 in Research and Technology

Machine learning predicts honeybee swarms

Vibrational spectra collected by accelerometers embedded in hives signal when a queen is about to leave and start a new colony.

BY SAMANTHA CREECH 24 Jul 2020 in Research and Technology

Background: Physics Today, June 2019
Image courtesy of NASA/JPL-Caltech/SwRI/MSSS/Gerald Eichstädt/ Seán Doran

Reporting

The process of getting information for an article

- Reading the literature
- Interviews

Background: Physics Today, October 2019
Harold Fisk/Army Corps of Engineers

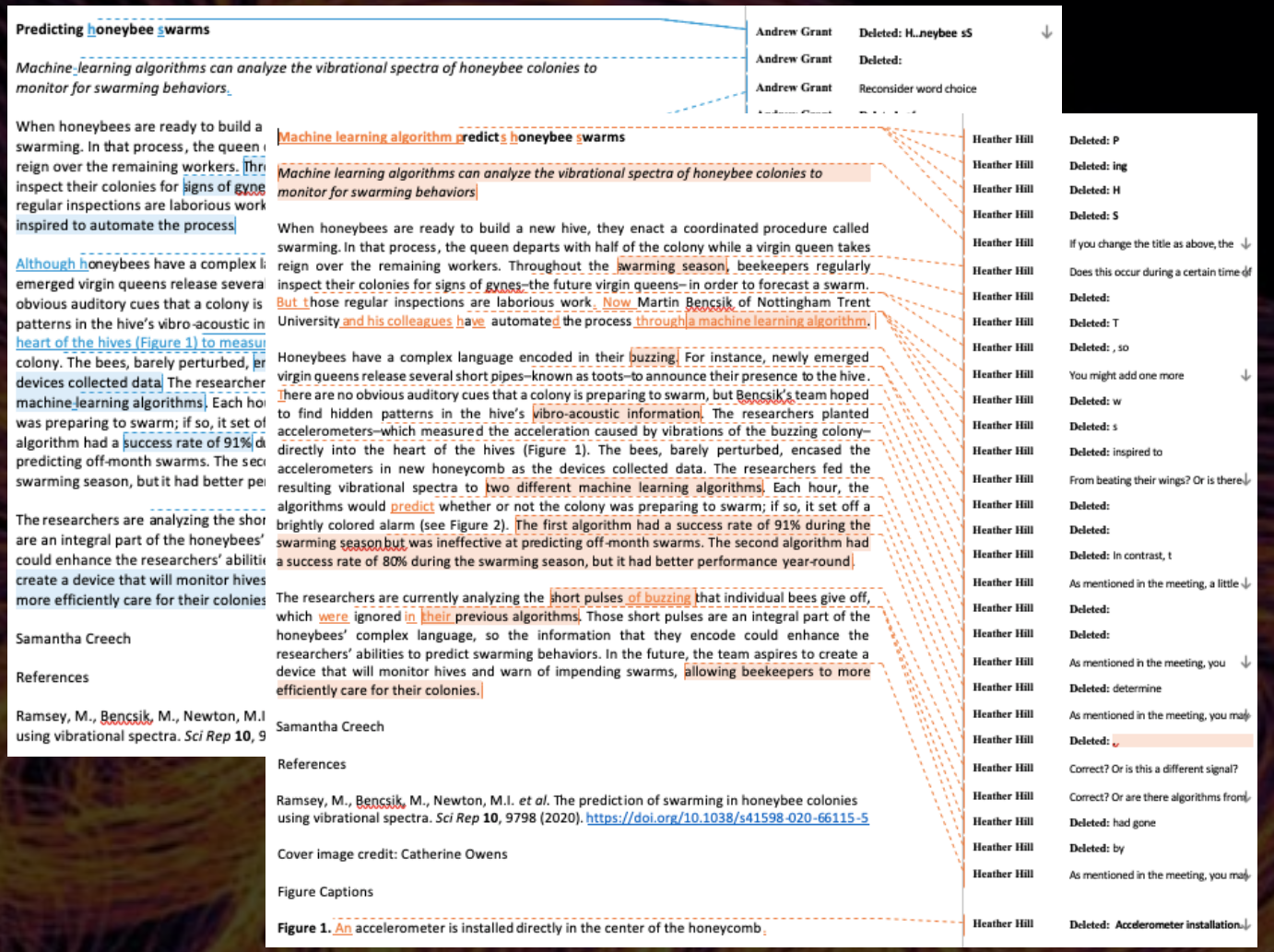
Writing

- Story structure
  - Lede, middle, kicker
- PT style
  - Details
  - Figures

Background: Physics Today, February 2018
Photo courtesy of Kenneth Libbrecht

Editing

- Editor comments
- Copyediting
- Fact-check



Machine learning algorithm predicts honeybee swarms

Machine learning algorithms can analyze the vibrational spectra of honeybee colonies to monitor for swarming behaviors

When honeybees are ready to build a new hive, they enact a coordinated procedure called swarming. In that process, the queen departs with half of the colony while a virgin queen takes reign over the remaining workers. Throughout the swarming season, beekeepers regularly inspect their colonies for signs of gynes–the future virgin queens–in order to forecast a swarm. But those regular inspections are laborious work. Now Martin Bencsik of Nottingham Trent University and his colleagues have automated the process through a machine learning algorithm.

Honeybees have a complex language encoded in their buzzing. For instance, newly emerged virgin queens release several short pipes–known as toots–to announce their presence to the hive. There are no obvious auditory cues that a colony is preparing to swarm, but Bencsik's team hoped to find hidden patterns in the hive's vibro-acoustic information. The researchers planted accelerometers–which measured the acceleration caused by vibrations of the buzzing colony–directly into the heart of the hives (Figure 1). The bees, barely perturbed, encased the accelerometers in new honeycomb as the devices collected data. The researchers fed the resulting vibrational spectra to two different machine learning algorithms. Each hour, the algorithms would predict whether or not the colony was preparing to swarm; if so, it set off a brightly colored alarm (see Figure 2). The first algorithm had a success rate of 91% during the swarming season but was ineffective at predicting off-month swarms. The second algorithm had a success rate of 80% during the swarming season, but it had better performance year-round.

The researchers are currently analyzing the short pulses of buzzing that individual bees give off, which were ignored in their previous algorithms. Those short pulses are an integral part of the honeybees' complex language, so the information that they encode could enhance the researchers' abilities to predict swarming behaviors. In the future, the team aspires to create a device that will monitor hives and warn of impending swarms, allowing beekeepers to more efficiently care for their colonies.

Samantha Creech

References

Ramsey, M., Bencsik, M., Newton, M.I. *et al.* The prediction of swarming in honeybee colonies using vibrational spectra. *Sci Rep* **10**, 9798 (2020). https://doi.org/10.1038/s41598-020-66115-5

Cover image credit: Catherine Owens

Figure Captions

Figure 1. An accelerometer is installed directly in the center of the honeycomb.

Background: Physics Today, November 2018
Image by Ambre Bouillant, Célia Boutilier, and David Quéré

Publishing

Machine learning predicts honeybee swarms

Vibrational spectra collected by accelerometers embedded in hives signal when a queen is about to leave and start a new colony.

BY SAMANTHA CREECH 24 Jul 2020 in Research and Technology

Background: Physics Today, October 2019
Detail from CF126_480, 2020, courtesy of Mark J. Stock

Thank you!

Questions?

Background: Physics Today, September 2019
Image courtesy of Manohar Vanga, Max Planck Institute for Software Systems