

Finding a Voice:

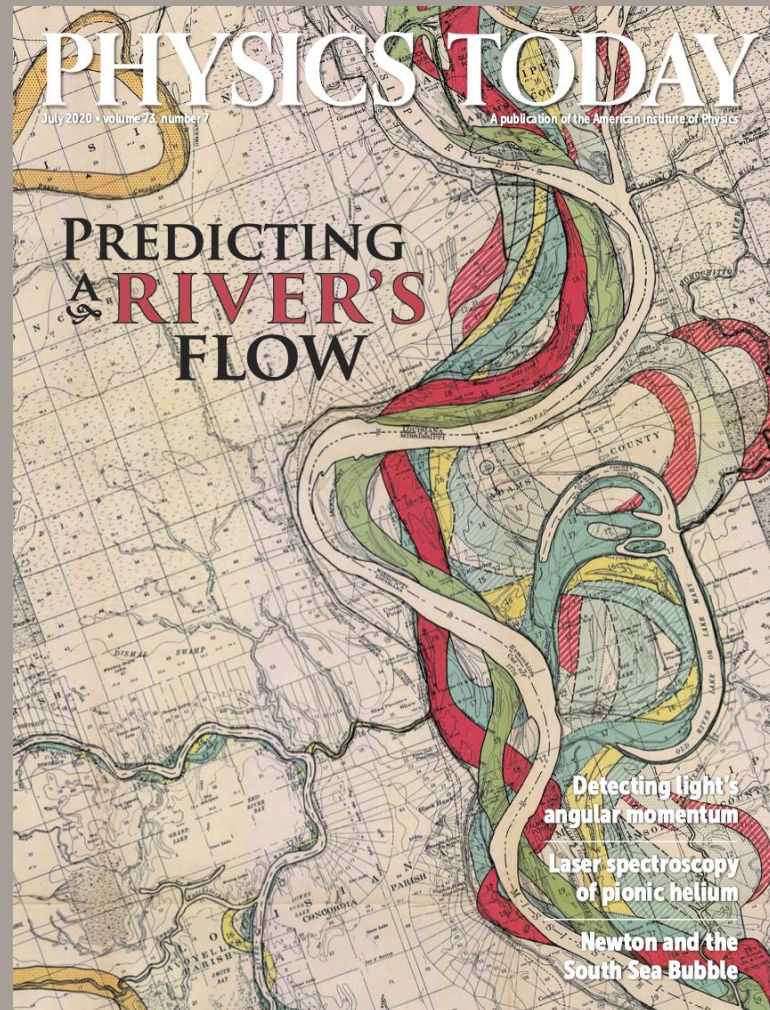
Writing Stories for Physics Today

Samantha Creech
Mentor: Andrew Grant

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

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Today in History
Born on 28 July 1915 in Greenville, South Carolina, Charles Townes was a Nobel Prize-winning physicist who invented the maser and laser. After earning his
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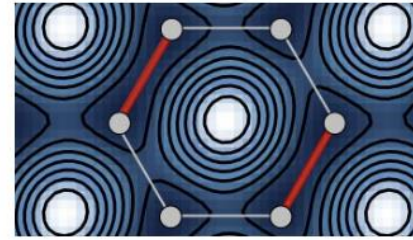
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The Pitch

- 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

The screenshot displays a document editing interface. The main text area contains several paragraphs about honeybee swarms and machine learning algorithms. The text is partially highlighted in orange, and various editing tools like arrows and brackets are visible. On the right side, there is a sidebar with a list of comments from 'Heather Hill', each with a 'Deleted' status and a dropdown arrow. The comments include suggestions like 'Deleted: P', 'Deleted: ing', 'Deleted: H', 'Deleted: S', 'if you change the title as above, the', 'Does this occur during a certain time of', 'Deleted: T', 'Deleted: , so', 'You might add one more', 'Deleted: w', 'Deleted: s', 'Deleted: inspired to', 'From beating their wings? Or is there', 'Deleted:', 'Deleted: In contrast, t', 'As mentioned in the meeting, a little', 'Deleted:', 'Deleted:', 'As mentioned in the meeting, you', 'Deleted: determine', 'As mentioned in the meeting, you may', 'Deleted: .', 'Correct? Or is this a different signal?', 'Correct? Or are there algorithms from', 'Deleted: had gone', 'Deleted: by', 'As mentioned in the meeting, you may', and 'Deleted: Accelerometer installation'. At the top right, there are three comments from 'Andrew Grant' with statuses 'Deleted: H...neybee sS', 'Deleted:', and 'Reconsider word choice'.

Predicting 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 swarming. In that process, the queen reign over the remaining workers. They inspect their colonies for signs of gynes. These regular inspections are laborious work inspired to automate the process

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. using vibrational spectra. *Sci Rep* 10, 9

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

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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