

PHYSICS TODAY

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INTERNAL GRAVITY WAVES

**Computing with
metamaterials**

**The hunt for
axions**

**A tiny planet orbits
a white dwarf**

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FEATURES

SPECIAL FOCUS ON INTERNAL WAVES

34 Spontaneous generation of internal waves

Callum J. Shakespeare

The waves responsible for transporting energy in the ocean and atmosphere are not solely a product of the combined forces of winds, tides, and mountains.

40 Obscure waves in planetary atmospheres

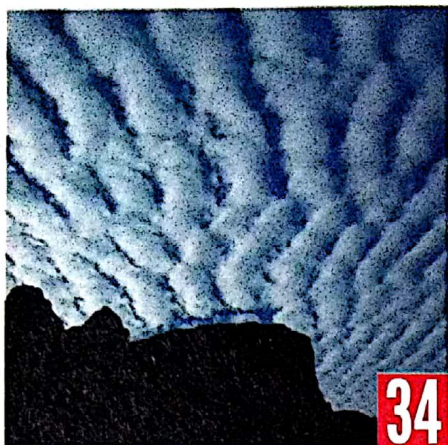
Erdal Yiğit and Alexander S. Medvedev

On Earth and on other planets, internal gravity waves shape the dynamics and thermodynamics of the atmosphere.

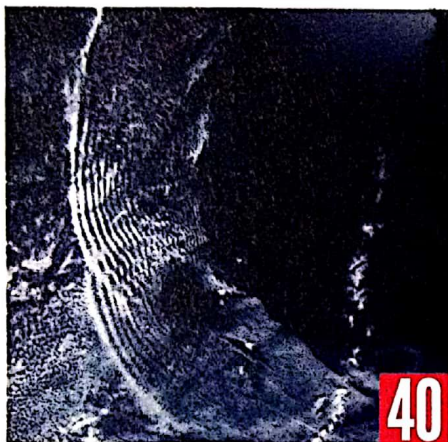
48 Putting the squeeze on axions

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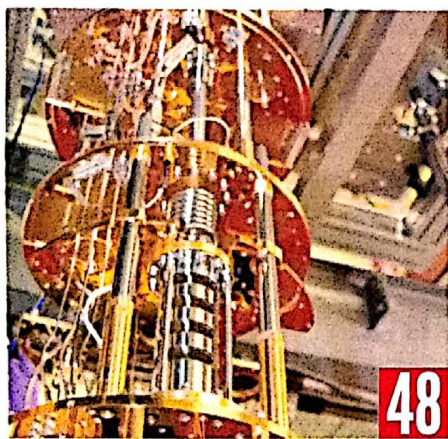
Microwave cavity experiments make a quantum leap in the search for the dark matter of the universe.



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ON THE COVER: Images of Jupiter's swirling atmosphere, such as the one shown here taken by NASA's *Juno* spacecraft, have provided an unprecedented look at the gas giant's atmosphere. On page 40, Erdal Yiğit and Alexander Medvedev discuss the role of gravity waves in the atmospheric dynamics of Jupiter, Earth, and other planets. (Image courtesy of NASA/JPL-Caltech/SwRI/MSSS/Gerald Eichstädt/Seán Doran.)

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JAMI VALENTINE MILLER

► **Black women in physics**
Since 1972 more than 60 000 people have received PhDs in physics in the US; fewer than 100 are African American women. One of them, Jami Valentine Miller, writes about the organization she founded to honor the pioneering physics PhD holders, inspire future physicists, and promote diversity in the field. physicstoday.org/Jun2019a




WHOI

► **Marine seismology**
Among the thousands of seismic stations collecting data globally, the vast majority are on land. That's why some seismologists are developing instruments that listen in on subsurface vibrations from the ocean depths. PHYSICS TODAY's Alex Lopatka reports on how researchers are filling in the gaps as to what goes on beneath Earth's oceanic crust. physicstoday.org/Jun2019b



ED BATRES

► **Popular science**
Awesome Con might seem like an odd place to find an astrophysicist. But for Erin Macdonald, fan conventions are a second home. The former LIGO researcher talks to PHYSICS TODAY about communicating science in myriad venues and advising TV producers and novelists about science. physicstoday.org/Jun2019c

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