asks Schuster, who is now at the Nanyang Technological University in Singapore. After the genome paper came out, San leaders held workshops with scientists, ethicists and lawyers to draft research guidelines. The TRUST Project, a European effort to promote global research ethics, funded the drive.

The process for endorsing research under the guidelines is still taking shape, says Swart, but researchers will be encouraged to submit proposals to the South African San Council. The council "undertakes not to unduly curb or hinder good research", adds Chennells.

Both Chennells and Swart hope that the research code will achieve the same influence as guidelines for working with Aboriginal communities in Australia. There, researchers must typically gain approval from groups that represent local or regional indigenous communities. A 2011 study[2] reporting the first genome of an Aboriginal Australian (taken from an early-twentieth-century hair sample) was nearly scrapped because the scientists had not initially sought the endorsement of an Aboriginal group. "We are learning from Australians," says Swart.

"If researchers want to work among the San and that's the protocol, they should honour it. That's what social justice is all about," says Himla Soodyall, a geneticist at the University of the Witwatersrand in Johannesburg, South Africa, who co-authored a 2012 paper[3] analysing the genomes of San individuals.

That team sought permission for its research from the South African San Council and another San organization, the Working Group of Indigenous Minorities in Southern Africa. The researchers communicated their findings to San communities and told individuals what they had learnt about their genetic ancestry.

Emma Kowal, an anthropologist at Deakin University in Melbourne, Australia, who works on indigenous research ethics, thinks the code will encourage scientists to consider the interests of San communities. "Our experience in Australia is that researchers will come to the table and change the way that they practise," she says. ■

1. Schuster, S. C. *et al. Nature* **463,** 943–947 (2010).
2. Rasmussen, M. *et al. Science* **334,** 94–98 (2011).
3. Schlebusch, C. M. *et al. Science* **338,** 374–379 (2012).

AWARDS

Wavelets scoop maths prize

Yves Meyer wins the Abel Prize for role in theory with multiple applications in data analysis.

BY DAVIDE CASTELVECCHI

French mathematician Yves Meyer has won the 2017 Abel Prize for his "pivotal role" in establishing the theory of wavelets — data-analysis tools used in everything from pinpointing gravitational waves to compressing digital films.

The prize of 6 million Norwegian kroner (US$710,000) — hailed as mathematics' Nobel prize — was announced by the Norwegian Academy of Science and Letters on 21 March. Following the Nobel tradition, Meyer learnt that he was the winner only when he received a call on the morning of the announcement.

"There are not many examples of mathematical discovery that have directly influenced society so much," says Jean-Michel Morel, an applied mathematician and Meyer's colleague at the École Normale Supérieure Paris–Saclay.

Wavelet-based computer algorithms are among the standard tools used by researchers to process, analyse and store information. They also have applications in medical diagnostics, where they can help to speed up magnetic resonance imaging, for example; and in entertainment, to encode high-resolution films into files of manageable size.

After groundbreaking work — in the 'wavelet revolution' — spearheaded by Meyer in the 1980s, textbooks were rewritten, Morel says.

Wavelets are an extension of the toolkit of Fourier analysis, named after Joseph Fourier, who initiated the field in the 1800s. He discovered that a complex waveform can be broken down into simpler, sine-wave components. That is, a piece of information such as a musical note or a seismic signal can be expressed in a compact way using Fourier techniques.

"There are not many examples of mathematical discovery that have directly influenced society so much."

But Fourier's mathematically elegant formulae did not easily apply to many types of real-world data, explains John Rognes, a mathematician at the University of Oslo who chairs the Abel Committee. Fourier's techniques were helpful for steady signals, such as a continuous note played on a violin. But they were not efficient for sifting a noisy data set to extract transient signals — such as the 'chirp' of two black holes colliding, which the Laser Interferometer Gravitational-wave Observatory (LIGO) picked up in 2015.

In the 1900s, researchers developed algorithms that made Fourier analysis more practical for applications such as seismology. Among these were waveforms invented in 1981 by French geophysicist Jean Morlet at CNRS in Marseilles. These could replace Fourier's sine waves and were of finite duration, making them more efficient for dealing with transient signals. Morlet called them *ondelettes* — wavelets in English. But until Meyer entered the field, these tools did not have the full power of Fourier's theory.

Meyer made his serendipitous encounter with Morlet's wavelets in 1982, while waiting for a photocopier at the École Polytechnique in Paris, where he then worked. A colleague was copying a paper on Morlet's wavelets, and the two struck up a conversation.

Meyer, a researcher in functional analysis, was so captivated that he took the first train to Marseilles to talk to Morlet and his colleagues. He decided overnight to change fields. "It was

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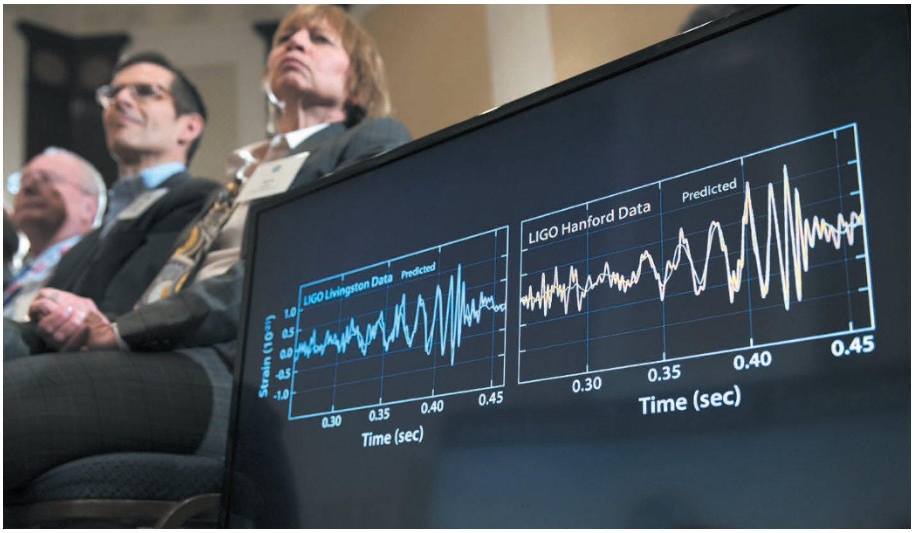

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Wavelet theory helped LIGO to detect gravitational waves.

like a fairy tale," Meyer said in a 2011 interview (see go.nature.com/2n71lot). "I felt I had finally found my home."

By 1986, Meyer had created the first set of wavelets that were at least as powerful as Fourier's waves (P. G. Lemarié & Y. Meyer *Rev. Matem. Iberoam.* **2,** 1–18; 1986). And in the following years, while at the University of Paris Dauphine, he acted as the hub of a network of mathematicians, engineers, physicists and computer scientists who seemed to make new discoveries every week, Morel recalls. "He was communicating to people who don't even talk the same mathematical language," says Morel. "All of these people had pieces of the puzzle."

He adds that a "nice, clean, general theory emerged" that included, and improved on, the tools used to make Fourier analysis more practical — for example, showing that tools for processing signals could also compress data.

Meyer's desire to cross disciplines stemmed from his childhood in colonial Tunis: he was "obsessed", he said in the 2011 interview, by wanting to cross ethnic frontiers.

People who know Meyer describe a man of generosity and rectitude, Morel says. He leads an ascetic life, split between office and home, where he lives with his wife, and is "the most welcoming" and "modest person".

Indeed, on hearing the news, Meyer said: "I feel at the same time happy, surprised and slightly guilty." ■

CORRECTIONS

The graphic in the News story 'China seeks cosmic-ray win' (*Nature* **543,** 300–301; 2017) erroneously gave the surface area of the surface-water Cherenkov detector as 80-m^2. In fact, the area is 80,000 m^2.

The News story 'Ancient volcanoes exposed' (*Nature* **543,** 295–296; 2017) wrongly said that ancient Siberian volcanic eruptions could have raised global temperatures by 7 °C per year, rather than over 100 years.

The News Feature 'A new twist on epigenetics' (*Nature* **542,** 406–408; 2017) omitted a reference (M. J. Koziol *et al. Nature Struct. Mol. Biol.* **23,** 24–30; 2016) that demonstrated ^{6}mA in mammalian cells.