ARIANE KOEK

Bill Fontana listens in to CERN's power supply.

Q&A: Bill Fontana

Sound chaser

Audio sculptor Bill Fontana creates recordings of particle generators as artist-in-residence at CERN, Europe's particle-physics laboratory near Geneva, Switzerland. Ahead of his opening lecture, Fontana talks about probing the links between the speeds of sound and light, and chasing vibrations in gases, liquids and solids.

NICK HIGGINS

What did you do when you first visited CERN last winter?
I made audio recordings of the machines they use to generate subatomic particles. Probably the most interesting was at 'the source', a device the size of a wine bottle where the protons begin their journey around the 27-kilometre-long ring of the Large Hadron Collider. The magnets that propel the protons when they leave the bottle produce rhythmic pulses every 1.2 seconds. The recordings were made with accelerometers mounted on the machines to pick up the sounds inside them, like a stethoscope picks up a heartbeat. The devices have a clock-like quality to them, similar in my mind to the giant mechanism inside London's Big Ben clock tower.

What will you do on your return this month?
I'll be building up recordings for my sound sculpture, which has a working title of *Acoustic Time Travel*. In a sense, I am mimicking the protocol of a scientific experiment. I plan to design a series of short sound bursts to test the sonic properties of various materials. The Large Hadron Collider will be turned off for repairs, so I'll be able to explore its underground tunnels that stretch for miles and miles. I will play back some of my recordings there, using accelerometers mounted on the machinery to explore how these sounds travel through the space.

What do the physicists think of your work?
I have played my recordings for several scientists at CERN. They work with these machines every day, so they tend to disregard the sounds they make. To hear the sounds played back in all their intensity caused surprise, and maybe a little wonder.

How did you begin recording sound?
I started out as a composer in the 1960s, but then recognized that the acts of listening and recording can be equal in mental intensity to writing music. In the 1970s, I had a chance to record the effect of a total solar eclipse on the birds and animals of an Australian rainforest. At first, no creature knew what time it was, so they all started calling at the same time. Then the moment of the eclipse arrived, and the sounds cut to silence. I was fascinated that such a moment might not occur again for hundreds of years. It is something I think about often when recording: this moment, that we're alive and listening, is never going to happen again. When I place live microphones in an environment, I want to convince people that the moment they are experiencing is unique and real, and that everything around them is alive with hidden dimensions of sound.

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Listen to a recording by Bill Fontana at CERN:
go.nature.com/jnc1jv

How do you work as a sound sculptor?
For 30 years, I have been making sound installations that transform our perceptions of public space. I put microphones and speakers in museums and monuments around the world. I am interested in letting people 'hear as far as they can see' by transmitting faraway sounds to them electromagnetically at the speed of light — from bell towers throughout Venice or traffic around the Arc de Triomphe in Paris — before the sounds arrive through the air. This allows me to investigate the relationship between the speeds of sound and light.

How do you draw on technology?
Measurement technology is essential to my work. I have used acoustic microphones that pick up sounds from the air, underwater sensors known as hydrophones and accelerometers that measure the vibration of solid materials. I plan to use seismic networks to explore the energy of ocean waves that spread underground after they reach the shore. I couldn't do my work without technology, but it is a means to an end.

What will you present at your 4 July lecture?
The lecture falls on the first anniversary of the announcement of the discovery of the Higgs boson. CERN director-general Rolf-Dieter Heuer will introduce myself and young cosmologist Subodh Patil, my inspirational partner, in the Globe of Science and Innovation. I will play some of the recordings of machinery and talk about my plans for the summer. Subodh will explain how the cosmic microwave background can be thought of as the echo of the Big Bang and what acoustic vibrations in the early Universe's plasma can reveal about its physics. We will give another lecture at the end of my residency about the discoveries we have made, after my work has been heard at the Ars Electronica Festival in Linz, Austria.

What would you like to do next?
There is a rare compound, tungstate, that looks like a crystal and is extremely heavy for its size. If you send a beam of photons into it, it slows the light down. At CERN, they use this material to see particle collisions in slow motion. I am told that if you could get a sound wave into tungstate, you might be able to speed it up to almost the speed of light. My fantasy is that, if I could get a large enough piece and then pass a vibration through it over a long distance, I could achieve a very long Doppler shift. ■

INTERVIEW BY JASCHA HOFFMAN