Make music with ATLAS data

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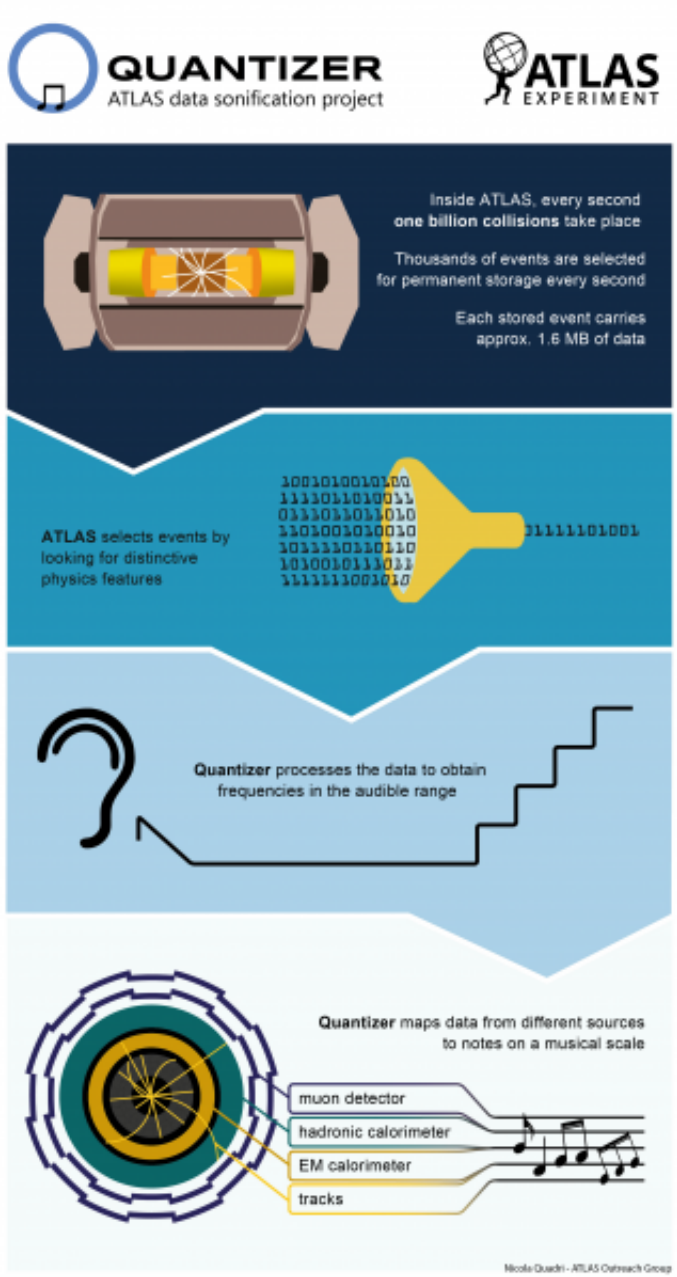

An infographic explaining how the ATLAS quantiser works. Credit: Nicola

From techno beats to classical melodies, from jazz swinging to pop and rock riffs – the ATLAS experiment can play them all thanks to Quantizer.

This new platform translates ATLAS events into notes and rhythms, meaning one of the most complex scientific instruments in the world will not only search for new physics, but also generate music.

Quantizer was conceived by Juliana Cherston, a Master's student in the Responsive Environments Group at the MIT Media Lab, and designed in partnership with ATLAS Doctoral student Ewan Hill from the University of Victoria. They have just released Quantizer on the web, providing real-time audio samples produced with the latest data.

"I did my undergraduate degree in physics and I spent a couple of summers at CERN working for the ATLAS experiment," says Juliana Cherston. "I was really inspired by the place, so I started my Master's studies already knowing what I wanted to work on: more artistic and creative ways of using high-energy physics data."

Less than a year later, her project became a reality. Quantizer challenges artists and composers to explore the thin border between science and art. At the same time, it is a powerful tool for outreach and education, since its music embodies fundamental physics research in a more intuitive and appealing way. But how does it work?

First, Quantizer takes the data released through the ATLAS Live website and applies a noise filter. It then clusters the data geometrically, scales it and shifts it – to ensure that the output is in the audible frequency range

– and then maps the data as notes.

Considering its origin, it is not surprising that one can recognise physics phenomena within the music. "You can hear lower notes more often than higher notes, because less energetic particles are more common than highly energetic ones," explains Ewan Hill, who supervises the data selection and the first translation steps. "At the same time, Quantizer makes use of the particle spatial distribution, so that you can hear the geometric symmetries of the detector in the music."

Last July, Quantizer gave its first performance at the Montreux Jazz Festival, as part of the third The Physics of Music and the Music of Physics event. A few days before the festival, Quantizer held a workshop with twenty composers who worked with the software, exploring all the possibilities it provides. "The hardest and most intriguing part of the project has been figuring out how to manage the tension between the randomness of data and the structure of music," says Juliana Cherston. "For this reason, working side by side with composers is extremely important, especially in this starting phase."

More information: Discover Quantizer for yourself and listen to the wonderful sound of physics: quantizer.media.mit.edu/

Provided by CERN

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