Data from the LHC converted to piano music

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For almost a decade, the Large Hadron Collider (LHC) has been enabling scientists to develop a greater understanding of – and, in some cases, rewrite – the laws of physics.

But now data generated by the world's largest and most powerful particle accelerator are to be transformed into music through a ground-breaking project involving researchers at the University of Plymouth.

The Interdisciplinary Centre for Computer Music Research (ICCMR), working in collaboration with the MIT Media Lab and CERN in Switzerland, is developing new ways of listening to particle collision data produced by one of the LHC's detectors, ATLAS.

Composers will use high performance computers and sophisticated modelling and simulation technology to present the data in sound, creating musical works that are objectively informed by science rather than merely inspired by it.

But as well as portraying the complex science in a new way, it is also hoped scientists might be able to use the compositions to enhance their understanding of the data in front of them.

The Head of the ICCMR, Professor Eduardo Miranda, said: "We have previously worked on various sonification projects, however it does not always work for very complex data because it can result in nonsense noise. As such, we are championing the concept of 'musification', using a subjective interpretation to render the information aesthetically, rather

than merely scientifically. This approach to render big data sonically might reveal properties and behaviours that would probably not be revealed with parametric sonification."

LHC collisions produce an extremely large amount of data, and the design of a system that is able to convey these data auditorily in meaningful ways is not a trivial task.

The research is looking into combining ICCMR's granular sound synthesis technology, based on theory of sound quanta, with MIT's Quantizer system, which enables artists to sonify a small subset of the complicated phenomena occurring inside the collider.

The MIT Media Lab is an interdisciplinary research laboratory at the Massachusetts Institute of Technology devoted to projects at the convergence of technology, multimedia, sciences, art and design.

Professor Miranda recently took part in a research residency at the MIT Media Lab – partially funded by Santander Universities and the University's School of Humanities and Performing Arts – which helped launch the current collaboration.

Professor Joe Paradiso, Director of the MIT Media Lab's Responsive Environments Group, said: "My team enjoyed engaging with Eduardo and getting him going with the tools we developed to map music onto the ATLAS data at the Large Hadron Collider. We're looking forward to hearing the composition he produces, leveraging his granular synthesis tools that are well-suited to being driven by data of this sort."

As part of the project, Professor Miranda is also working with piano prodigy Derek Wang, from the Juilliard School in New York, on a new composition for piano and electronics titled Weak Force. It is likely to premiere in the Spring of 2018.

"This is an unprecedented opportunity to put the outcomes of this project, and some of the new music technologies that we have been developing at ICCMR, into practice," Professor Miranda added. "I am thrilled that Derek is keen to premiere this exciting new composition here in Plymouth."

Provided by University of Plymouth