



# CERN Colloquium

SPEAKER: WILLIAMS, G. (Anglia Ruskin University - Cambridge UK)  
VICINANZA, D. (Anglia Ruskin University and GEANT - Cambridge UK)

TITLE: **Exploring science with sound: sonification and the use of sonograms as data analysis tool**

DATE: Thu 26/01/2017 16:30

PLACE: 503-1-001 - Council Chamber

## ABSTRACT

Resonances, periodicity, patterns and spectra are well-known notions that play crucial roles in particle physics, and that have always been at the junction between sound/music analysis and scientific exploration. Detecting the shape of a particular energy spectrum, studying the stability of a particle beam in a synchrotron, and separating signals from a noisy background are just a few examples where the connection with sound can be very strong, all sharing the same concepts of oscillations, cycles and frequency.

This seminar will focus on analysing data and their relations by translating measurements into audible signals and using the natural capability of the ear to distinguish, characterise and analyse waveform shapes, amplitudes and relations. This process is called data sonification, and one of the main tools to investigate the structure of the sound is the sonogram (sometimes also called a spectrogram). A sonogram is a visual representation of how the spectrum of a certain sound signal changes with time, and we can use sonograms to examine the phase relations between a large collection of variables without having to reduce the data. Spectral analysis is a particularly relevant tool in many scientific disciplines, for example in high-energy physics, where the interest lies in energy spectra, pattern and anomaly detections, and phase transitions. We will give a synopsis of applications of sonification in science, demonstrating how sound can provide quantitative form of data analysis. The seminar will take the audience on a journey through the many ways of listening to scientific data: from hearing the differences between stem cells to analysing data from NASA satellites, from innovative ways of offering physical therapy to pure musical wonder.

Organised by: W. Lerche/TH-SP.....

**\*\*Tea and coffee will be served at 16h00\*\***