second sound

a text score by suzie shrubb

this work defines a number of experiments in particle physics as musical performances.

the experiments, which are currently taking place, are intended by their devisors to detect dark matter and probe its nature.

since the detection apparatus used relies on generating a form of sound (even if it is not a form we are familiar with in the everyday sense) they can be considered musical instruments, as well as and separate from their function as scientific instruments.

the piece comprises of a set of premises to establish that the ongoing experiments constitute an emergent musical process, as well as and distinct from their stated scientific purpose. the duration, form and content of the pieces are elegantly produced as a result of interactions between particle and experiment.

the piece *second sound* is conceptual, it cannot be 'heard' in any traditional sense of the word. when viewed through the context of *second sound*, the experiments themselves become performances of the piece in real time.

premises 1

- the term second sound refers to the way heat can be transferred as waves of phonons through solids that have a crystal structure. it is known as second sound because the wave motion of phonons is similar to sound waves moving through a gas or liquid. sound occurs when vibrations induce molecules to fluctuate through a substance. we think of a 'sound wave' moving through the air. in second sound heat transference replaces the vibrations and induces phonons (instead of molecules) to fluctuate through the crystal structure. second sound can be thought of as a wave of phonons moving through the crystal lattice. simply, it is a sound wave of heat moving through a solid.

- a phonon is a particle of sound operating at atomic scales.

- several dark matter detection experiments[1] are set up to detect phonons as a way of inferring the presence of a predicted form of dark matter: WIMPs or Weakly Interacting Massive Particles.

- in the context of the piece *second sound*, dark matter detection experiments themselves are musical instruments which are 'played' by WIMP particles. each time a WIMP strikes a detector the resulting phonons produce the 'musical' content of the piece.

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1 SuperCDMS, CRESST, EDELWIESS, CDMSI, CDMSII.

premises 2

- the apparatus of dark matter experiments which detect phonons are musical instruments played by detected dark matter particles.

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- the experiment is an emergent generative musical process- the form produced is random and is generated by the interaction of the experiment with the dark matter particles.

- the duration of the piece is set by the duration of the experiment.

- performances of second sound have completed and are currently taking place- SuperCDMS, CRESST and EDELWIESS, EDELWEISS-II, EDELWEISS-III CDMSI, CDMSII