

# NUBIS ET NUCLEI: A STUDY ON NOISE AND PRECISION

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## Abstract

**This study sets out to explore the perception of noise, as well as the relation towards meaning or information that it might contain, in arts, science, and daily life. It is realized as an installation based on a suspended cloud of nitinol drums that create a sonic environment evolving in time and space. The instruments are driven by digital random noise. Roaming freely and listening, visitors become part of an ecology of noise. Exploring the differing regions in time and space, what appears to be noise can shift to a “meaningful” signal. This process of discovering a clear signal in a noisy background holds strong analogies to the scientific search for a nuclear resonance performed in the “nuClock” project.**

The motivation of the artwork is to explore and understand noise in a way that leads to alternative modes of orientation within our increasingly complex and technologized world. Noise is not considered to be dissonant or semantic-free, but rather as raw data, which treasures a tremendous potential [1]. Thus, noise is not an inextricable residual that falls out of the symbolic order, but rather calls for new methods and approaches to process this dynamic yet unpredictable raw material [2]. Besides the sonic realm the artwork questions the close connection between noise (in a mathematical sense) to measurability and precision [1].

The “nuClock” consortium, a team of researchers from nuclear and quantum physics, seeks to detect and characterize an elusive nuclear state in the unique isotope Th-229. This state forms the basis of a future *nuclear* clock that holds the potential to outperform today’s atomic clocks. With a precision of up to 20 digits, it would be used for global navigation, synchronization of telecommunication networks, and basic research. The first step in its implementation is the detection of a very faint frequency masked by strong noise.

Our collaborative study on noise and precision is undertaken at the crossing of the technological and the metaphorical. Noise is where our practices cross, literal technically, phenomenologically and philosophically. Even in science, noise is mainly an obstacle to overcome by improving statistics. It is information incognito, the condition for the constitution of meaning.

“Nubis et Nuclei” is a sculptural sound installation. It consists of a number of custom-made acoustic instruments, nitinol drums. The digitally controlled instruments derive from string drums, using nitinol as instrumental wire [3]. They are arranged in a cloud-like formation and suspended from the ceiling [Fig. 1]. The field of instruments renders the digital input of noise into a standing momentum that appears to evolve in time. Percussive rain-like noises and sounds interlace with standing tones of picked and amplified resonance frequencies. Surrounded by an ecology of noise the visitor is addressed as a listening body and invited to follow the acoustic and tactile rhythms emitted by the cloud of instruments.

The acoustic sense, the ear and its neurological correlative, has a finer time resolution than the visual: our ear is the primary organ to measure rhythm and time. In contrast to vision, which captures only a fraction of our surroundings hearing covers the entire sphere around us. [4] Note that until the advent of digital communication, precise timing signals

(e.g. church bells, reference frequencies) were all acoustic [5].

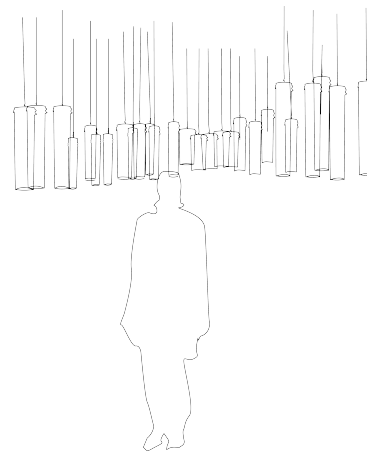
We now describe the technological implementation: White noise is digitally fed into the control system. The signals are randomly distributed over the field of nitinol drums. Each drum, consisting of a tube of variable length and material, has its own characteristic resonance frequencies: in this way, the drums act as a set of random band pass filters, giving rise to standing tones, harmonics, and drones. The drums are arranged such that local acoustic signal patterns appear: the atmosphere is noisy and precise at the same time. Based on the kinetic quality of the nitinol wire we will experiment with an analog feedback system, which allows the sonic environment to further modulate itself, as well as the visitor to alter her/his surroundings. By probing various locations within the cloud of noise, she/he is challenged to define “meaningfulness” of a potential signal, and to develop a search strategy. Eventually, this study is also an experiment and exercise in awareness and fine-tuning.

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## References and Notes

1. Nathanja van Dijk, Kerstin Ergenzinger, Sebastian Schwesinger, and Christian Kassung (Eds.), *Navigating Noise* (Cologne, Germany: Verlag der Buchhandlung Walther König, 2017).
2. E.g. amongst others artistic practices by Bruce Odland and Sam Auinger: Chris Salter, *Alien Agency, Experimental Encounters with the Art in the Making*, MIT Press 2015, pp. 21-84
3. Nitinol/Flexino® is a super-elastic shape memory alloy out of nickel and titanium that exhibits robotic and acoustic effects.
4. Marshall McLuhan and Bruce R. Powers, *The Global Village, Transformations in World Life and Media in the 21st Century* (Oxford University Press, 1993)
5. Peter Gollison, *Einstein's clocks, Poincaré's maps, Empires of time* (New York City, USA, W.W. Norton & Co., 2003)



**Fig. 1. Sketch of the installation, showing an observer moving below a cloud of nitinol drums. (© Kerstin Ergenzinger)**