

# Nadav Drukker

## Ceramic Artist, Theoretical Physicist

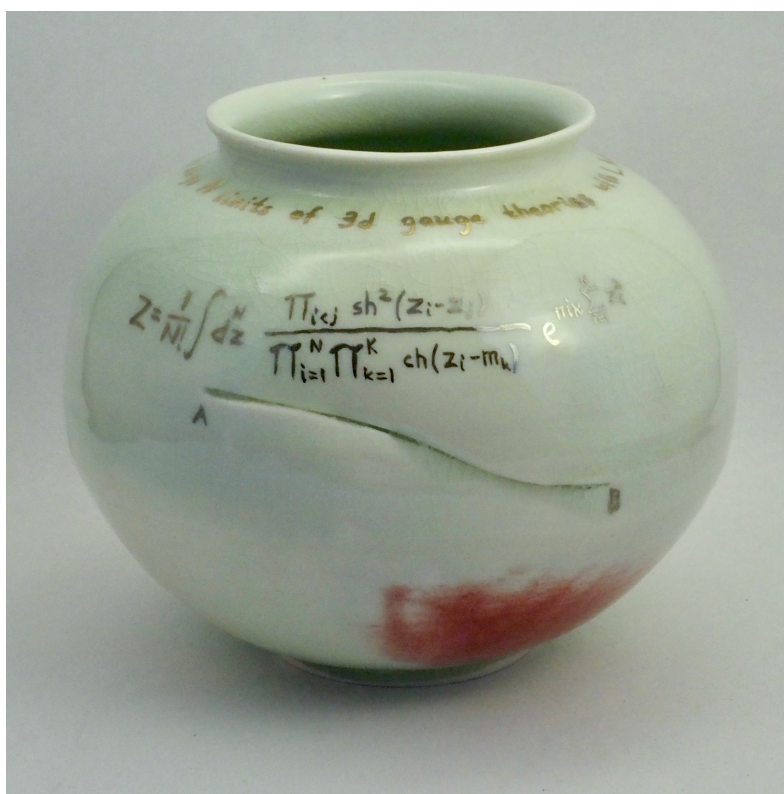
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Dr. Nadav Drukker is a ceramic artist bringing modern science to this ancient art form. Dr. Drukker grew up in Jerusalem, studied in the US and lived in Copenhagen and Berlin before settling in London. He studied ceramics in parallel to completing his PhD in theoretical physics and has been developing his art for over fifteen years. He has recently established his own studio and has been able to devote more of his time to ceramics. Dr. Drukker's influences include ancient ceramics, as Israel is steeped in archeology and he lived at the foot of the Jerusalem Museum whose prominent building housing the dead sea scrolls was modeled after a ceramic vessel. One can also sense his exposure to Japanese art, via his grandfather, who was a major collector and dealer and who established the Tikotin museum of Japanese art in Haifa

Dr. Drukker is a Reader (equivalent to Associate Professor) in Theoretical Physics in the Maths Department of King's College London, specializing in string theory. His most recent creations combine these two facets of his life into several series of ceramic vessels, reflecting his scientific research in clay. The finished pieces follow the research process of a theorist, from basic assumptions and conjectures via calculations to final results or formulas. The piece submitted to Officine Saffi, "cut-15" is part of a series of 21 ceramic works representing one research project which took one year to complete. Many of the pieces were made during the research or soon afterwards and captured the different stages of the project.



"Cut-15", Glazed porcelain, lustres, 17×19×19cm, €2000.

To date, Dr. Drukker has realized ten research projects in series of pottery creations with a total of over 150 completed pieces. This portfolio presents four of these series, named "cut", "cusp", "defect" and "spectral", explain a bit about the motivation and symbolism in each and present the artist practice through them.

## “Cut” series

The piece below, “cut-2” is an early piece in the series following a research project which culminated in the publication of a scientific paper <https://arxiv.org/abs/1701.04409> (and also in *J.Phys. A* 50 (2017) no.34, 345401) . This work was done in collaboration with Dr. Louise Anderson from Imperial college, who also got one of the pieces (“cut-3”, not pictured here) as a present, as I like to do with all my scientific collaborators.

This is an early piece in the series, and the formulas on it are drafts, some of them crude or possibly ultimately false. To depict this, Dr. Drukker used stoneware and often rugged pots with rough inscriptions obscured here by the crude application of dark blue glaze.



“Cut-2”, Stoneware, coblat blue glaze,  $17 \times 17 \times 17$ cm, sold.





“Cut-5”, detail. Stoneware, coloured slips, celadon and other glazes, 26×26×26cm, sold.

“Cut-5”, shown above, is another stoneware piece in the same series. It clearly shares the spherical shape and also has a cut through it, in this case partially fused by the glaze. This is a somewhat later piece, and the formulas are more evident. One can also notice that the figure in the rectangle with green, blue, black and white slip is the same as the figure in lustres on the back on “cut-15”, indicating that some of the final results of the research were already known at that stage of the work.

The choice of the shape of the pieces and of the cut is associated to the research project, studying a model of a physical theory on a sphere, so considering a universe that is essentially the surface of a ball. This is not our universe, but theoretical physicist study many hypothetical universes and theories to understand our universe and the laws governing it better.

The cut is a reference to the mathematical notion of a “branch-cut”, which arises naturally when considering square roots of complex numbers. It is associated to the fact that every number has two square roots, so  $2 \times 2 = 4$ , but also  $(-2) \times (-2) = 4$ . The cut is an indication of where we should use the positive root and where the negative root. scientific notions inspired the look of the pieces.

*“The process of representing my research in clay requires a new examination of the project and can lead to further scientific progress. Some of the formulas on my vessels are copied from my notes, drafts and the final paper, but others are calculated specifically for the ceramic pieces.”*



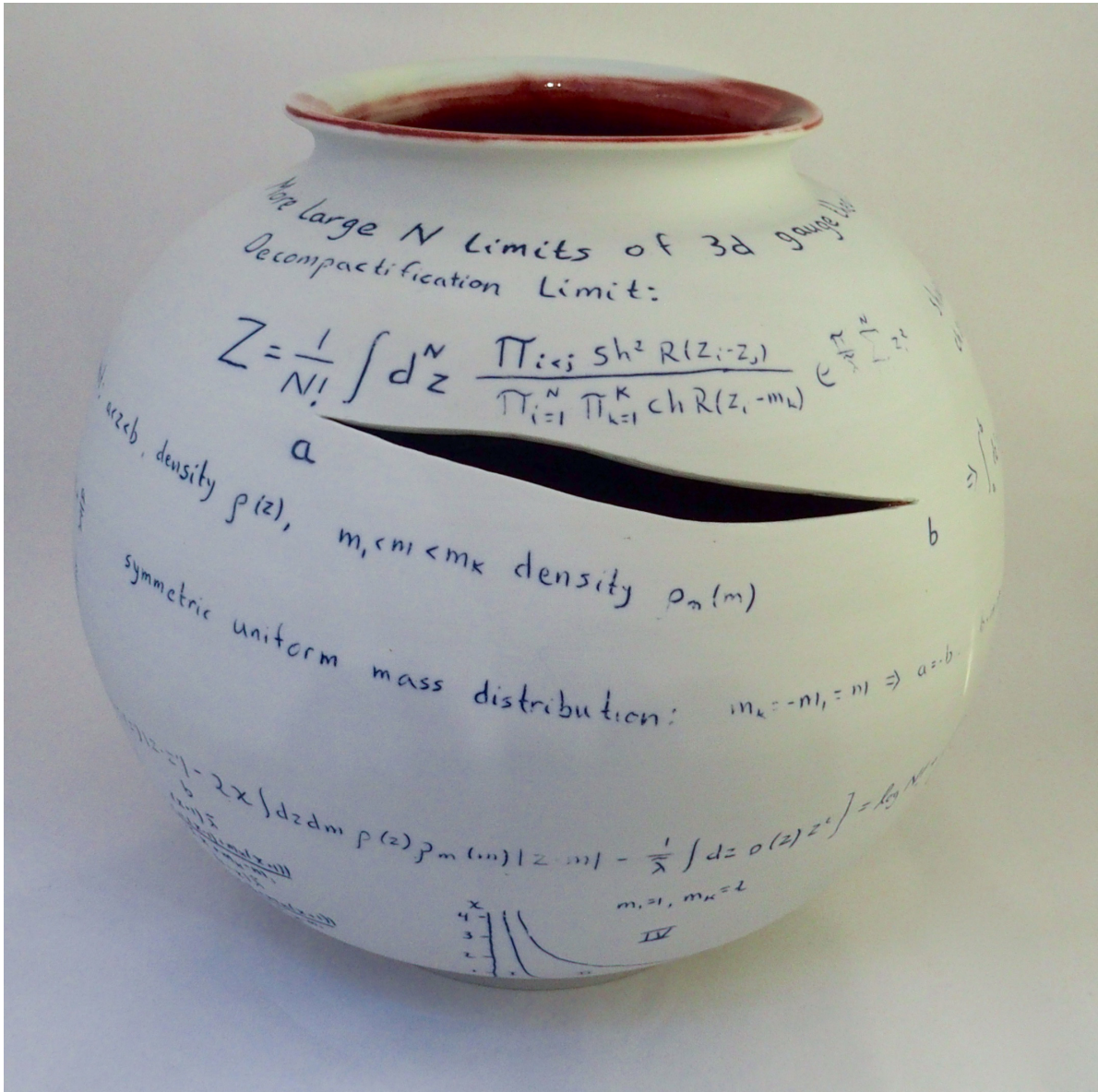
"Cut-9", Incised and inlaid porcelain, celadon glaze. 11×11×11cm. Sold

"Cut-9" is already a more refined piece, made of porcelain, with very fine writing and inlaid coloured porcelain. This piece and the following ones represent the final outcome of the research.



"Cut-10, Cut-11, Cut-12, Cut-13", Incised, inlaid and glazed porcelain. dim: 10×11×11cm. Two sold, others €500





“Cut-21”, Inlaid porcelain, partially glazed. 29×30×30cm. €3000.

In addition to the physics and math inspiration of these works, there are clearly also references to traditional Asian ceramics, in this case the moon-jar, and to Lucio Fontana’s cuts in canvas.

## “Cusp” series

This series is based on research with Dr. Valentina Forini from City University College, London. The shape of the pieces is directly taken from the research topic, related to two arcs meeting at two corners, as is the cross-section of these pieces.

This project reorganized and extended the calculations of these objects using two very different manifestations of the same physical theory via what is known as duality (in particular holographic duality). The two sides of these vessels were chosen to represent the “weak coupling” and “strong coupling” sides of this duality. So the very different calculations on the two sides actually end up computing the same quantity.

One reason that led Dr. Drukker to create this series is the difficulty of communicating string theory to the general public. String theory’s claim to fame is its ability to unify



“Cusp-2”, detail. Incised stoneware, shino and blue glazed. 34×21×6cm. Sold.



quantum mechanics with general relativity. That is hard to explain to an audience that knows next to nothing on either. Furthermore, this statement about string theory dates back to the '70s and current research in the field, including that carried out by Drukker, is even more esoteric, harder to explain, and ultimately irrelevant to all but a handful of experts.

*"The remoteness of my research from any practical application and day to day experiences*



*"Cusp-13", Cut stoneware, glazed. 35 × 32 × 6cm. €1800.*

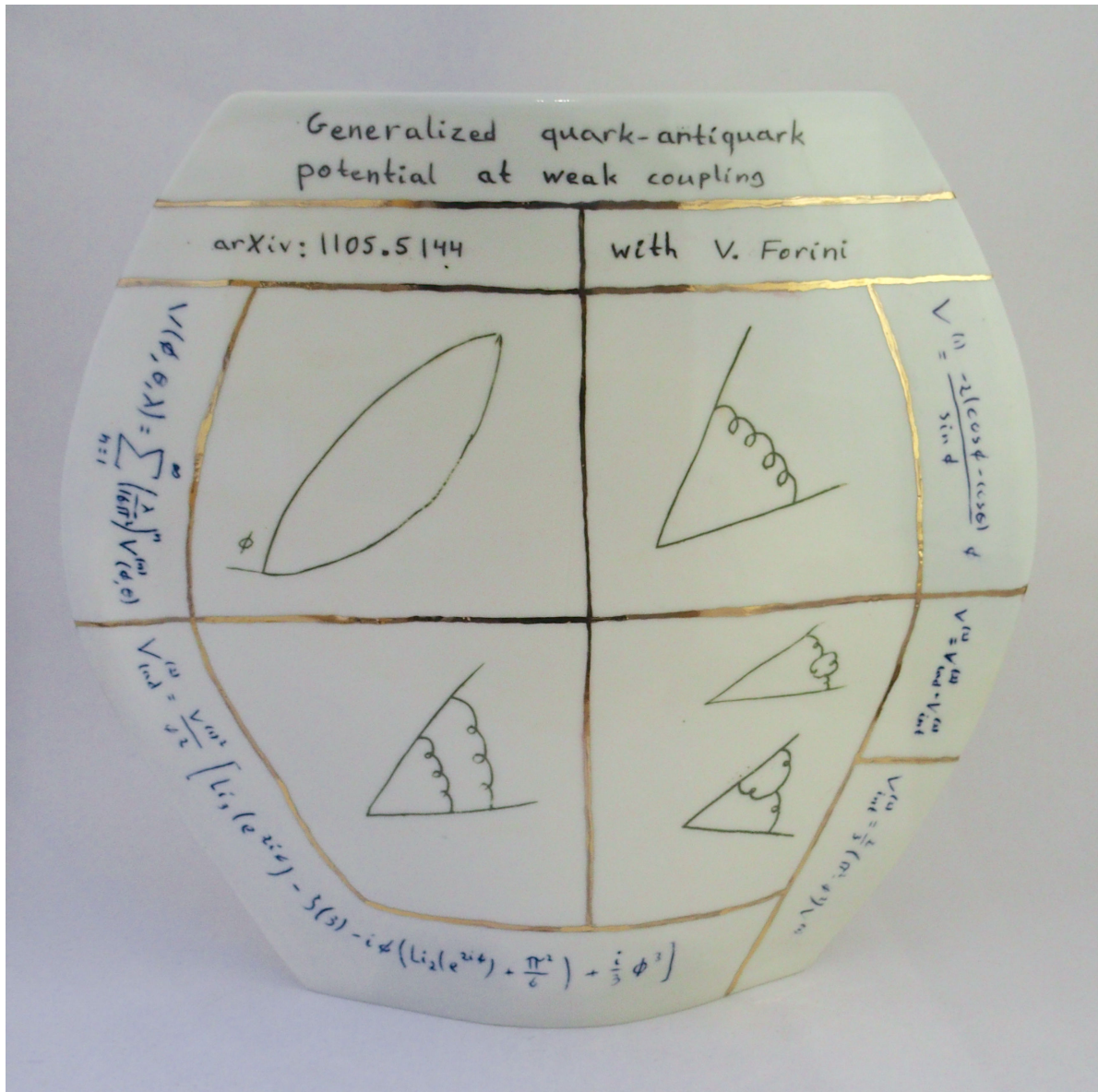
*is a source of great frustration to me. I cannot explain my breakthroughs (and snags) as it requires a great deal of mathematical knowledge. I therefore chose to mirror my scientific creativity in tangible objects and hopefully my work will trigger the curiosity of the viewer to the meaning of the formulas presented on them."*

Instead of presenting the content of his research in simplified language, Dr. Drukker decided to present the technical details in an aesthetically pleasing art form, and thus bringing the language of science and mathematics to a wider audience. He also presented public lectures interweaving his scientific research with his artistic practice, as another way of reaching out.



*"Cusp-18", Incised stoneware with coloured slip, celadon glaze. 33×30×7cm. €1800.*





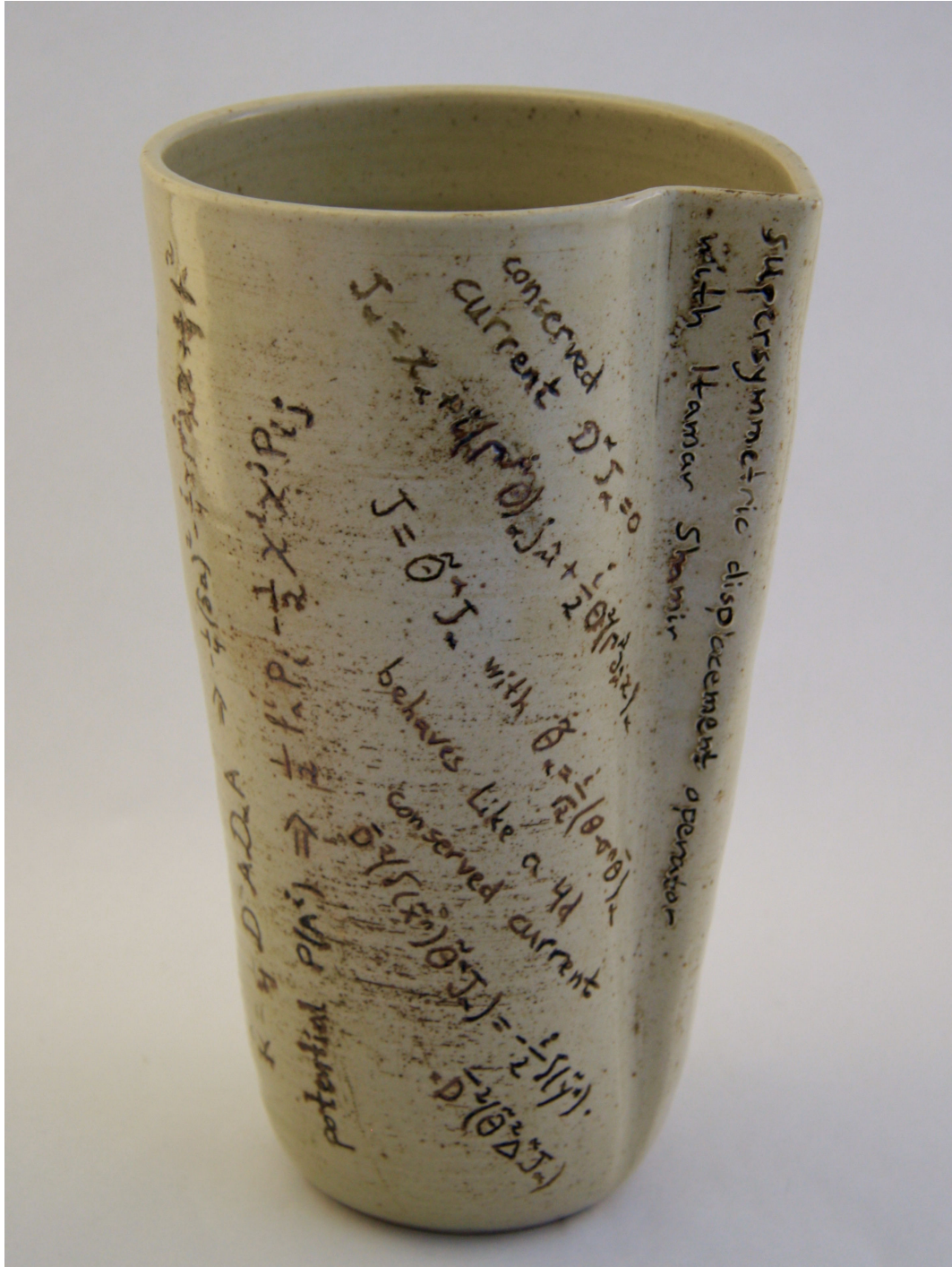
“Cusp-21”, Inlaid porcelain, clear glaze and lustres. 30×32×6cm. €3000.

Of the four pieces presented here, the first one, “cusp-2”, which was shown at the Royal Academy of Arts’ 2017 Summer Exhibition, is the only one representing the “rough” or “draft” phase of the project. The others, in both stoneware and porcelain are refined versions. The latest, “cusp-21” was chosen for an exhibition of arts and science at Bath University.

The figures and formulas are mostly taken from the manuscript, with some further development and refinement to fit the ceramic medium.

## “Defect” series

The “defect” series is based on a project with two collaborators at King’s College London, which was then further developed into another project, realized in a series entitled “codimension”, not presented here. The second piece in this series, “defect-2”, shown below, was made very early when neither the final form of the vessels in this series, nor the content of



“Defect-2”, Incised stoneware, oxides and celadon glaze. 23×14×12cm. €1200.



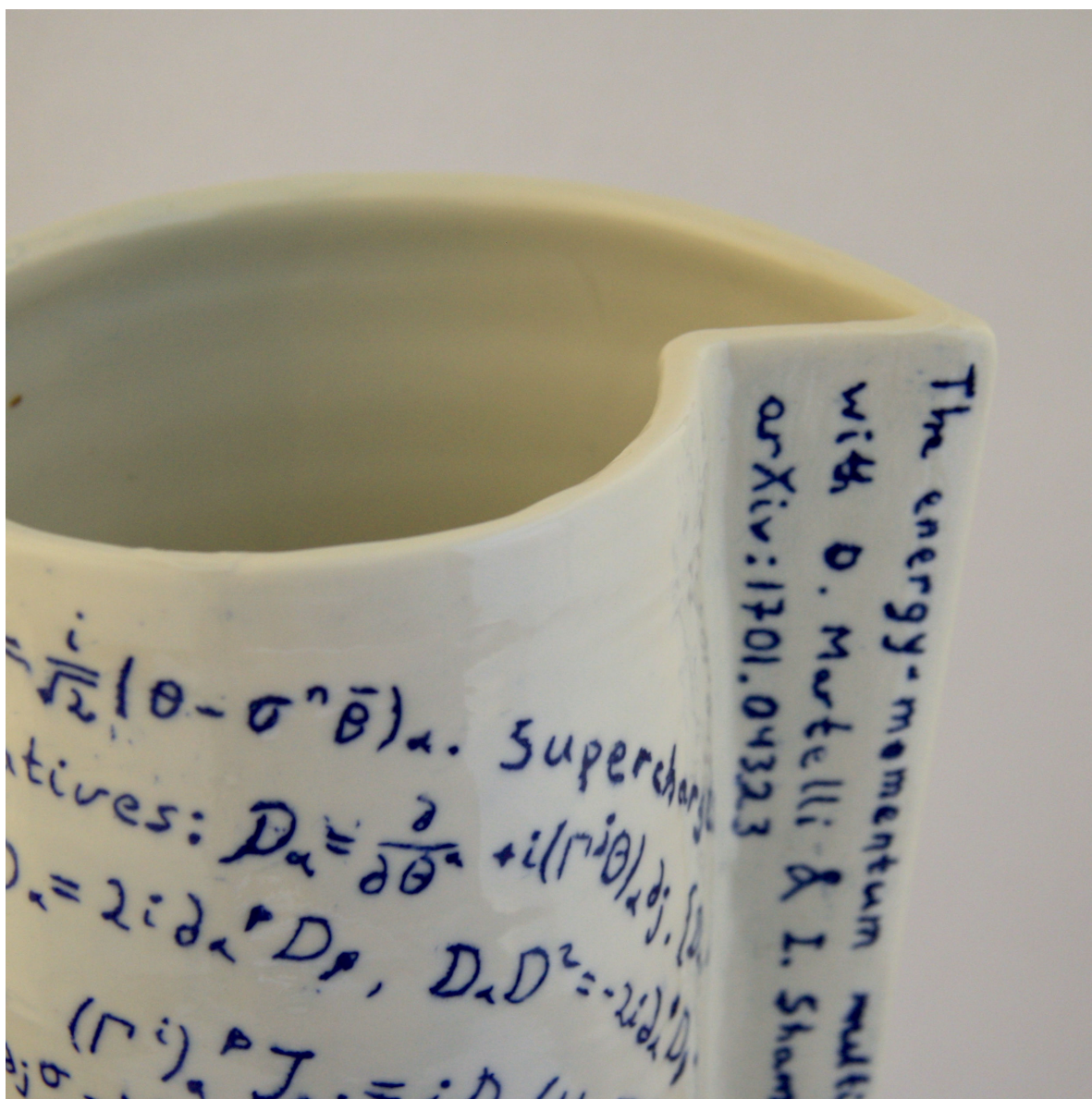
the upcoming paper were completely decided. This piece was made by folding a thrown pot, while in subsequent pieces, the thrown pots were cut and reattached.

The formulas written are glimpses of the topics that were finally included in the paper, mostly technical background that had to be developed. The writing is very rough, incised into the grogged stoneware as is the finish, with iron oxide and a celadon glaze.

“Defect-1” was made after “defect-2”, but was fired in an earlier firing, hence the numbering. It already exhibits the final form of the pieces in the series, but the formulas are still very rough, made to be partially obscured by the shino glaze. The name “defect” is a reference to something that is changing across a line, and clearly the outline of the pot jumps at the location of the fold or cut. In many of the pieces in this series the text also changes across this line and does not continue straight. It may change position, angle, or another characteristic.



*“Defect-1”*, Incised stoneware, oxides, shino and blue glaze.. 23×15×13cm. Sold.



“Defect-10”, detail. Inlaid porcelain, clear glaze. 33×16×13cm. Sold.

In addition to the far eastern influences, another source of inspiration for Dr. Drukker ceramics are Assyrian cuneiforms, an ancient script impressed in clay (or in other cases carved in stone). Many viewers of the works also make the reference to Egyptian hieroglyphics.

*“I like the view of my formulas as modern cuneiforms or hieroglyphs, understood at ancient times only by scribes and today by specialized scholars. For all others, these are hidden coded languages, appreciated for their mystery and aesthetics.”*

The fact that visitors to the British Museum, the Louvre, Luxor, etc. enjoy looking at ancient scripts without a need to decipher their content is an important guiding point. Most people when presented with mathematical formulas or physics texts feel intimidated and profess their ignorance, but they do not feel that way in front of ancient scripts. Putting the equations in ceramics makes them pleasing, rather than intimidating, objects. Dr. Drukker hopes that his work will bring people closer to science and encourage young people to be



curious about the content and pursue science.

“Defect-10” is made of porcelain with inlaid porcelain slip with cobalt carbonate, with the obvious references to fine China decorated with cobalt, as well as Delft (and other majolica) traditions.

“Defect-13”, like “cusp-13” takes a very symbolic view on the topic and represents a single formula in very large script cut out of the stoneware piece. In this case also decorated with the application of white slip through a lace mesh. This piece has been chosen for an exhibition and competition at the Mall Galleries in Mayfair, London.

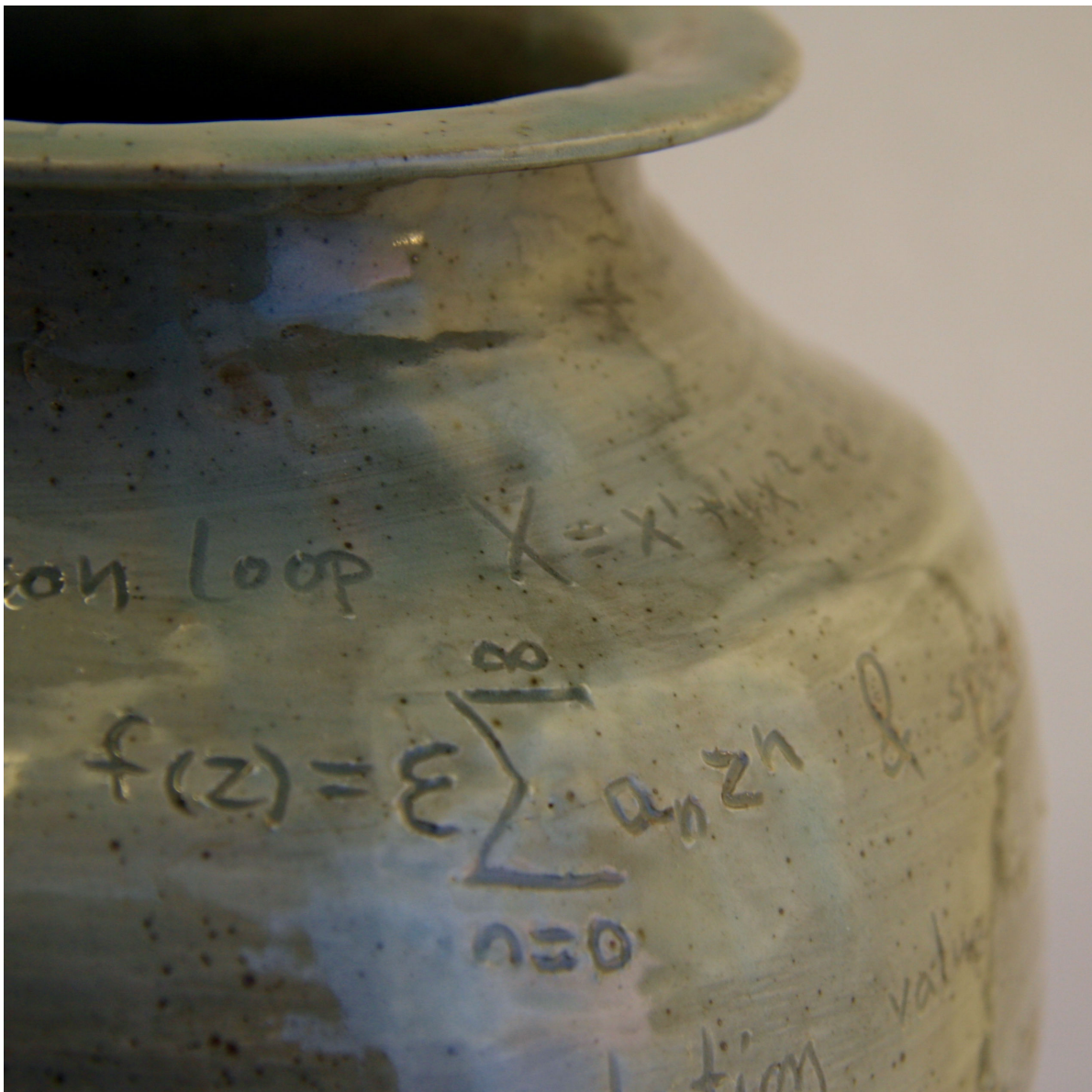


*“Defect-13”*, Cut stoneware, slips, celadon and blue glaze. 40×21×14cm. €2200.

## “Spectral” series

The most recent series that Dr. Drukker has been working on is named “spectral”, where the associated research project is not yet complete. Because of this fact, this series does not contain any porcelain pieces, only rougher stoneware ones.

In “spectral-1” Dr. Drukker was still experimenting with the shape of the vessels, as deformations of traditional vase forms. It is also a first attempt at rough sgraffito, with the entire body, made of dark stoneware, covered by white slip and then inscribed with very preliminary formulas he had at the time. In fact, these formulas turned out to be full of mistakes, which were fixed in later pieces in the series, and will hopefully be completely eliminated before publication of the research paper and the realization of the final results in porcelain.



*“Spectral-1”*, detail. Incised stoneware with white slip, celadon glaze. 30 × 24 × 24cm. €2500.



Another motivation for Dr. Drukker's work is to manifest the similarities between creativity in art and that in science. Not only the final product is important, but we admire also studies for paintings and work hard to uncover the working processes of artists. Hopefully these series of works showing refinement in form, in decoration techniques, and in the formulas presented, bring across the was scientific progresses is achieved.

The form of the vessels, still evolving in "spectral-8", is a deformed vase and is based



"Spectral-8", Incised stoneware with coloured slip, celadon glaze. 35×23×23cm. €1500.



*"Spectral-9"*, Incised dark stoneware, matte blue glaze. 19×13×13cm. €1200.

on the topic of research involving deformations of the circle. The project in fact focuses on families of different deformations of the circle, which would be realized by different cross-sections of these pots. This is best manifested in the last two pieces, "spectral-9" and "spectral-14".





"Spectra-14", Incised stoneware, oxides and partial celadon glaze. 40×34×34cm. €2000.