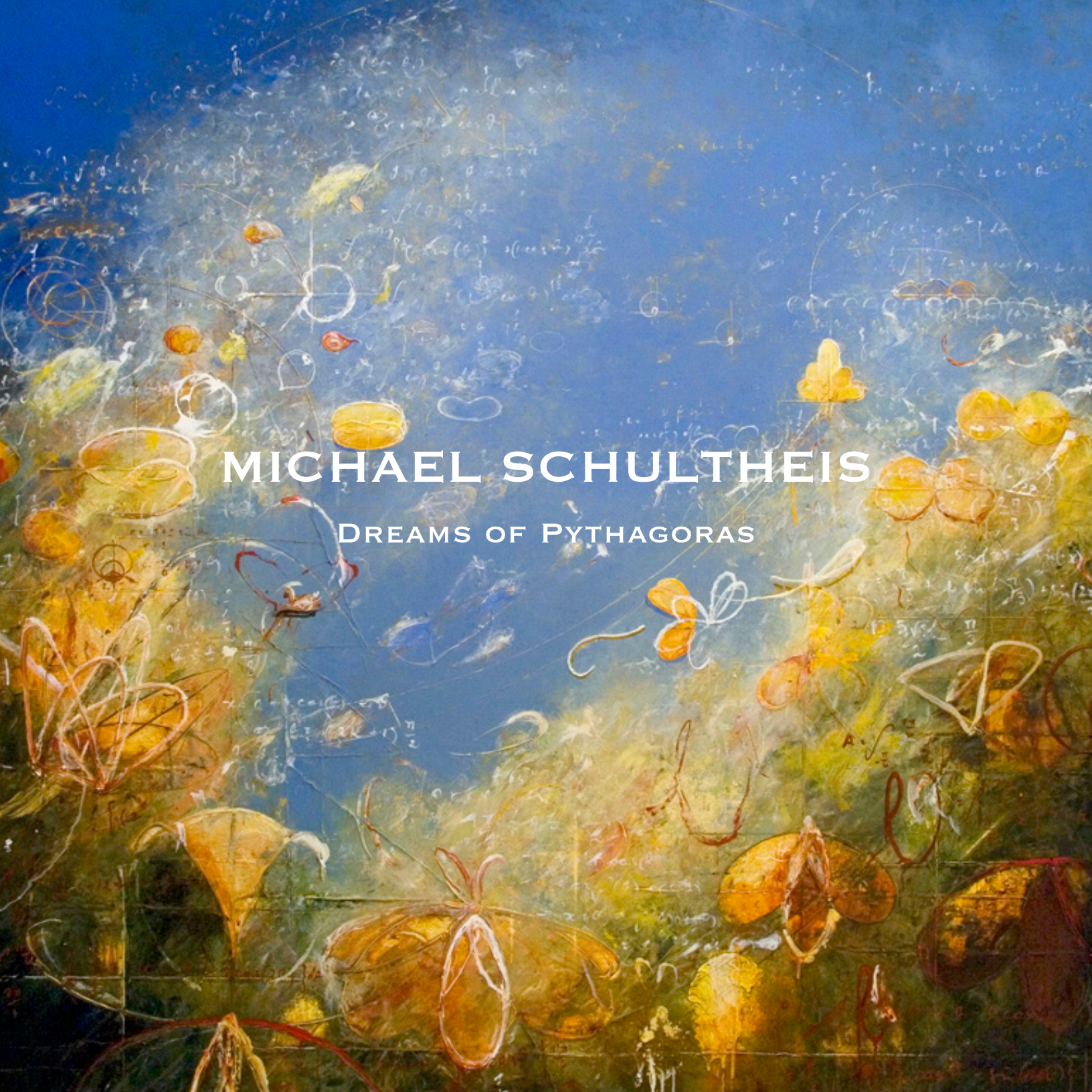

MICHAEL SCHULTHEIS

Dreams of Pythagoras

Cardioid Limaçons of Pythagoras, 2014, acrylic on canvas, 48 x 72 inches

MICHAEL SCHULTHEIS

Dreams of Pythagoras

November 5, 2014 – December 23, 2014

Winston Wächter Fine Art
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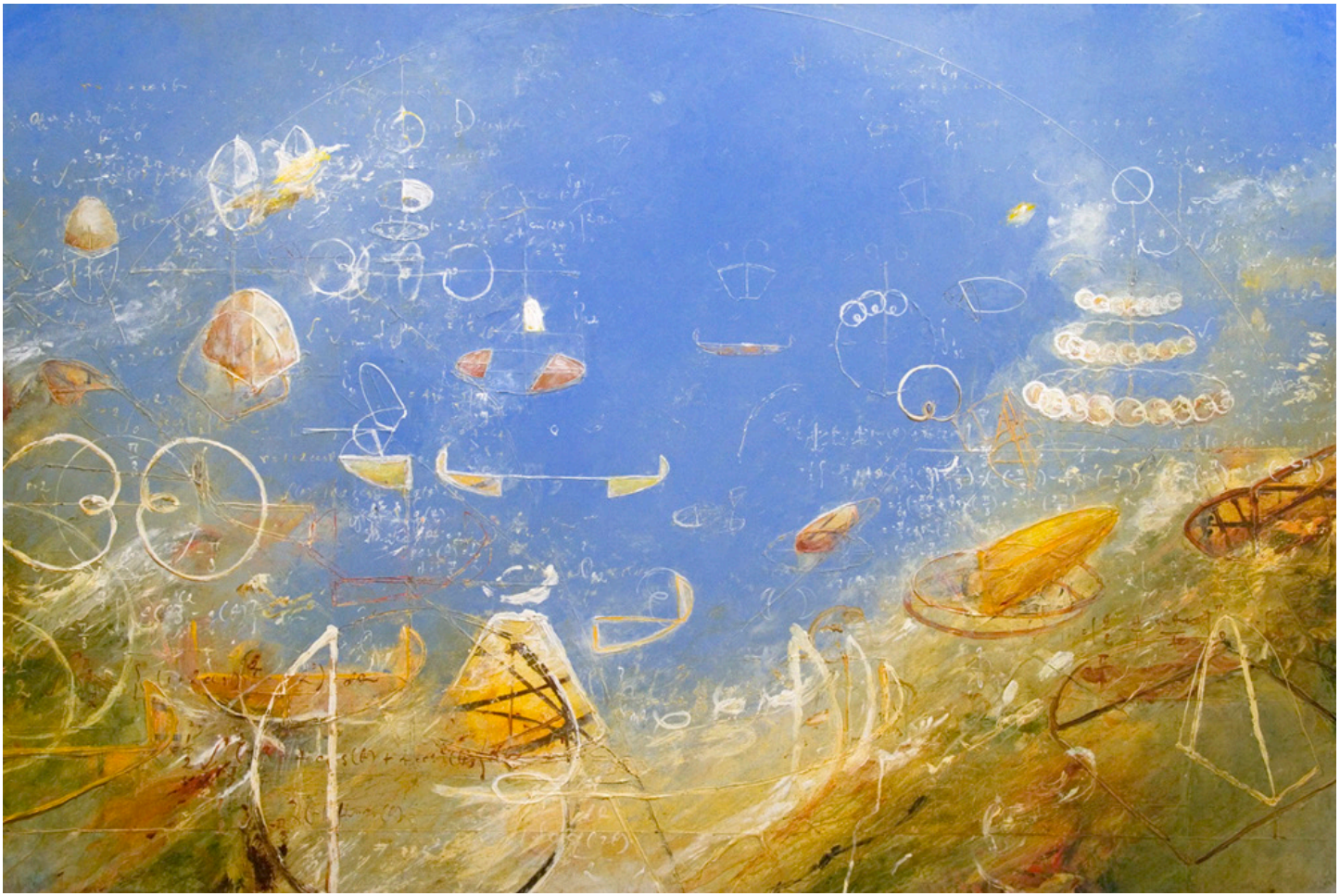


Balios and Xanthos, 2014, acrylic on canvas, 48 x 72 inches

Foreward

Visions of Mathematics

by Allison Henrich, Ph.D., Associate Professor & Chair, Department of Mathematics, Seattle University

My first viewing of Michael Schultheis' *Dreams of Pythagoras* prompted a visceral reaction. What initially appears to be a collection of discrete two-dimensional lines and curves suddenly becomes a rich three-dimensional world. Into a heavenly blue field float objects that are formally defined with polar and spherical coordinates but intuitively understood as smooth curves and surfaces. Schultheis' work suggests a Platonic realm of perfect mathematical forms.

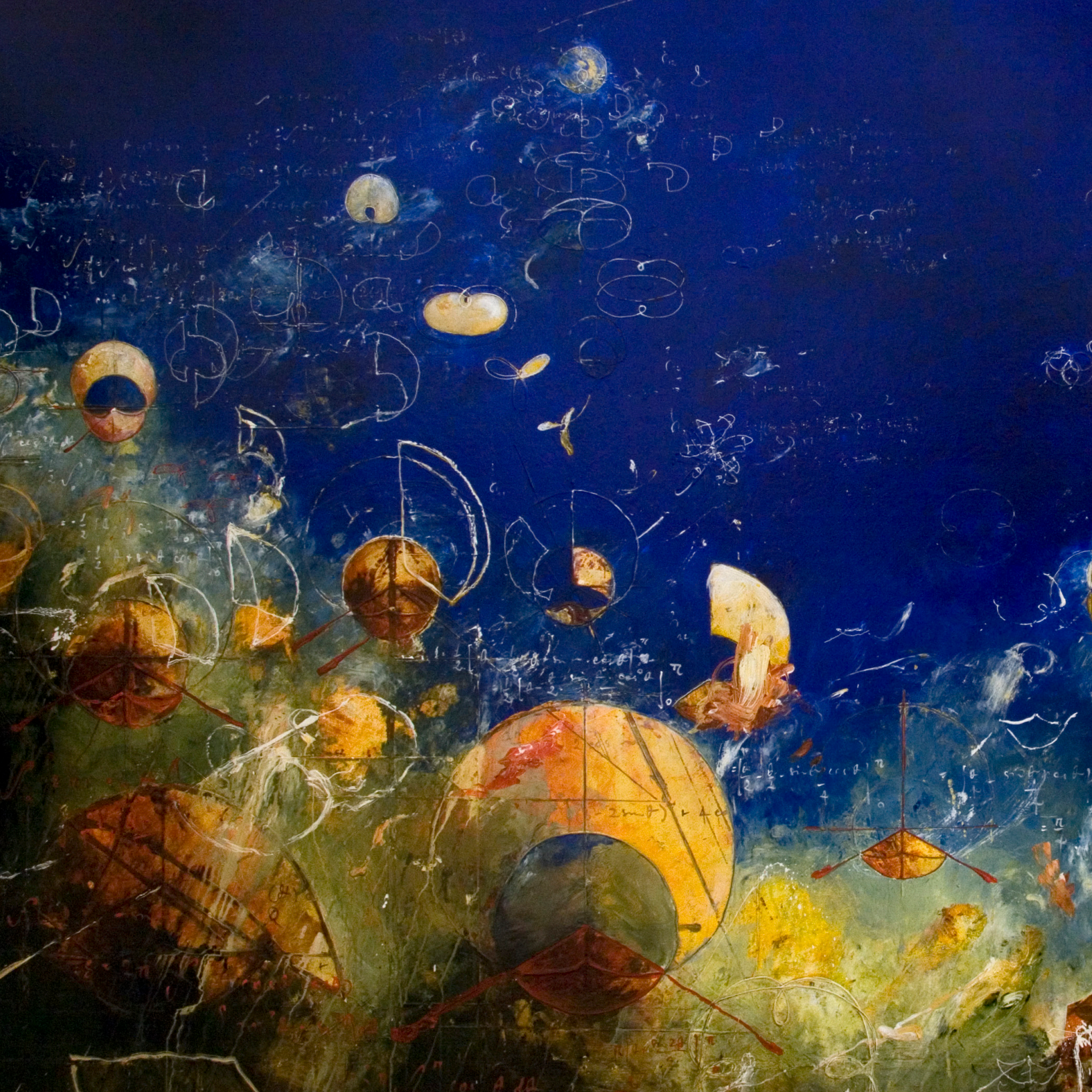
One of Schultheis' paintings titled *Pythagoras Autumn* pulled me back to that moment in graduate school when my advisor gave me my first mathematical research paper to not only read, but absorb. Several of the images that float in Schultheis' ethereal world are the very same images that appear in Vladimir Arnol'd's unforgettable paper on the Strangeness of immersed curves.

Arnol'd's work features a striking interplay between the profoundly deep, yet simple and beautiful aspects of immersed curves in the plane. His research involved imagining the universe consisting of these immersed curves and studying how paths in this space could link one curve to another. It was initially impossible for me to visualize a topological space whose "points" were curves in a plane, rather than the more familiar "dots" in Euclidean space. Each time I grappled with his research, deconstructing his curves, Arnol'd's vision would sink deeper and deeper into my mind. My own mathematical visions eventually became *immersed* in this universe.

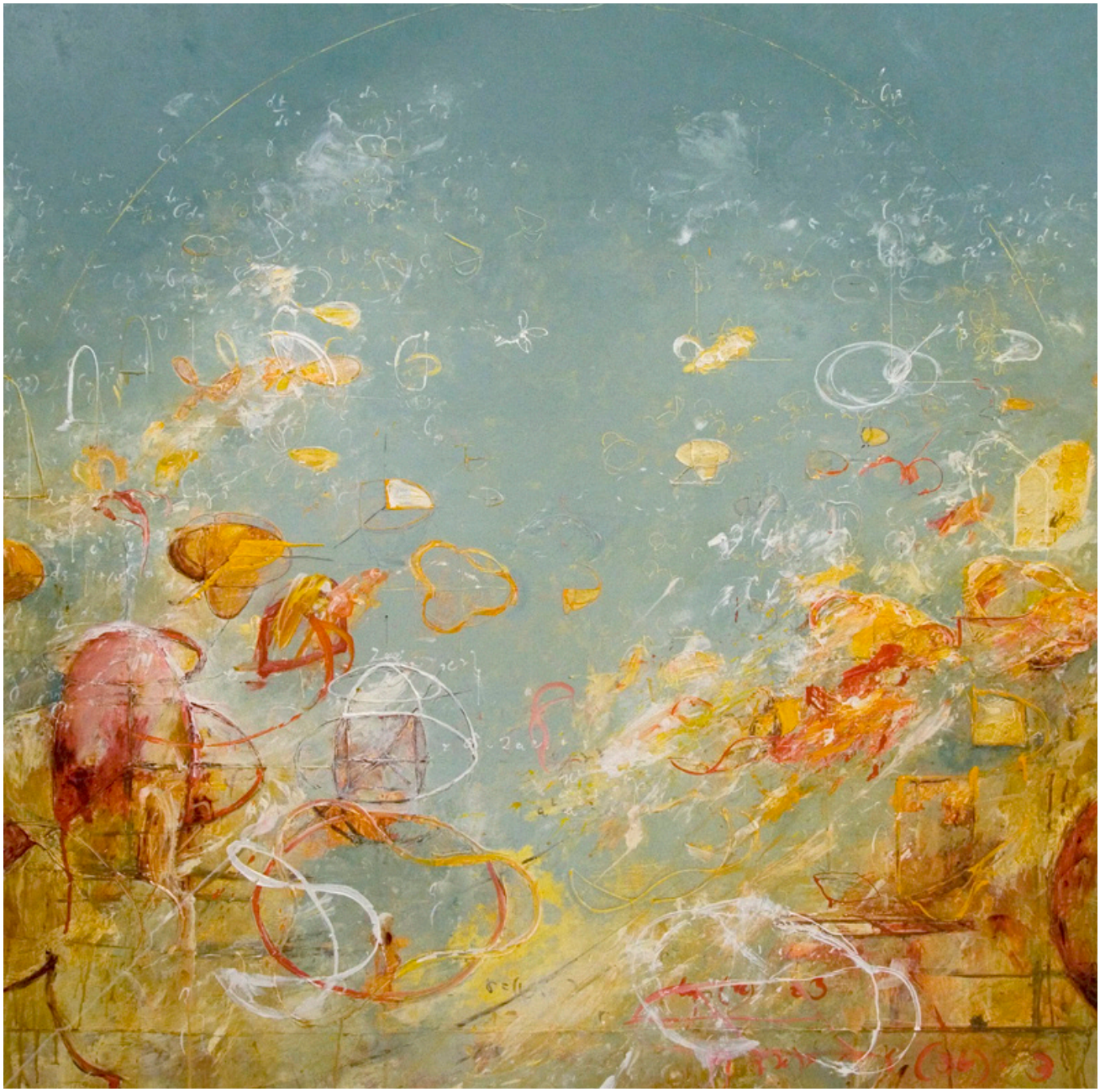
These days, I lead my mathematics students through a similar process of discovery. My Calculus students recently embarked on a journey of honing mathematical mental images when they learned about surfaces of revolution. A surface of revolution begins as a closed curve in the plane. This curve is then rotated in three-dimensional space about an axis. Students in Calculus are asked to find the volume contained within the surface. In order to find a correct method of obtaining the desired volume, it is essential that a student be able to create a reasonably accurate picture in their mind of the three-dimensional object.

In *Balios and Xanthos*, Schultheis beautifully captures the process of creating a surface of revolution from the limaçon curve. We glimpse how the single point of self-intersection in the limaçon produces an infinite set of points of self-intersection in the surface it produces. We also arrive at the realization that the distance of the curve from the axis it is rotating around affects the resulting surface. The longer we let Schultheis' art permeate our mental imagery, the clearer our mathematical insight becomes. His images help us to form a surface that can be rotated, sliced, and manipulated in our mind's eye. In the end, we arrive at understanding.

This is precisely why I implore my students to think like artists. Visual imagination is essential in my own research on knots, which are themselves curves floating in space. Indeed, the intuition that precedes mathematical discovery can only be conceived when a bond is formed between mathematical formalism and visualization.



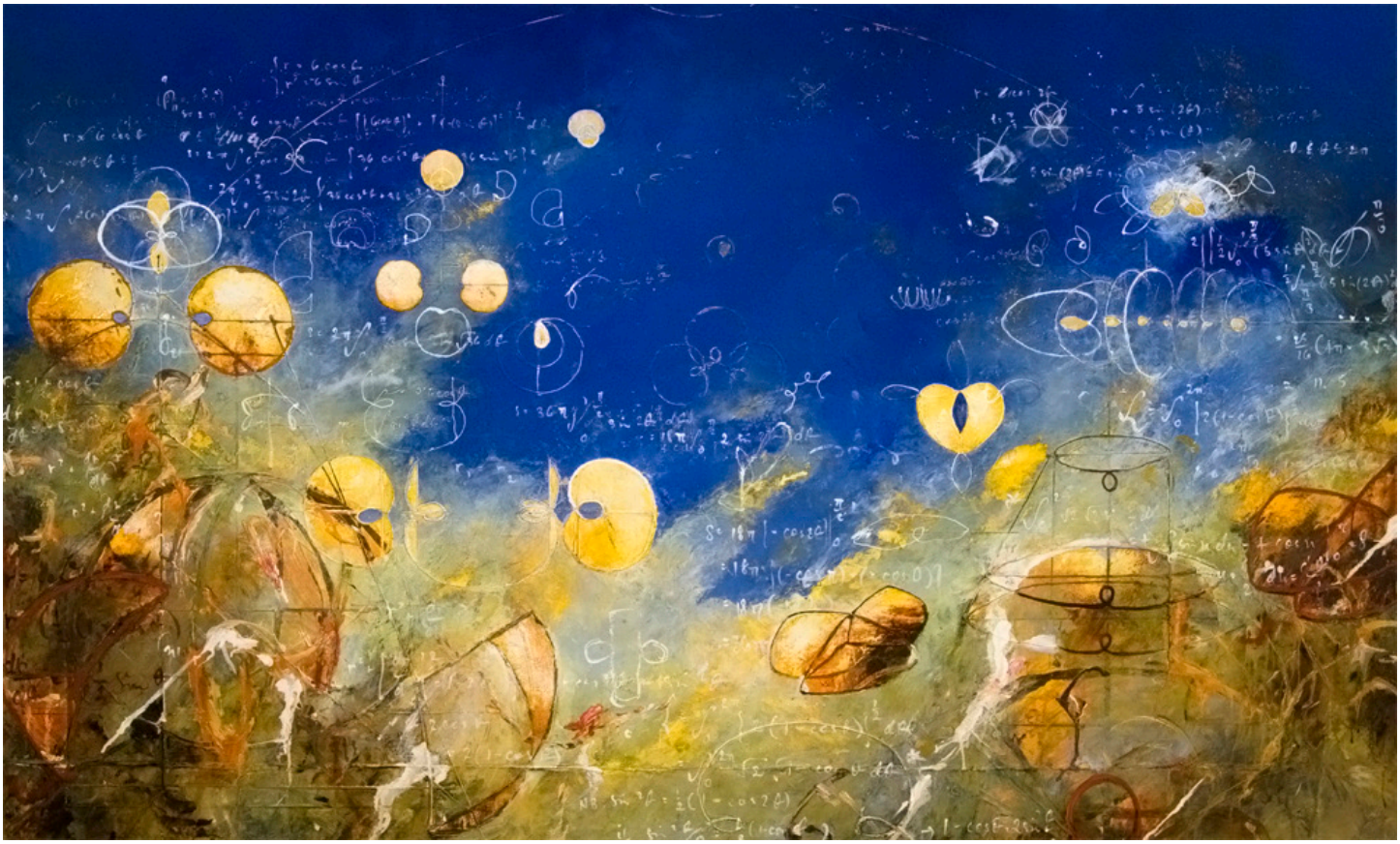
Dreams of Pythagoras
2014, acrylic on canvas, 60 x 96 inches



Seven Limaçons for Chiron, 2014, acrylic on canvas, 48 x 48 inches

Dimpled Limaçon of Pythagoras, 2014, acrylic on canvas, 60 x 60 inches

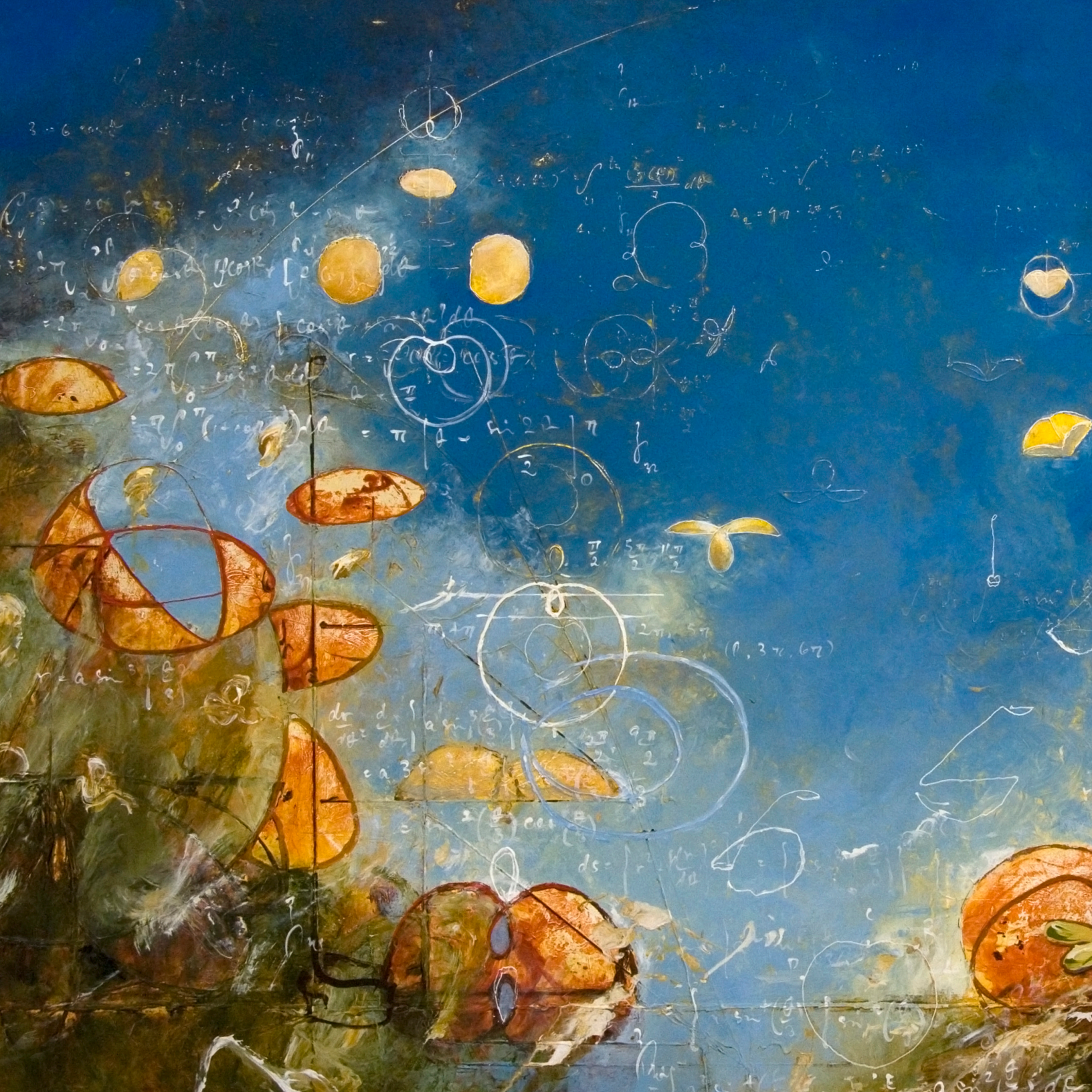
Pythagoras Spring, Pythagoras Summer, Pythagoras Autumn, and *Pythagoras Winter,* 2014, acrylic on canvas, 48 x 48 inches (each)

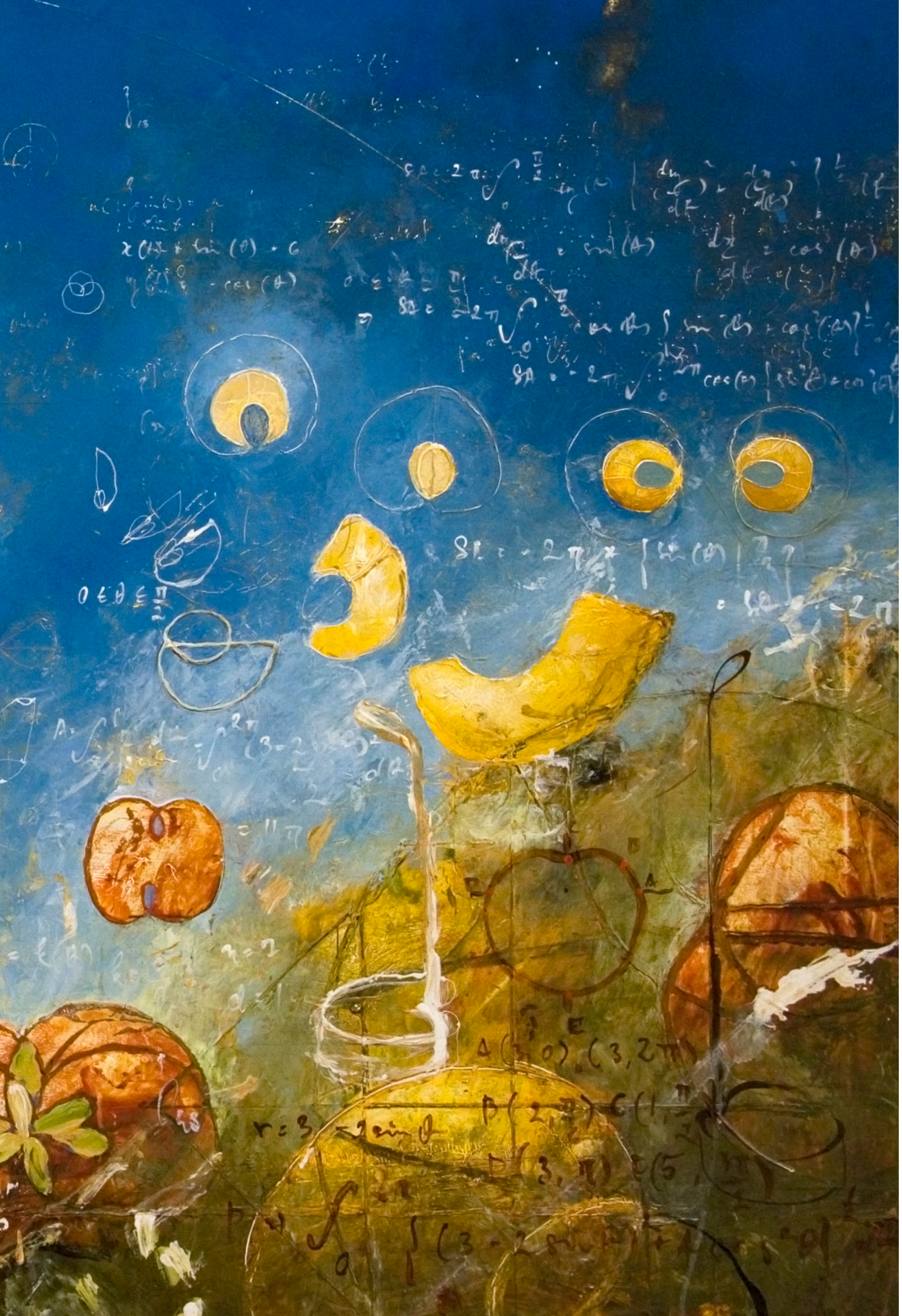


Pythagoras Nocturnes in Cosine, 2014, acrylic on canvas, 36 x 60 inches

Seven Petals for Patroclus, 2014, acrylic on canvas, 36 x 48 inches

Seven Petals for Achilles, 2014, acrylic on canvas, 36 x 48 inches

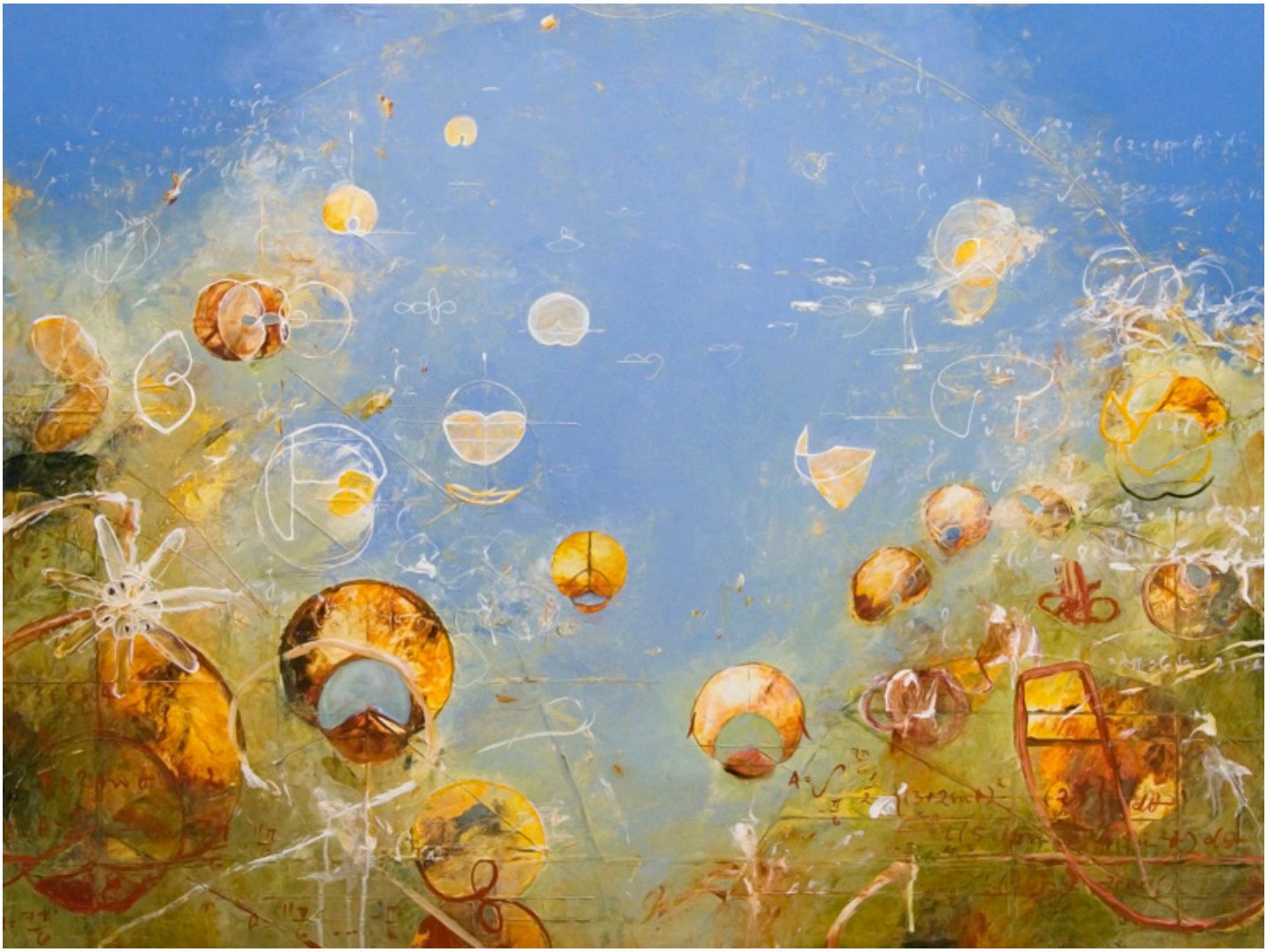




Pythagoras Nocturnes in Sine
2014, acrylic on canvas, 36 x 60 inches

Cardioid Nights on Pelion, 2014, acrylic on canvas, 24 x 24 inches

Limaçon Nights on Pelion, 2014, acrylic on canvas, 24 x 24 inches



Seven Petals for Phoinix, 2014, acrylic on canvas, 36 x 48 inches

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(front cover) *Convex Limaçons of Pythagoras,* 2014, Acrylic on canvas, 60 x 60 inches