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Author

Cox, Brian E.

Publication Date

2026-11-28

DOI

10.5281/zenodo.24658922

Data Availability

The data associated with this publication are available at:
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OF OPEN SCIENCE

2025
ASTROPHYSICS
PUBLICATIONS FOR THE PUBLIC

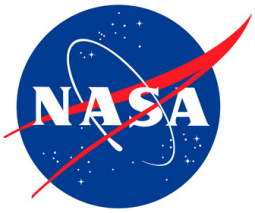
BRIAN E. COX AND PATRICIA I. COX

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OF OPEN SCIENCE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OF OPEN SCIENCE

2025
ASTROPHYSICS
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BRIAN E. COX AND PATRICIA I. COX



National Aeronautics and Space Administration
Open Science
NASA Science Mission Directorate
Washington, DC 20546

NASA SP-2025-0009-0008-6635-9602-01

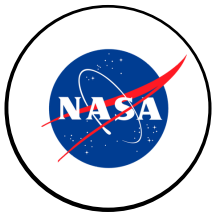
Names: Cox, Brian E., author; Cox, Patricia I., author. | United States. National Aeronautics and Space Administration, publisher.

Title: National Aeronautics and Space Administration of Open Science: 2025 Astrophysics Publications for the Public

Description: Washington, DC: National Aeronautics and Space Administration, Open Science, NASA Science Mission Directorate, [2025] Summary: "*National Aeronautics and Space Administration of Open Science: 2025 Astrophysics Publications for the Public* shares Citizen Science (i.e., academic papers) published during the 2025 calendar year in a public-friendly book format in the style of the work of Christopher Gainor (i.e., 'Not Yet Imagined: A Study of Hubble Space Telescope Operations' published in 2020)." Provided by authors.

This publication is available as a free download through NASA.
www.nasa.gov





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ACADEMIC PAPERS

The Inflationary Multiverse: Universes within the Universe..... **2**

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ACADEMIC PAPERS

The "Academic Papers" section of *National Aeronautics and Space Administration of Open Science: 2025 Astrophysics Publications for the Public* consists of two academic papers authored and published for the public during the 2025 year from Tuesday, November 25th, 2025 to Tuesday, December 2nd, 2025 (originally) and Thursday, December 4th, 2025 to Sunday, December 28th, 2025 (revised).

Listed in chronological order, the two academic papers are the following:

1. The Inflationary Multiverse: Universes within the Universe
2. Positive Infinity: The Radius of the Inflationary Multiverse

The Inflationary Multiverse: Universes within the Universe

The Inflationary Multiverse: Universes within the Universe

Brian E. Cox
University of Manchester

Patricia I. Vargas
Oregon State University

Original: November 25, 2025
Revised: December 04, 2025

// Abstract //
In this short science write, two educators and published research authors explore what may be beyond Pluto. Dr. Brian E. Cox and Ms. Patricia I. Vargas apply their respective expertise, physics and mathematics, to challenge the definition of Universe upon conducting archival and quantitative analyses. They conjecture The Inflationary Multiverse. Mathematically, Universes within the Universe, exist. Could this have been The Cosmos the Greeks spoke of thousands of years ago? Perhaps, pleasantly probable ($p<0.05$).

Keywords: space, the universe, the cosmos, western philosophy, physics, mathematics, science, statistics

// Introduction //
Have you ever wondered what might truly be out there, beyond planet Earth? So have scientists, particularly in Europe and the United States of America!

We ask the binary question, “Could alternate and parallel worlds exist in the Universe?”

// Background //
The Milky Way has been understood to consist of one Sun, nine planets (Earth inclusive), the Moon of Earth, and two types of stars.

Some additional wonders of outer space have included Worm Holes, Black Holes, dark matter, and gravity.

This is an elementary picture of the Universe. Could there be more?

// Methods //

We apply two types of analyses to arrive at a conclusion from which implications can be drawn: archival analysis and quantitative analysis.

// Results //
Please see Interpretation written via iPhone Notes below:

Want to learn what is beyond the Sun? Read on about the mountains of magic that lie ahead!

After Aristotle spoke with his father, Plato, he understood that circles were crucial for everlasting life. He understood that planets moved in circles for two dwarf stars kept each planet levitating within dark matter. Aristotle understood that planet Earth was not the center of the Universe. Plato, Aristotle's father, drew an incomplete "cosmological model" for Aristotle, his son, to decipher. Aristotle kept asking his father about more planets and so learned about planets past five, visually painting them onto the incomplete "cosmological model."Aristotle understood that planets moved in a circle about the axis of their two dwarve stars and about the axis of Helios.

——

An interpretation of "Our Picture of the Universe," Figure 1.1. Written by Patricia I. Vargas on Wednesday, October 8th of 2025. Figure 1.1 provided by Dr. Brian E. Cox and Neil deGrasse Tyson on Saturday, June 14th of 2025.

An understanding of pi, circles, and spheres is vital for accurately deciphering the Cosmological model(s) of the Greeks.

Please see Table created via iPhone Notes below (i.e., kindly see next page):

SUN (10)	SWITCH IN ROTATION (0)	BLACK HOLE (-10)	SWITCH IN ROTATION (0)	SUN (10)	PATTERN REPEATS (...)
Mercury (9)	Mercury (-9)	Mercury (9)	Mercury (-9)	Mercury (9)	
Venus (8)	Venus (-8)	Venus (8)	Venus (-8)	Venus (8)	
Earth (7)	Earth (-7)	Earth (7)	Earth (-7)	Earth (7)	
Mars (6)	Mars (-6)	Mars (6)	Mars (-6)	Mars (6)	
Jupiter (5)	Jupiter (-5)	Jupiter (5)	Jupiter (-5)	Jupiter (5)	
Saturn (4)	Saturn (-4)	Saturn (4)	Saturn (-4)	Saturn (4)	
Uranus (3)	Uranus (-3)	Uranus (3)	Uranus (-3)	Uranus (3)	
Neptune (2)	Neptune (-2)	Neptune (2)	Neptune (-2)	Neptune (2)	
Pluto (1)	Pluto (-1)	Pluto (1)	Pluto (-1)	Pluto (1)	

Table created by Patricia I. Vargas while in conversation with Dr. Brian E. Cox and Neil deGrasse Tyson on Wednesday, October 8th of 2025.

An understanding of arithmetic inclusive of both positive and negative values, concentricity, rotor movement, equilibrium, and infinity are vital for accurately deciphering the table of The Inflationary Multiverse.

// Conclusions & Implications //

B.C. Greek philosophers discovered universes within the Universe thousands of years ago, perhaps terming such an existence, The Cosmos.

A.D. European and American scientists rediscovered universes within the Universe, terming such a prevailing existence, The Inflationary Multiverse.

Reflecting on the cosmological model(s) of B.C. Greek philosophers, we learn inquiry based pedagogies carry information across time by tapping into the innate curiosity of the sentient being.

Reflecting on the table of A.D. European and American scientists, we learn creative rote pedagogies carry information across time by tapping into the intrinsic short-term and long-term neuroprocesses of the sentient being.

We can equate (i.e., equalize without congruency) The Cosmos with The Inflationary Multiverse.

And so when we ask, “Could alternate and parallel worlds exist in the Universe?”

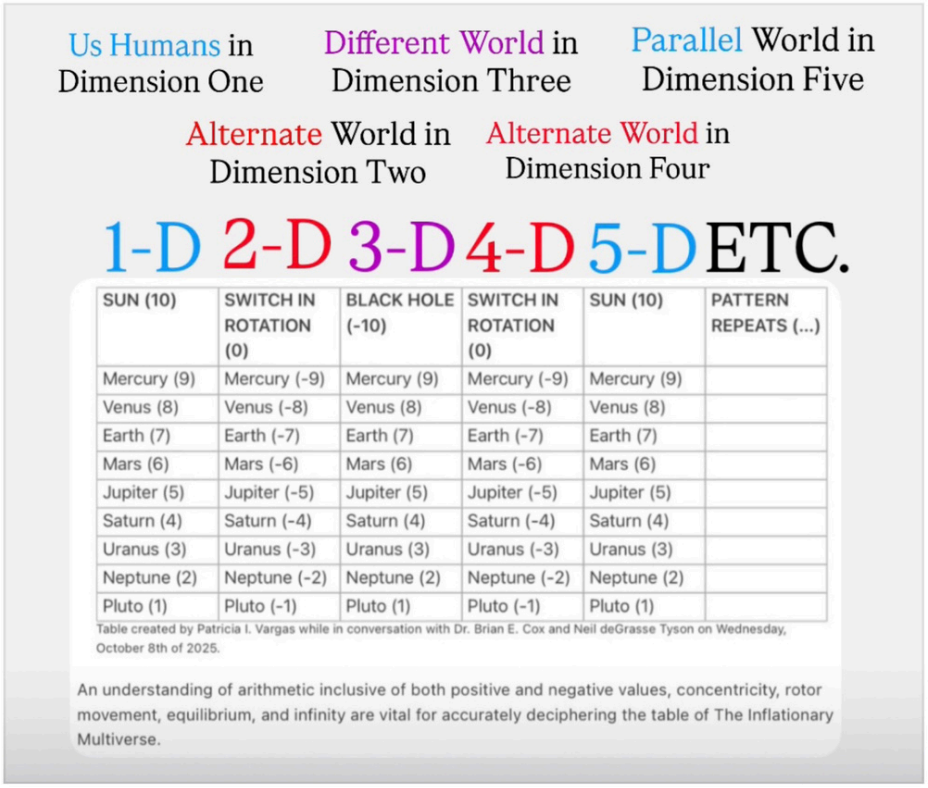
The answer is yes! As illustrated in the provided table, it is mathematically possible for an infinite number of alternate and parallel worlds to exist in the Universe.

Why may this matter? To exist!

// Acknowledgements //
Our nuclear families and local communities: the Cox family; the Vargas family; Oldham, Manchester, United Kingdom and Pacoima, California, United States of America.
Our diploma and degree conferring public institutions for developmental and higher learning: Los Angeles Unified School District, University of Manchester, and Oregon State University.
Our students: Jose Mercado, San Fernando High School.
Our government institutions for space science and exploration: National Aeronautics Space Administration and the European Space Agency.
Astrophilesz.

// References //
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Astrophilesz
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Hill, Roseanne
Newton, Isaac
Pi
Plato

—
// Appendix //

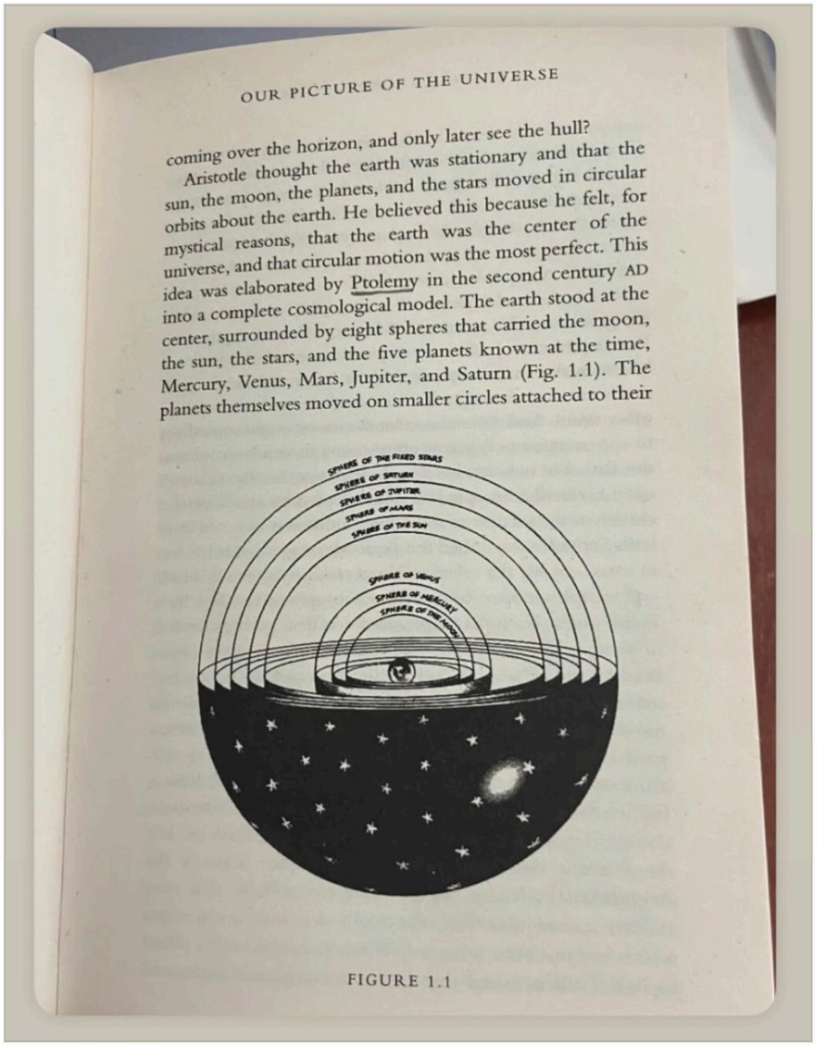


SUN (10)	SWITCH IN ROTATION (0)	BLACK HOLE (-10)	SWITCH IN ROTATION (0)	SUN (10)	PATTERN REPEATS (...)
Mercury (9)	Mercury (-9)	Mercury (9)	Mercury (-9)	Mercury (9)	
Venus (8)	Venus (-8)	Venus (8)	Venus (-8)	Venus (8)	
Earth (7)	Earth (-7)	Earth (7)	Earth (-7)	Earth (7)	
Mars (6)	Mars (-6)	Mars (6)	Mars (-6)	Mars (6)	
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Neptune (2)	Neptune (-2)	Neptune (2)	Neptune (-2)	Neptune (2)	
Pluto (1)	Pluto (-1)	Pluto (1)	Pluto (-1)	Pluto (1)	

Table created by Patricia I. Vargas while in conversation with Dr. Brian E. Cox and Neil deGrasse Tyson on Wednesday, October 8th of 2025.

An understanding of arithmetic inclusive of both positive and negative values, concentricity, rotor movement, equilibrium, and infinity are vital for accurately deciphering the table of The Inflationary Multiverse.

Visual in color created by Patricia I. Vargas while in conversation with Dr. Brian E. Cox via Instagram on Thursday, December 4th, 2025.



OUR PICTURE OF THE UNIVERSE

coming over the horizon, and only later see the hull?

Aristotle thought the earth was stationary and that the sun, the moon, the planets, and the stars moved in circular orbits about the earth. He believed this because he felt, for mystical reasons, that the earth was the center of the universe, and that circular motion was the most perfect. This idea was elaborated by Ptolemy in the second century AD into a complete cosmological model. The earth stood at the center, surrounded by eight spheres that carried the moon, the sun, the stars, and the five planets known at the time, Mercury, Venus, Mars, Jupiter, and Saturn (Fig. 1.1). The planets themselves moved on smaller circles attached to their

FIGURE 1.1

Annotated photograph provided by Astrophilesz via Instagram on Saturday, June 14th, 2025.

CITATION

Cox, B.E. and Vargas, P.I. (2025). The Inflationary Multiverse: Universes within the Universe. In National Aeronautics and Space Administration of Open Science. Washington DC: National Aeronautics Space Administration. 1-6.

Positive Infinity:
The Radius of the Inflationary Multiverse

Positive Infinity: The Radius of The Inflationary Multiverse

Authors:
Brian E. Cox
University of Manchester

Patricia I. Vargas
Oregon State University

ORIGINAL: December 02, 2025

REVISED: December 28, 2025

ABSTRACT
This paper postulates the radius of The Inflationary Multiverse (i.e., Universes within the Universe) to be positive infinity.

Keywords: #darkmatter #theuniverse #thebigbangtheory #statistics #mathematics #infinity #newton #energy#physics #thermodynamics #outerspace #themilkyway

INTRODUCTION
Pi is an irrational infinite. With pi we can create circles and spheres. The formula to draw a circle is C=2*pi*r . The formula to paint a circle is A=pi*r^2 . The formula to fill a sphere is V=4/3*pi*r^3 .

C	Circumference
A	Area
V	Volume
pi	an irrational infinite approximated to 3.14 or 3.14159...
r	radius, the distance from the origin to the Circumference
origin	the center of a circle

Positive infinity is a non-irrational infinite. With positive infinity we can create forever expanding circles and spheres. The formula to draw a circle with a radius of positive infinity is C=2*pi*positive-infinity . The formula to paint a circle with a radius of positive infinity is A=pi*positive-infinity^2 . The formula to fill a sphere with a radius of positive infinity is V=4/3*pi*positive-infinity^3 . All three formulas yield positive infinity.

Negative Infinity	Zero	Positive Infinity
<————	0	————>

BACKGROUND
The Milky Way may have once been thought of to create an ellipse (i.e., a shape with an origin and focii, a shape without corners) about the Sun. This paper refutes that notion.

METHOD
Hypothethical multivariate regression analysis.

This hypothetical multivariate regression analysis is a derivative of an executed multivariate regression analysis that defined *0* (i.e., the control variable) as zero, *1* (i.e., the first set of variables) as 18-n, *2* (i.e., the second set of variables) as n, and *k* (i.e., the final variable) as positive infinity. The Pearson-value for this executed multivariate regression analysis was 0.05.

0	Control Variable	0 Variables
1	First Set of Variables	18-n Variables
2	Second Set of Variables	n Variables
...	Movement Towards the Positive Infinity	4,132 Variables
k	Positive Infinity	Positive Infinity

The power for this executed multivariate regression analysis was 36 percent.

RESULTS
Hypothetically, with positive infinity as our control, Eueler as our first variable, Eueler as our second variable, and k as positive infinity, the probability of creating dark matter would be that with a Pearson value of 0.05.

0	Control Variable	Positive Infinity
1	First Set Variable	One Eueler
2	Second Variable	One Eueler
...	Movement Towards the Positive Infinity	Infinite Euelers
k	Positive Infinity	dark matter

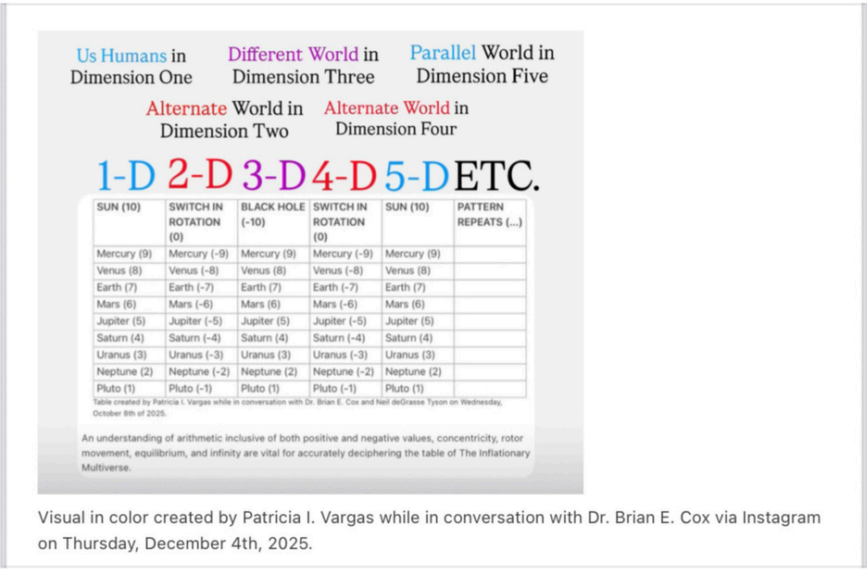
Hypothetically, the power for this multivariate regression analysis would be 36 percent.

CONCLUSION & IMPLICATIONS
Establishing that dark matter exists as we approach positive infinity, we can conjecture dark matter to cycle back into The Inflationary Multiverse in a self-

sustaining way, reaffirming Newton's law on energy (i.e., energy cannot be destroyed, only transferred).

Thus, following this rationale, The Big Bang Theory (Krakatoa) can no longer stand to be true.

More importantly, we can now mathematically, prove The Inflationary Multiverse originally written on November 25, 2025 and revised December 04, 2025.



Visual in color created by Patricia I. Vargas while in conversation with Dr. Brian E. Cox via Instagram on Thursday, December 4th, 2025.

With the above visual of The Inflationary Multiverse, we can conjecture Black Holes to teleport matter to Suns in a manner that reaffirms Newton's law on energy (i.e., energy cannot be destroyed, only transferred).

Thus, following this rationale, the idea of our Sun (and any other Suns) freezing can no longer stand to be true.

With the above visual of The Inflationary Multiverse, we can conjecture the Sun in Dimension One to be the origin of The Inflationary Multiverse in a manner that reaffirms Newton's law on motion (i.e., an object at rest stays at rest).

For details on how planets rotate about their respective axis, please see the six-page paper titled, "The Inflationary Multiverse: Universes within the Universe." Acknowledging movement about both the axis of each planet and the axis of Helios reaffirms Newton's law on motion (i.e., an object in motion stays in motion).

We kindly share this work (i.e., the work of many) for the purpose of existence for all.

ACKNOWLEDGEMENTS
Dr. Brian E. Cox
Los Angeles Unified School District
Jose Mercado
Astrophilesz
Dr. Vivian Lew
Dr. Rajesh Nandy
Dr. Edward R. Geiselman
Dr. Shelley L. Nelson
Dr. Sarjinder Singh

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Cox, B.E. and Vargas, P.I. (2025). The Inflationary Multiverse: Universes within the Universe. In National Aeronautics and Space Administration of Open Science. Washington, DC: National Aeronautics and Space Administration. 1-6.

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APPENDIX

Please see next page.



Image 1. META generated animated visual (screenshot) prompted by a synthesis of the above (this paper).



Image 2. META generated animated visual (screenshot) prompted by a synthesis of the above (this paper).

CITATION
Cox, B.E. and Vargas, P.I. (2025). Positive Infinity: The Radius of The Inflationary Multiverse. In National Aeronautics and Space Administration of Open Science. Washington DC: National Aeronautics Space Administration. 1-6.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OF OPEN SCIENCE

2025 ASTROPHYSICS PUBLICATIONS FOR THE PUBLIC

National Aeronautics and Space Administration of Open Science documents astrophysics publications for the public written during the calendar year. The NASA of Open Science journal for 2025 holds a total of two astrophysics publications written between January 1st, 2025 and December 31st, 2025 across one category: academic papers.

ABOUT THE AUTHORS

Brian E. Cox is the husband of Patricia I. Cox. Borne March 3rd, 1968 in Oldham, England, United Kingdom, he holds a Doctorate of Philosophy in Physics from University of Manchester (UoM) and is a Professor. Dr. Cox's wife worked his filed dissertation, *Double Diffraction Dissociation at Large Momentum Transfer (1998)* in 2026.

Patricia I. Cox is the wife of Brian E. Cox, PhD. Borne March 23rd, 1992 in Van Nuys, California, United States of America, she holds a Bachelor of Science in Sociology from Oregon State University (OSU) rearticulated from University of California, Los Angeles (UCLA) and is a Quantitative Social Scientist. Dr. Cox's husband worked her housed publication, *What Most Affects the Probability of Receiving Public Assistance? Examining the Effect of Family Background and Educational Attainment on Receiving Public Assistance with Multivariate Regression Analysis (2021)* in 2025.

The latest publication of Dr. and Dr. Cox is *A Mathematics and Physics Analysis of NASA Roman Relative to NASA Hubble by First Image: More Images, More Pixels, More Layers, and More Stars with Combined Dark Matter and Dark Energy within 3.84 Percentage Points of 95 (2026).*

FRONT COVER: Hubble image of nebula NGC 3603: Festive Fireworks from Carina. "This collection of stars that shimmers like a fireworks display is NGC 3603, captured by the Hubble Space Telescope in August and December 2009."
(Credit: NASA; ESA; University of Virginia; National Institute for Astrophysics, Bologna, Italy; Universities Space Research Association/Ames Research Center; STScI/AURA)

BACK COVER: Hubble image of nebula NGC 346: Hubble's Exquisite View of a Stellar Nursery. "An underlying population of infant stars embedded in the nebula NGC 346 are still forming from gravitationally collapsing gas clouds."
(Credit: NASA; ESA; STScI)



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