



# INSAP<sup>VIII</sup>

## CITY *of* STARS

7-12 JULY 2013 • NEW YORK



AMERICAN MUSEUM  
OF NATURAL HISTORY

# Contents

- 4 Welcome**
- 6 Contact**
- 7 Venue**
- 8 Keynote Speakers**
- 10 Short Program**
- 12 Program**
- 18 Presentations**
- 37 Posters**
- 38 Artwork**
- 40 Participants**
- 42 Navigation & Maps**

# Welcome

## RON OLOWIN

Chair, INSAP International Organizing Committee



The INSAP Conferences are a series of international meetings that have investigated a wide variety of cosmic themes that explore the effect of the glorious spectacles we see in the heavens on humanity and human culture. It is no mere coincidence that in this period of Cosmic Revolution we grapple with the power of our relationship with the Cosmos. The continuous search for new frontiers within Nature, on our Earth and in the Universe has been a stronghold, stimulating not only scientific thought but also that of art and spirituality. It is on the upsurge of this encounter that INSAP engages a very particular pathway through modern times, perhaps revealing an insightful narrative. It is characterized, and in some ways, defined, by works of expression, often of extraordinary richness and quality, drawn from mythology, ethnography, anthropology, history, literature, poetry, music, the visual and graphic arts, to the new visualization media.

Our admiration goes first to our hosts at the American Museum of Natural History whose talents have been revealed in accord with the scale of this remarkable venue and prestigious setting. The LOC must also be given credit for rigorously defining the parameters of this meeting, which spans Observational Cosmology to the Avant-Garde. Our gratitude naturally extends to this team, whose varied specialties and conquering enthusiasm have made it possible to bring out both the astronomical and artistic dimensions that are as surprising as they are unexplored.

The following epigram which is accepted by many scholars to have been written by Ptolemy himself, appears in Book 1 of Ptolemy's *Almagest*, after the list of contents:

Well do I know that I am mortal, a creature of one day.  
But if my mind follows the winding paths of the stars  
Then my feet no longer rest on earth,  
but standing by  
Zeus himself  
I take my fill of ambrosia,  
the elixir of the gods.

Let us partake of this glimpse of our universe and its grandeur, and perhaps have a taste of Ptolemy's ambrosia, as we celebrate INSAP VIII!

Ron Olowin  
Saint Mary's College

## NEIL DEGRASSE TYSON

Chair, Local Organizing Committee



Dear INSAP VII Attendees,

Welcome to the Hayden Planetarium, the Rose Center for Earth and Space, the American Museum of Natural History, and to New York City.

What all native New Yorkers have in common, is that our first night sky was at this institution—under the dome of the Hayden Planetarium. The universe was something presented to you—an exposition of the cosmos, duly graced by the culture, lore, and romance of the night sky. I still find myself commenting, upon viewing the actual night sky from mountain tops, “this reminds me of the Hayden Planetarium.”

In spite of this obvious urban constraint, the City itself enjoys more than its share of inspirational astronomical phenomena. Yes we have van Gogh's famous “Starry Night” painting at the Museum of Modern Art. We've got the star-studded ceilings of Grand Central Terminal & St. Paul's Church. We've got the Rockefeller Center statues of Prometheus & Atlas. We've got an “Underground Railroad” sculpture, in Harlem, celebrating the Northern constellations that guided Southern slaves to freedom in 19th century America. And of course, we've got the Manhattanhenge sunset on the City's cross streets—now pulling thousands of people off the sidewalks, blocking traffic to witness this biannual spectacle. Not to mention the Rose Center for Earth and Space, itself.

I suspect every city has a list. Because, as you already know, the universe inspires architects, artists, and everyday people alike.

We look forward to all that you will bring to this workshop—drawn from your own lines of research interest and from your own corners of the world, fleshing out a week of shared ideas and discoveries about all the ways the universe reaches our minds and hearts.

Neil deGrasse Tyson  
Hayden Planetarium

## CONFERENCE HOST

**Brian Abbott, Hayden Planetarium**



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## CONFERENCE ADMINISTRATOR

**Elizabeth Stachow, Hayden Planetarium**



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## ADDRESS

**American Museum of Natural History**

Central Park West at 79th Street  
New York, NY USA 10024

## LOCAL ORGANIZING COMMITTEE

Chair: Neil deGrasse Tyson (AMNH, New York)  
Brian Abbott (AMNH, New York)  
Carter Emmart (AMNH, New York)  
Lynn Gamwell (School of Visual Arts, New York)  
Joseph Patterson (Columbia University, New York)  
John Pazmino (NYSkies Astronomy, Inc, New York)  
Ellis Rubenstein (New York Academy of Sciences, New York)

## INTERNATIONAL EXECUTIVE COMMITTEE

Francesco Bertola (ISVLA, Venezia, Italy)  
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Nicholas Campion (University of Wales Trinity Saint David, Lampeter, UK)  
Enrico Corsini, (Universita di Padova, Italy)  
George Coyne, S.J. (Specola Vaticana, Vatican City)  
Chris Impey (University of Arizona, Tucson, AZ, USA)  
Ron Olowin, Chair, (St. Mary's College, Moraga, CA, USA)  
David Pankenier (Lehigh University, Bethlehem, PA, USA)  
Richard Poss (University of Arizona, Tucson, AZ, USA)  
Valerie Shrimplin (Independent Art Historian, London, UK)  
Rolf M. Sinclair, (Centro de Estudios Cientificos, Valdivia, Chile)  
Gary Wells, Vice-Chair (Ithaca College, NY, USA)



**Central Park West Entrance.** The Roosevelt Rotunda and main museum entrance. © AMNH/D. Finnin

## HAYDEN PLANETARIUM

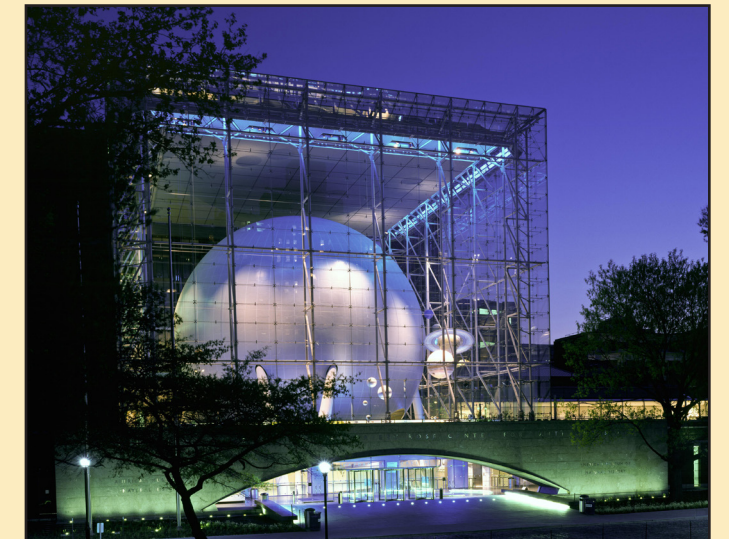
The Hayden Planetarium was founded in 1935, then rebuilt and reopened in 2000 as AMNH's Rose Center for Earth and Space, which encompasses the Hayden Planetarium sphere.



**The 77 Street Entrance.** The original entry, dating from the 1870s. © AMNH/D. Finnin

## AMERICAN MUSEUM OF NATURAL HISTORY

The American Museum of Natural History is one of the world's preeminent scientific and cultural institutions. Since its founding in 1869, the Museum has advanced its global mission to discover, interpret, and disseminate information about human cultures, the natural world, and the universe through a wide-ranging program of scientific research, education, and exhibition.



**The 81 Street Entrance.** Rose Center for Earth and Space and the Hayden Planetarium. ©AMNH/D. Finnin

# Keynote Speakers

## OPENING KEYNOTE



Piero Boitani, FBA, FMAA, Lincei, is Professor of Comparative Literature at "Sapienza," Rome, and at the University of Italian Switzerland, Lugano. His books include *The Shadow of Ulysses: Figures of a Myth* (Oxford 1994), *The Bible and its Rewritings* (Oxford 1999), *Winged Words. Flights in Poetry and History* (Chicago 2007), *La prima lezione sulla letteratura* (Rome 2007), *Letteratura europea e Medioevo volgare* (Bologna 2007), *The Gospel according to Shakespeare* (Notre Dame 2013), *Il grande racconto delle stelle* (Bologna 2012), *Dante e il suo futuro* (Rome 2013), *Letteratura e verità* (Rome 2013).

## PIERO BOITANI

### Circulation of Stars

Contemplation of the stars is a primary impulse in the human being from the very beginning all over the world. Aristotle sees it as the product of primeval and perennial 'wonder' which gives rise to what we would call science, philosophy, and poetry. Astronomy, astrology, and star art (painting, architecture, literature, and music) go hand in hand through millennia in all cultures of the planet (and all use catasterisms to explain certain phenomena). Some of these developments are independent of each other, i.e., they take place in one culture independently of other ones. Some, on the other hand, are the product of the 'circulation of stars.' There are basically two ways of looking at this. One seeks out forms, the other concentrates on the passing of specific lore from one area to another through time. The former relies on 'archetypes' (for instance, with catasterism), the latter constitutes a historical process. In this paper I present some of the surprising ways in which the 'circulation of stars' has taken place—from East to West and further East, and from West to East, at times simultaneously.



Andrew Fraknoi is the Chair of the Astronomy Department at Foothill College near San Francisco and former Executive Director of the Astronomical Society of the Pacific. During his 39 years working for the ASP, he was instrumental in creating many of the Society's science outreach programs, including Project ASTRO (a national project to link volunteer astronomers with 4th - 9th grade teachers in regional sites around the country.) With Sidney Wolff, he was the founding editor of *Astronomy Education Review*, an on-line journal currently published by the American Astronomical Society.

He is the lead author of *Voyages through the Universe*, a college astronomy textbook series, and wrote Disney's *Wonderful World of Space* for children. In the 1980's, he was the scientific editor for *The Universe and The Planets*, two collections of science and science fiction published by Bantam. Fraknoi was selected as the California Professor of the Year by the Carnegie Endowment for Higher Education in 2007 and has received the Faraday Prize of the National Science Teachers' Association and the Gemant Prize of the American Institute of Physics.

## KEYNOTE DINNER

## ANDREW FRAKNOI

### Inspiration Today: Music, Astronomy, and Popular Culture

In this illustrated talk, I will explore some sources of astronomical inspiration in our present day, focusing particularly on a variety of examples of music inspired by serious astronomy (as opposed to simply a quick allusion to spooning in June to the light of the Moon). I will discuss operas based on the life and work of astronomers, six songs based on a reasonable understanding of the properties of black holes, constellation pieces written by composers from around the world who are or were active amateur astronomers, the song that compares walking on the Moon to being in love, the little-known rock song that became a reference in the *Astrophysical Journal*, pieces that base the patterns of the music on the rhythms of astronomical phenomena, and a number of other pieces of classical and popular music. We'll also take a brief (and light-hearted) look at other ways that astronomy has become part of popular culture, including advertising, drama, fiction, philately, etc. The audience will be encouraged to name their favorite examples and we will together reflect on the reasons astronomy continues to capture the popular imagination. (For a published catalog of astronomical music, see: <http://dx.doi.org/10.3847/AER2012043>).

# Short Program

SUNDAY	JULY 7	
19:30	Registration - Enter 81 Street Rose Center	
19:30 - 20:45	Session 7.1 - Opening Reception	Hall of the Universe
20:45 - 22:00	Grand Tour of the Universe	Hayden Planetarium

MONDAY	JULY 8	
08:30 - 09:00	Continental Breakfast - Enter 77 Street	
09:00 - 09:50	Session 8.1 - Opening Keynote: Piero Boitani, Sapienza University of Rome Circulation of Stars	Kaufmann Theater
09:50 - 10:40	Session 8.2 - Astronomical Events	
10:40 - 11:00	Coffee Break	
11:00 - 12:40	Session 8.3 - Our Relationship with the Sky	
12:40 - 14:15	Lunch	Powerhouse
13:40 - 14:15	Session 8.4 - Posters and Artwork	Powerhouse
14:25 - 15:40	Session 8.5 - Science Visualization	Kaufmann Theater
15:40 - 16:00	Coffee Break	
16:00 - 17:40	Session 8.6 - Architecture	

TUESDAY	JULY 9	
08:30 - 09:00	Continental Breakfast - Enter 77 Street	
09:00 - 10:40	Session 9.1 - Ancient Civilizations	Kaufmann Theater
10:40 - 11:00	Coffee Break	
11:00 - 12:40	Session 9.2 - History of Astronomy	Powerhouse
12:40 - 14:00	Lunch	
14:00 - 15:15	Session 9.3 - Pre-Columbian America	Kaufmann Theater
15:15 - 15:40	Coffee Break	
15:40 - 17:00	Session 9.4 - Heavenly Bodies	
17:00 - 19:30	Dinner on your own	
19:30 - 22:00	Session 9.5 - Full-dome Films & Performances - Enter 81 Street Rose Center	Hayden Planetarium

WEDNESDAY	JULY 10	
08:30 - 09:00	Continental Breakfast - Enter 77 Street	
09:00 - 10:40	Session 10.1 - Teaching & Learning	Kaufmann Theater
10:40 - 11:00	Coffee Break	
11:00 - 12:15	Session 10.2 - Contemporary Art	Kaufmann Theater
12:15 - 14:00	Lunch on your own	
14:00 - 15:40	Session 10.3 - Myths, Dieties, & Superheroes	
15:40 - 16:00	Coffee Break	Kaufmann Theater
16:00 - 17:15	Session 10.4 - Film, Animation, & Music	
17:15 - 19:30	Free Time	
19:30 - 22:30	Session 10.5 - Keynote Dinner: Andrew Fraknoi, Foothill College, California Inspiration Today: Music, Astronomy, and Popular Culture	Hall of the Universe

THURSDAY	JULY 11	
08:30 - 09:00	Continental Breakfast - Enter 77 Street	
09:00 - 10:30	Session 11.1 - Murals	Kaufmann Theater
10:30 - 16:00	Session 11.2 - Tour Grand Central Terminal	Grand Central Terminal
16:00 - 21:00	Free Time, Dinner and Manhattanhenge Viewing on your own	

FRIDAY	JULY 12	
08:30 - 09:00	Continental Breakfast - Enter 77 Street	
09:00 - 11:05	Session 12.1 - Historic Artworks	Kaufmann Theater
11:05 - 11:30	Session 12.2 - Concluding Remarks	

# Program

## SUNDAY

17:00 - 18:00	Poster & Artwork Setup (Enter Columbus Ave Entrance at 79th Street)		
19:30 - 21:00	Registration (Enter 81 Street - Rose Center)		
19:30 - 22:30 Hall of the Universe & Hayden Planetarium	Session 7.1 - Opening Reception		
	19:30 - 20:45	Cocktail Reception	
	20:00 - 20:15	Welcoming Remarks	
	20:45 - 21:45	Brian Abbott & Carter Emmart	AMNH

## MONDAY

08:30 - 09:30	Continental Breakfast (Enter 77 Street)			
09:30 - 10:40 Kaufmann Theater	Session 8.1 - Opening Keynote — Introduction Teodolinda Barolini — Chair, Brian Abbott			
	Piero Boitani	Sapienza University of Rome	Circulation of Stars	
10:40 - 11:00	Coffee Break			
11:00 - 12:40 Kaufmann Theater	Session 8.2 - Our Relationship With the Sky — Chair, Valerie Shrimplin			
	11:00 - 11:25	Gary Wells	Ithaca College	Blinded: Modern Art, Astronomy, and the Lost Sky
	11:25 - 11:50	Jean Hinson Lall	Independent Scholar	Journeying with the Planets: Divination and Cosmology in Psychotherapy
	11:50 - 12:15	Christopher Corbally & Margaret Rappaport	Vatican Observatory / University of Arizona & PRMI	Visible Supernovae in A.D. 1054, 2054, and 3054: Inspiration for the Religious and Artistic of the Past and Future
12:15 - 12:40	Leopoldo Benacchio	Astronomical Observatory Padua, INAF	Second Star to the Right and Straight On	
12:40 - 14:15	Lunch			

## MONDAY

13:40 - 14:15 Powerhouse	Session 8.3 - Posters and Artwork — Chair, Brian Abbott			
	13:40 - 13:44	Andrew Fraknoi	Foothill College	A Multicultural Astronomy Resource Guide for Astronomy Instructors
	13:44 - 13:48	Marea Atkinson	University of South Australia	Cosmic and architectural visions of Bruno Taut
	13:48 - 13:52	Robert K. Tarquinio	Bright Star Pictures LLC	The Helical Rising of Sirius and its Relationship to the Egyptian Goddess Sopdet
	13:52 - 13:56	Carrie Paterson	California State University Fullerton	The Chemisphere - A Star Map By Artist Carrie Paterson
	13:56 - 14:00	Elisabeth Long	University of Chicago	Indigo Skies: Remapping the Universe
	14:00 - 14:04	George Beke Latura	Independent Researcher	Celestial Symbols On Roman Coins
	14:04 - 14:08	Ken Cro-Ken	Independent Artist	The Nature of Paint
14:08 - 14:12	Marilyn Gottlieb-Roberts	Miami Dade College	A Personal Almanac	
14:25 - 15:40 Kaufmann Theater	Session 8.4 - Science Visualization — Chair, Brian Abbott			
	14:25 - 14:50	Richard L. Poss	University of Arizona	What is the Future of Space Art?
	14:50 - 15:15	Lucia Ayala	UC Berkeley	Fluid Skies
15:15 - 15:40	Carter Emmart	AMNH	Steps to the stars?	
15:40 - 16:00	Coffee Break			
16:00 - 17:40 Kaufmann Theater	Session 8.5 - Architecture — Chair, Gary Wells			
	16:00 - 16:25	Naomi Miller	Boston University	Homage To Our Hosts
	16:25 - 16:50	Nicholas Champion	Univesaity of Wales Trinity Saint David	Astronomy, Community and Modern Calendar Buildings
	16:50 - 17:15	Nurit Golan	Tel Aviv University	Science for Everyone - Sculpted Cosmologies on Fourteen Century Upper-Rhine Churches
17:15 - 17:40	Valerie Shrimplin	Gresham College	Cosmological Symbolism in the Decorative Cycles of Mid-Byzantine Churches	

# Program

## TUESDAY

08:30 - 09:00	Continental Breakfast (Enter 77 Street)			
09:00 - 10:40 Kaufmann Theater	Session 9.1 - Ancient Civilizations — Chair, David Pankenier			
	09:00 - 09:25	George Beke Latura	Independent Researcher	Eternal Rome – Guardian of the Heavenly Gates
	09:25 - 09:50	Juan Antonio Belmonte & A. César González-García	Instituto de Astrofísica de Canarias	Sun Cities: Thebes, Hattusha And Petra, A Landscape Story
	09:50 - 10:15	Patrick Das Gupta	University of Delhi	Comets in Indian Scriptures
	10:15 - 10:40	Reza Assasi	McGill University	Heidentor: The House of Eternal Time; The Gate of Heaven
10:40 - 11:00	Coffee Break			
11:00 - 12:40 Kaufmann Theater	Session 9.2 - History of Astronomy — Chair, Suzanne Morris			
	11:00 - 11:25	JoAnn Palmeri	University of Oklahoma	Of Stars and Harlow Shapley
	11:25 - 11:50	Valerie Shrimplin	Gresham College	The Gresham Professors of Astronomy 1597-2013
	Session 9.3 - Astronomical Events — Chair, Suzanne Morris			
	11:50 - 12:15	Rolf Sinclair	Centro de Estudios Científicos, Valdivia, Chile	When Astronomy Gets In Its Own Way
12:15 - 12:40	Daniele Galli & Antonella Gasperini	INAF - Osservatorio Astrofisico di Arcetri, Firenze, Italia	"A Starry Diamond in a Veil of Light" - The Artistic and Literary Legacy of Donati's Comet	
12:40 - 14:00	Lunch			
14:00 - 15:15 Kaufmann Theater	Session 9.4 - Pre-Columbian America — Chair, David Pankenier			
	14:00 - 14:25	Angel Rodriguez	Center of Historical Studies	Archaeoastronomy at Jacana: Evaluating the Evidence from the Archaeological Investigations
	14:25 - 14:50	Mark Van Stone	Southwestern College	A Summary of What We Know, Think, and Speculate About Mayan Calendrical Mathematics
	14:50 - 15:15	Susan Milbrath	Florida Museum of Natural History	Venus, the Solar Year, and Eclipse Cycles Among the Ancient Maya
15:15 - 15:40	Coffee Break			
15:40 - 17:00 Kaufmann Theater	Session 9.5 - Heavenly Bodies — Chair, Nick Campion			
	15:40 - 16:05	Clea T. Waite	iMAP, U of So. California	A Selenological History of Lunar Poetics
	16:05 - 16:30	Greg Mort	Lowell Observatory	The Enduring Cultural and Scientific Influence of the Red Planet Mars
	16:30 - 16:55	Paul Murdin	Institute of Astronomy	Planetary Landscapes
17:00 - 19:30	Dinner on your own			
19:30 - 22:30 Hayden Planetarium	Session 9.6 - Full-dome Films & Performances (Enter 81 Street - Rose Center) — Chair, Suzanne Morris			
	19:30 - 20:00	Clea T. Waite	iMAP, U So. California	Moonwalk
	20:00 - 20:35	G. E. Schwartz & Damian Catera	Rutgers Univ., Goucher College, Praxis Classics, Word Consortium	Voyager1Now
	20:35 - 21:10	John Kaufmann	Beloit College	The Sky from Scratch
	21:10 - 21:35	AJ Epstein	The Ethereal Mutt	Recent Poetry

## WEDNESDAY

08:30 - 09:00	Continental Breakfast (Enter 77 Street)			
09:00 - 10:40 Kaufmann Theater	Session 10.1 - Teaching & Learning — Chair, Valerie Shrimplin			
	09:00 - 09:25	Elizabeth F. Wallace	Giraffe 'n' Ant Productions	StarryTelling: Discover the Galileo in You
	09:25 - 09:50	Mike Simmons	Astronomers Without Borders	A Global Astronomy Community for Sharing Our Common Heritage
	09:50 - 10:15	Ralfee Finn	Hunter College, CUNY	Finding the Stars in the City
	10:15 - 10:40	Robin Kingsburgh	Ontario College of Art & Design University	Opening the Universe: Teaching Astronomy to Art & Design Students
10:40 - 11:00	Coffee Break			
11:00 - 12:15 Kaufmann Theater	Session 10.2 - Contemporary Art — Chair, Lynn Gamwell			
	11:00 - 11:25	Alison Hawthorne Deming	University of Arizona	Red Rovers At Work & Play: Literary & Visual Arts on Mars
	11:25 - 11:50	John David Mooney	John David Mooney Foundation	The Urban Skyscraper As Horizon Astronomy
	11:50 - 12:15	John G. Hatch	Western University	The Story behind Asteroid Patersonewen 14060
12:15 - 14:00	Lunch on your own			
14:00 - 15:40 Kaufmann Theater	Session 10.3 - Myths, Dieties, & Superheroes — Chair, Nick Campion			
	14:00 - 14:25	Aimé Dafon Segla	Université d'Abomey-Calavi	Batammaliba Reading Time Zones Chasing the Shadow of the Sun
	14:25 - 14:50	Brad Ricca	Case Western Reserve University	A Distant Planet: Superman, Astronomical Phenomena, and the Birth of Comics
	14:50 - 15:15	David Pankenier	Lehigh University	Wherefore the Star-Crossed Lovers Weaving Maid and Oxherd?
	15:15 - 15:40	Safron Rossi	Opus Archives & Pacifica Graduate Institute	She Who Draws Our Eyes
15:40 - 16:00	Coffee Break			
16:00 - 17:15 Kaufmann Theater	Session 10.4 - Film, Animation, & Music — Chair, Lynn Gamwell			
	16:00 - 16:25	José Francisco Salgado	Adler Planetarium	Science and Symphony Films
	16:25 - 16:50	Matthew Whitehouse	The University of Arizona	Pleiades Visions
	16:50 - 17:15	Pangratos Papacosta	Columbia College Chicago	Unlocking the Universe: The Contribution of Henrietta Leavitt - A Harvard College Observatory "Computer."
17:15 - 19:30	Free Time			
19:30 - 22:30 Hall of the Universe	Session 10.5 - Keynote Dinner (Enter 81 Street - Rose Center); Introduction, Ron Olowin; Chair, Brian Abbott			
	19:30 - 22:15 Cocktail Reception & Dinner			
	21:15 - 22:15	Andrew Fraknoi	Foothill College	Inspiration Today: Music, Astronomy, and Popular Culture



# Program

## THURSDAY

08:30 - 09:00	Continental Breakfast (Enter 77 Street)			
09:00 - 10:30 Kaufmann Theater	Session 11.1 - Murals — Chair, Richard Poss			
	09:00 - 09:25	E.C. Krupp	Griffith Observatory	Stars on the Ceiling
	09:25 - 09:50	Jessica Santascoy	Astronomy Outreach Consultant	Astronomy on the Walls
	09:50 - 10:15	Patricia Likos Ricci	Elizabethtown College	Edwin Austin Abbey's "Passage of the Hours" - Astronomy as History
	10:15 - 10:30	John Pazmino	NYSkies	Station at the Center of the Universe
10:30 - 16:00	Session 11.2 - Grand Central Terminal Tour			
	10:30 - 11:00	Transport to Midtown		
	11:00 - 14:30	John Pazmino	NYSkies	Station at the Center of the Universe: Tour of Grand Central Terminal
		Red Group		Blue Group
	11:30 - 13:00	Tour		Lunch
	13:00 - 14:30	Lunch		Tour
	14:30 - 15:30	Free Time		
	15:30 - 16:00	Transport to AMNH		
16:00 - 19:00	Free time & Dinner on your own			
19:00 - 21:00	19:00 - 20:00	Manhattanhenge Planetarium Public Program (signup required)		
	20:00 - 21:00	Manhattanhenge Viewing (see below)		

### SUGGESTED MANHATTANHENGES LOCATIONS

If you come back on the buses, any wide street on the Upper West Side will provide views of the setting sun. The prime locations are:

- 79 Street between Columbus and Amsterdam Avenues
- 72 Street at Central Park West
- 86 Street at Amsterdam Avenue

If you choose to remain in Midtown Manhattan and return on your own, the best locations are:

- 42 Street between Grand Central and Broadway (Times Square)
- 42 Street on the Tudor City overpass - reach by stairs on 42 Street near First Avenue.  
The Tudor City location tends to be very crowded, but offers a great, traffic-free view.
- 34 Street east of 5 Avenue (and the Empire State Building)

Wherever you are, please be safe and be mindful of the traffic.

## FRIDAY

08:30 - 09:00	Continental Breakfast (Enter 77 Street)			
09:00 - 11:30 Kaufmann Theater	Session 12.1 - Historic Artworks — Chair, Brian Abbott			
	09:00 - 09:25	Donald Olson	Texas State University	Astronomical Dating of Monet's Paintings on the Normandy Coast
	09:25 - 09:50	Jay M. Pasachoff & Roberta J. M. Olson	Williams College & New-York Historical Society	The Eclipse Mural Series by Howard Russell Butler for the American Museum of Natural History and the Hayden Planetarium
	09:50 - 10:15	Liana De Girolami Cheney	SIELAE, Universidad de Coruna	Edward Burne-Jones' "The Days of Creation" - A Cosmic Utopia
	10:15 - 10:40	Michael Mendillo	Boston University	Landscape By Moonlight: Peter Paul Rubens and Astronomy
	10:40 - 11:05	Alan Friedman	Consultant for Museum Development & Science Communication	Astronomy as Muse: the Astonishing Paintings of Remedios Varo
	Session 12.2 - Concluding Remarks			
11:05 - 11:30	Ron Olowin	Chair, INSAP Int'l Organizing Committee	Conference Wrap-up	
	Brian Abbott	INSAP LOC, Host		



Manhattanhenge looking down 42 Street from across the East River in Queens. © Neil deGrasse Tyson

### 8.1 OPENING KEYNOTE

#### Circulation of Stars

Piero Boitani

Contemplation of the stars is a primary impulse in the human being from the very beginning all over the world. Aristotle sees it as the product of primeval and perennial ‘wonder’ which gives rise to what we would call science, philosophy, and poetry. Astronomy, astrology, and star art (painting, architecture, literature, and music) go hand in hand through millennia in all cultures of the planet (and all use catasterisms to explain certain phenomena). Some of these developments are independent of each other, i.e., they take place in one culture independently of other ones. Some, on the other hand, are the product of the ‘circulation of stars.’ There are basically two ways of looking at this. One seeks out forms, the other concentrates on the passing of specific lore from one area to another through time. The former relies on ‘archetypes’ (for instance, with catasterism), the latter constitutes a historical process. In this paper I present some of the surprising ways in which the ‘circulation of stars’ has taken place—from East to West and further East, and from West to East, at times simultaneously.

### 8.2 OUR RELATIONSHIP WITH THE SKY

#### Blinded: Modern Art, Astronomy, and the Lost Sky

Gary Wells (Ithaca College)

For today’s casual visual observer, the night sky has become lost. Pollution, light glare, and the built environment have created a blindness through which the night sky is only imperfectly seen, when seen at all. Can the night sky, then, still inspire art if it has become invisible? In this paper, I would like to explore the question of the inspiration of the night sky in the absence of direct observation. In particular, I suggest that the absence of the visual night sky has forced artists to consider the problems of representing an “invisible” subject from nature. The implications of this “invisible” sky are not just a matter of stylistic expression, but also of cultural interpretation.

Motivated by the topic of this conference, “City of Stars,” this paper will be an opportunity to consider an important aspect of the representation of the night sky in art since the later nineteenth century. Two related ideas about this modern representation quickly come to the forefront. One is the idea of loss, and what I am calling “blindness” in the face of nature. The fact that the night sky has become largely inaccessible to the urban populations of the world and has been “lost” to artists and non-artists alike has significant implications. Our understanding of the meaning of the sky is created, in part, by the way in which we picture that sky. The second idea is that this loss of connection with the night sky has itself become a central trope of modern art’s representation of celestial phenomena. The “lost” sky only becomes “real” again through instrumentation and a mediated experience. The inspiration and wonder of direct contact with the sky has, in the modern world, been transformed into a meditation on invisibility. A number of different artists will illustrate this paper, ranging from nineteenth century painters like Alfred Stevens and Odilon Redon to later twentieth century artists like Robert Rauschenberg and Roy Lichtenstein.

#### Journeying with the Planets: Divination and Cosmology in Psychotherapy

Jean Hinson Lall (Independent Scholar)

This paper grew out of a psychotherapist’s interest in (1) the significance of cosmology for human self-understanding and (2) the uses of divination in psychological work. The study of sky phenomena over thousands of years helped to shape our language, thought, and imagination; provided foundations for traditional theories of personality; and informed philosophical and theological views of the place of humankind in the cosmos. Contemporary people carry this history within them while also re-imagining and re-theo-

rizing themselves in relation to the radically transformed universe revealed via the Hubble Space Telescope and the Large Hadron Collider. Besides the scientific mind which allows us to feel at home in the space age, we still have a poetic mind attuned to image, gesture, and symbol, which enables us to interpret psychological phenomena as well as works of art, literature, and religious texts. As a way into that mind I examine the widespread tendency of our forebears to theorize, to imagine, to worship and to divine under the image of the circular journey. In the West, up until the early modern period, the path through the world was understood to resemble the paths of the sun, moon and planets across the ecliptic, against the backdrop of the fixed stars and constellations, recurring in predictable ways yet in ever-new combinations. Happenings in the macrocosm of the heavens were understood to reflect and to influence those in the microcosm of earthly existence. Objectivity concerning human problems might therefore be gained by reflecting upon them systematically against the great round map of heaven. The human mind thus traveled to the higher realms and returned with insight or wisdom. In ancient Greece, theory (theoria) was originally a circular journey to consult an oracle in a distant place, to attend a religious festival in another city, or to discharge a sacred obligation. It implied a special type of vision, a seeing and being-seen by the deity. Theoria also referred to the planetary aspects – the way the planets “gaze” at each other as they revolve in the heavens. I will consider the shape of the ancient theoretic journey alongside other circular maps and journeys; the widespread but often misunderstood literary form known as ring composition; and divinatory grids such as the Shang dynasty tortoise-shell oracle and the traditional astrological rulership chart. How does this circular pattern convey and conserve information, guide interpretation, and provoke insight? This exploration aims to contribute to a fuller understanding of the poetic and cosmological dimensions of both traditional divination and modern psychotherapy. Visible Supernovae in A.D. 1054, 2054, and 3054: Inspiration for the Religious and Artistic of the Past and Future

#### Visible Supernovae in A.D. 1054, 2054, and 3054: Inspiration for the Religious and Artistic of the Past and Future

Christopher Corbally (Vatican Observatory / Univ Arizona) & Margaret Rappaport (PRMI)

Three models of cognitive evolution guide our cross-cultural investigation of the documentation of a very bright star that shone suddenly above in the year 1054. The supernova creating the Crab Nebula was recorded by Chinese, Japanese, Korean, Arab, and some Native American astronomers. We review the historical, archaeological, and artistic evidence of that stellar explosion and speculate as to how ancient

scribes, scientists, and artists interpreted this unusual heavenly event and integrated it into their respective cultures. The documentation of “Crab” took more than symbolic thinking; it required a type of interpretation of natural events that characterizes hominid sentience and inspires all scientific, religious, and artistic thought. We ask questions from C. S. Pierce’s (1931–1935) work on semiotics, and a derivative paradigm by Robinson and Southgate (2010) called “entering the semiotic matrix.”

We then apply a model of “Enhanced Working Memory” from psychologist and cognitive archaeologist Coolidge and Wynn (2011), to explore likely understandings of the Crab supernova. With questions on the adaptive nature of art and religion from psychologists Fiddick and Barrett (2001;1999), we speculate on how ancient cultures may have integrated observation of a strikingly bright new star into cultures already well endowed with symbols, myths, and ideologies. We ask the obvious: What advantage did they gain from doing so? We ask the not-so-obvious: What was the “selective advantage,” in an evolutionary sense?

Finally, we look to starry skies of the future and ask how city skies will appear. How will religious and artistic practitioners interpret a supernova that suddenly appears and stays for two years, only to disappear? “Futures research” suggests that society will be very different in the coming decades and centuries. What will humans in the future see, how will they be inspired, and what documentation will they leave for archaeologists of the very distant future?

#### Second Star to the Right and Straight On Leopoldo Benacchio (Astronomical Observatory Padua, INAF)

The aim of the project “Second Star to the Right and straight on” is to “recover” the relationship between the man and the sky, present all over the medieval city but “invisible” to nowadays inhabitants and tourists. The city we are speaking of is Padua, an ancient and noble one, with its seven-century-old University. The Scrovegni Chapel, where Giotto painted a comet, probably the Halley, for the first time, the starry sky of Saint Anthony’s Basilica, and the largest (2000 m<sup>2</sup>) cycle of astrological frescoes in the “Salone” city hall are obviously the most important monuments, XIII-XVI century, where the sky plays an important role.

Inside these monuments, you can easily realize how in the past the sky used to be a daily rendez-vous, a life partner for our ancestors. There are also dozens of smaller pieces of artwork everywhere, paintings, frescoes or coats of arms on the external walls of the old buildings in the historical town center that give us the same message. All these chunks of history of the relationship we are dwelling on is accessible to the public just wandering through the town.

More than 200 of these have been catalogued by the project and a smaller number has been selected to create “A guide to Padua’s sky” (a book and an app) to visit the city with these new “glasses.” We think that could be very interesting for the 5 million of tourists visiting Padua every year and to classrooms as well. The state of the art of the project, funded by the Italian Ministry of University and Research, and the prototype of the main products will be shown and discussed.

### 8.3 POSTERS AND ARTWORK

See the Posters and Artwork sections below.

### 8.4 SCIENCE VISUALIZATION

#### What is the Future of Space Art?

##### Richard L. Poss (University of Arizona)

Space art is typically imagined as an oil-on-canvas painting depicting planetary landscapes or panoramic galaxies where no one can make a photograph. Hence the artist imaginatively renders what we would see if we were floating above a debris disk, and our eyes could see in infrared wavelengths, etc. The painting can make visible relationships and patterns in astronomical phenomena which no camera can record, but more importantly it can also interpret and comment on the subject in a profound and compelling way. A space art painting of a nebula is no more a mere image than Constable’s “The Hay Wain” is an image of a cart.

Unfortunately, the field begun by Chesley Bonestell and championed in our own time by William K. Hartman, Pat Rawlings, David Hardy, and others, seems to have a dubious, or at least cloudy, future. The decline in print media has deprived the artist of an important source of income. The large prices for original paintings do not supply enough to live on. The impact of endless reproductions on the status of the original work of art has uncertain effects. The exponential growth of the internet parallels the migration of the visual techniques of space art from the canvas onto the TV and movie set, video games, and countless websites. Add to this multimedia installations, performance and conceptual art projects, and it seems that from one perspective “space art” has become obsolete.

At the same time, it can be argued that space art, like surrealism before it, has expanded to take its place as a standard set of techniques in a great variety of types of visual and performance art. This paper will examine the aesthetics of space art and offer an optimistic perspective on its future by taking into account its current role in musical performances, film projects, conceptual art installations, and commercial graphic arts.

#### Fluid Skies

##### Lucia Ayala (UC Berkeley)

In this talk I will present “Fluid Skies,” a research and creative platform composed by the theoretical astrophysicist Jaime E. Forero-Romero (Assistant Professor of Physics and Astronomy in Bogota, Colombia), the Korean and Berlin-based artist Yunchul Kim, and myself (art and astronomy historian currently at UC Berkeley).

In 2011, we initiated a collaborative project to deal with diverse concepts in large-scale structure studies, such as gravitational lensing, structure formation, physical instabilities, or dark matter detection. From an interdisciplinary dialog on these topics, we have produced a series of outcomes: several artworks that were exhibited last year in Berlin, a symposium that brought astrophysicists and media theoreticians together, a concert, public talks, and a book.

I will show part of the photo and video documentation of the exhibition, while discussing our motivations, methods, and working principles as a group. I will explain how we interacted in order to create a common space connecting history, astronomy and art, paying attention to the role that this kind of projects can play in the development of the arts, as well in the popularization of complex astrophysical concepts.

My expertise as art historian working on visual history of astronomy, particularly on the representation of the structure of the Universe in western countries over the past four centuries, will serve as a bond between different parts in this discussion.

#### Steps to the Stars?

##### Carter Emmart (Amer. Museum of Natural History)

The sky was untouchable, and seemingly unknowable, yet its rhythms defined ours and foretold our survival in seasons of growth, migration and harvest. Reaching the sky was the very metaphor of the impossible. If we could only grow wings, we could go there and see as the birds, and perhaps beyond as only the Gods could see.

Reaching the moon, almost a half century ago remains our highest mountain top. The children of Apollo expected Mars and beyond as a birth right. But what does it mean to be in space? Are we not already? And is telepresence not just a gimmick but a way of being there? We want to know. We want to go. Inspired by sky, we measure and plot and now place ourselves where before we could not.

#### 8.5 ARCHITECTURE

##### Homage To Our Hosts

###### Naomi Miller (Boston University)

The Rose Center for Earth and Space is conceived as a “cosmic cathedral.” Thus, the architects aimed to create a spatial experience to arouse awe, and inspire visitors with the wonders of the universe.

AD ASTRA PER ASPERA: We will explore the problems encountered in the construction process, to result in perfect iconic forms—the sphere suspended within a transparent glass cube, a geometric configuration comparable to Pei’s Louvre pyramid. Further, it harkens back to Boullée’s Cenotaph to Newton, 1784, a sphere pinpointed by holes presenting the illusion of stars and planets revolving in a planetarium.

Generous patronage enabled builders to design a monument that “...symbolizes the infinity of space...and a stairway to the stars.”

##### Astronomy, Community and Modern Calendar Buildings

###### Nicholas Campion (University of Wales Trinity Saint David)

This paper will explore the tradition of constructing cities and sacred sites as reflections or embodiments of the sky. By creating spaces which were connected to the celestial bodies it was possible to create human communities which were linked to celestial ones, encouraging social stability and harmony. Such ideas underpinned traditions of the foundation of cities from China, through India, the Middle East and Mesoamerica. The rationale can often be seen as reflective. Xiaochun Sun argued that in China, “The universe was conceived not as an object independent of man, but as a counterpart of and mirror of human society,” (Sun, 2000). Trudy Griffin-Pierce talked of a “patterned mirroring between sky and earth” in native North American cosmology (Griffin-Pierce, 1995). And in Book IV of Plato’s Republic, Socrates argues that the city and the soul are structurally isomorphic so that individual, city and cosmos are all connected. The city then becomes a cosmogram, or cosmopolis. After considering notable ancient examples, including Baghdad and Cairo, the paper will look at two examples of nineteenth century astronomical architecture in England, both of which are described as “calendar buildings.” These are the Grand Hotel in Scarborough, which was opened in 1863, and Avon Tyrrel house, a substantial private residence which was completed in 1891. The paper will suggest that these two buildings may represent a genre of modern astronomical architecture which has so far not been studied, which were designed to create stronger communities precisely because of their

astronomical connections, and indicates scope for further investigation. The paper will conclude that both buildings may be seen as a response to Carl Sagan’s comment on the disenchanting state of modern society: “We have grown distant from the Cosmos. It has seemed remote and irrelevant to everyday concerns, but science has found not only that the universe has a reeling and ecstatic grandeur, not only that it is accessible to human understanding, but also that we are, in a very real and profound sense, a part of that Cosmos, born from it, our fate deeply connected with it. The most basic human events and the most trivial trace back to the universe and its origins” (Sagan, 1994).

##### Science for Everyone—Sculpted Cosmologies on Fourteen Century Upper-Rhine Churches

###### Nurit Golan (Tel Aviv University)

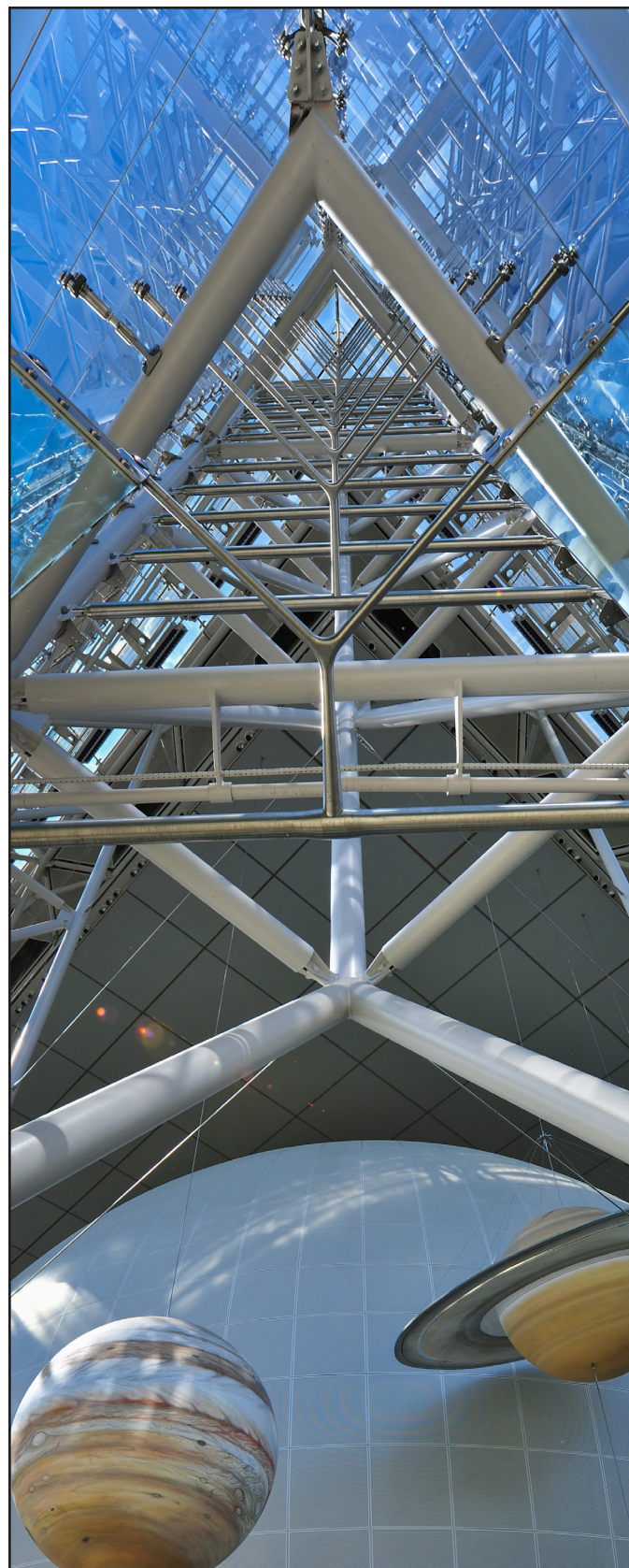
Five Upper-Rhine churches, all built during the 14th century by the Parler workshops, feature exterior sculptural cycles describing the Cosmological Creation. Such intensive usage of this subject, otherwise an extremely rare topic in monumental art facing public functions throughout the middle ages, suggest a strong interest in scientific theories some of which were, at times, considered controversial. The cosmos appears sometimes as a bell shape with a concentric system of orbs on which the seven planets can be seen and the earth shaped as an orb in the middle; or in the shape of an armillary sphere—an instrument used by astronomers and astrologers for deciphering the heavens and their influence on the sublunar world. The “cosmological reliefs” are installed on the main portals and are easily discernible, facing the main squares, often the market place, thus being a part of the public domain and having not only a religious significance, but also a civic function and context.

In this paper I shall interpret these representations iconographically and philosophically; I shall then refer to the public they were intended for and deal with questions concerning the propagation of knowledge in the contemporary society: Who were the intended recipients? What was the knowledge available to them? What was the role of sculptures in the spreading of scientific literacy from elite groups to prospering civic audiences? What can be learned from this document about scientific erudition in the 14th century Upper-Rhine?

### Cosmological Symbolism in the Decorative Cycles of Mid-Byzantine Churches

Valerie Shrimplin (Gresham College)

Fundamental links between theology and astronomy are widely reflected in the Judaeo-Christian tradition. From Genesis to Revelation, the great mysteries of the beginning and end of the universe, and the cycles of birth and death of individuals, are explained in terms of cosmological concepts. These are in turn reflected in art and architecture and nowhere more broadly, perhaps, than in Byzantine architecture and decoration. Following the Iconoclast prohibition of images in the Orthodox church (726-843), the mid-Byzantine period (843-1204) witnessed the primacy of the representation of the heavens in art and architecture. Reinforced by such writers as Cosmas Indicopleustes and Pseudo-Dionysius the Areopagite, not only were individual images reflective of the heavens (nativity and rebirth at the winter solstice, and rebirth/resurrection at the spring equinox) but entire cycles of church decoration were devised so as to reflect the ordering of God's universe. The architecture and decoration of the quintessential mid-Byzantine cross-in-square church was symbolic itself of the universe, as at Hosios Loukas and Daphni (11th century). From the location of the Pantocrator in the central celestial dome, to the descending zones of squinches and pendentives and the lowest earthly zones, decorative schemes are used to reflect the view of the sky/heavens above the earth. Hierarchical systems depicting the life of Christ and ascending/descending ranks of saints and angels were rigorously adhered to, with Mary in the apse as bridge between heaven and earth.



Above: © AMNH/D. Finnin

### 9.1 ANCIENT CIVILIZATIONS

#### Eternal Rome—Guardian of the Heavenly Gates

George Beke Latura (Independent Researcher)

Who knew that the Romans, besides being ferocious warriors and top-notch administrators, were also deeply religious? They looked to the heavens for inspiration, guidance and succor, as shown on coins of the Republic and the Empire.

On the earliest silver denarius of Rome, one can already find the Dioscuri, the twin stars of Gemini, who protect and champion the fledgling city—giving it divine help at the battle of Lake Regillus. The celestial Twins would become the patrons of the equestrian order that stood between the golden senators and the brassy plebs in the street. The ties with the savior twins could still be seen on coins of Maxentius, who would be defeated by Constantine at the Milvian bridge, as well as on commemorative coins of Constantine and his sons (VRBS ROMA) where the twin stars shine down on the Lupa Romana as she suckles the twins Romulus and Remus who founded Rome according to legend.

Julius Caesar claimed descent from Venus herself—the Morning and Evening Star—and when a comet appeared during his funeral games, it was held to be his soul joining the celestial gods. Subsequently, deceased emperors would be declared divine, and shown riding to the heavens atop an eagle—the bird of Jupiter, king of the gods. Augustus took the astrological sign Capricorn as his personal emblem and it could still be seen atop Roman standards hundreds of years later, as on coins of Caracalla and Gordian III, ready to welcome fallen soldiers into the heavenly abode.

The standards carried at the forefront of legions bore crescents and orbs or circles that stood for the Planets, whose orbits were like a staircase to the skies, as told by the architect Vitruvius and the philosopher Celsus. The path up the Planets led to the celestial portals that, according to the Roman writer Macrobius, stood at the intersections of the Milky Way and the Zodiac, the path of the Planets. At one of those intersections stands the constellation Gemini—the Dioscuri who guard the gates of heaven and stand guard over Rome herself.

With the emperor as Pontifex Maximus, or highest priest, Rome controlled the heavenly gates for centuries, and the battle for control of the celestial portals would leave a deep imprint on the history of the Western mind.

#### Sun Cities: Thebes, Hattusha And Petra, A Landscape Story

Juan Antonio Belmonte & A. César González-García

(Instituto de Astrofísica de Canarias)

The sky is a very important component of the landscape that has been lost completely in our modern, overcrowded, and excessively illuminated, cities. However, this was not the case in the past. Astronomy did play a most relevant role in urban planning, especially in the organization of sacred spaces which were later surrounded by extensive civil urban areas. Today, archaeoastronomy approaches the minds of our ancestors studying the starry landscape and how it is printed in the terrain by the visualization and the orientation of sacred buildings. The sun was indeed the most important component of that celestial landscape and was the primary focus within a large set of very unique cultures of great historical significance. In particular, we will study and compare the case of three sun cities: Thebes (Belmonte et al. 2009, Belmonte 2012), Hattusha (González García and Belmonte 2011) and Petra (Belmonte et al. 2013), capitals of Egypt in the Middle and New Kingdoms, the Hittite Empire and the Nabataean Kingdom, respectively. We will briefly discuss each of these cultures and will scrutinize their capital cities, showing how their strategic geographical position and orography were of key importance, but also how solar observation, and related hierophanies, played a most relevant role in the orientation and location of some of their most significant monuments. In particular, we will focus on the great temple of Amun-Ra in Karnak, Temple 1 in Hattusha presumably devoted to the Solar Goddess of Arinna, and the “Monastery” at Petra, among others. Astronomy certainly contributed to convert those cities in places of awe-inspiring crystallization of natural beauty, unique artistic creations of their people will and a gift for their gods, holding a holy meaning that our work is helping to unveil.

#### Comets in Indian Scriptures

Patrick Das Gupta (University of Delhi)

Comets and meteors have fired human imagination since the dawn of civilization. Giotto's depiction of Halley's comet as the star of Bethlehem in the 14th-century painting “Adoration of the Magi” indicates the level of fascination among Renaissance painters with celestial events. Jahangir of 17th century, a Mughal emperor ruling from Delhi, was so excited by the report of a fiery meteor event in Punjab, followed by the discovery of a hot, metallic meteorite, that he ordered his craftsmen to forge two swords, a dagger (extant in Smithsonian Institution) and a knife from the mix of a meteorite part and iron. The amount of nickel content discovered in a dagger from the tomb of Tutankhamen, has led to the suggestion that it was forged from a iron meteorite—a “thunderbolt of heaven.”

The year 2013 is significant not only because of the naked-eye sightings of three recently discovered comets—

Pan-STARRS, Lemmon and ISON, along with the ensuing enthusiasm of astronomers and public, alike—but also due to the mid-February glass shattering meteor strike in the Chelyabinsk region of Russia, just few hours before the closest encounter with 2012 DA 14, an asteroid. Comets and asteroids have been invoked to explain extinction of dinosaurs, origin of life on earth, ejection from Mars of ALH84001 (a meteorite discovered in Antarctica, with NASA's controversial claim that it bears signatures of life on Mars) and so on.

Curiously though, comets and meteors occupy an enigmatic status in Indian epics and ancient astronomy scripts. Writings from the times of Parasara (before 700 BC?) down to Varahamihira (6th-century) on ketu (the Sanskrit word for a comet), and its classification, pose intriguing interpretations. Ketu is still venerated as one of the Navagrahas (or, nine planets) deities, in almost all Hindu temples. Ulkas, or meteors, have been referred to in Mahabharata, Ramayana and numerous puranas. Several temples from antiquity still stand all around the Lonar Lake, an impact crater in Maharashtra (western India). The subject of possible influence of comets and meteors on the psyche and imagination of ancient Indian thinkers will be discussed in this paper.

### **Heidentor: The House of Eternal Time; The Gate of Heaven**

**Reza Assasi (McGill University)**

The paper demonstrates an original discovery by the author in the Roman Mithraic archaeological city of Carnuntum in Austria. A building called Heidentor or the Pagan Gate in this site has precise astronomical alignments towards solstitial and equinoctial points of local horizon. The author also suggests identical astronomical alignments in other similar Roman buildings and their connection to contemporaneous temples in Iranian plateau called Chartaqi.

This discovery opens new horizons to revisiting the unsolved problem of Roman Mithraism and its connection to ancient eastern mythology and astrology. The research shows the importance of certain star maps, celestial bodies and astronomical phenomena that led to the emergence of sophisticated religious notions and mysterious cults which played a significant role in creating sacred geometric patterns of ancient architecture, perception of spacetime, and justification of the political orders.

The research is based on three parallel projects:

- The analysis of data collected from several field works and observations in archaeological sites in Iranian plateau and Europe since 2001.
- New comparative study of Iranian, Indian, and Pagan myths and related symbology and iconography reviving the controversial notion of the strong connection

between Roman Mithraism and eastern myths

- Digital simulation and analysis of the ancient sky to support parallel arguments.

### **9.2 HISTORY OF ASTRONOMY**

#### **Of Stars and Harlow Shapley**

**JoAnn Palmeri (University of Oklahoma)**

For much of the twentieth century the astronomer and longtime Director of Harvard College Observatory, Harlow Shapley (1885-1972), embodied the public face of astronomy. From the 1920s through the 1960s he introduced millions to the wonders of the night sky. His compelling vision of humanity's place in the universe and moving message about cosmic connections inspired many who had never looked through a telescope, visited a planetarium, or taken an astronomy class. He encouraged readers and audiences to learn more about astronomy and other sciences. Over the course of a long career, Shapley not only bolstered the image of astronomy, but also the role of the astronomer as a public intellectual and spokesperson for science.

Shapley's early years on the newspaper beat honed his storytelling, and he then put these skills to use as a promoter and fundraiser for astronomy and science at Harvard. He used a variety of means to convey his message beyond the observatory—radio talks, lectures, magazine articles, TV appearances, and popular books. He also narrated an award-winning animated film based on one of his most widely read books—*Of Stars and Men*. Through words, voice, and visuals, Shapley offered the world an eloquent perspective on the cosmos and a timely message about the significance of science for society.

In this talk I focus on how Shapley conveyed the meaning and value of astronomical inquiry, and explore audience reception of the messages and images he used to popularize astronomy.

#### **The Art of Observing the Heavens**

**Marvin Bolt (Adler Planetarium)**

In 1781, Sir William Herschel achieved fame with an unprecedented discovery: a new planet. He was then a professional musician in the resort town of Bath, England, but he became an astronomer of the highest significance. In Herschel, science and art always kept close company: he taught astronomy to music students, he built telescopes revealing worlds hidden from others, but most of all, he had a bold new vision of the cosmos that marked a turning point in the history of astronomy.

#### **The Gresham Professors of Astronomy 1597-2013**

**Valerie Shrimplin (Gresham College)**

The first person to become Professor of Astronomy in England was Thomas Brerewood, Gresham Professor of Astronomy 1597-98, whose appointment predated the founding of Chairs in astronomy at Oxford and Cambridge by more than 20 years. A continuous line of thirty-six Gresham Professors of Astronomy has followed up to the present day including, over the centuries, such notable astronomers as Edmund Gunter, Henry Gellibrand, Sir Christopher Wren, Thomas Hooke, and in the twentieth century, Sir Martin Ryle, Roger Tayler, Sir Martin Rees, Michael Rowan-Robinson and, currently, Carolin Crawford. The collective contribution of "Greshamite" men and women to the study of Astronomy is immense. Gresham College was founded in 1597 due to the vision and beneficence of Sir Thomas Gresham (1519-79) inventor of "Gresham's Law" and the foremost royal agent and financier in sixteenth-century England. On the death of his only son and heir in 1564 he left his vast fortune, instead, to fund a College based on seven professorships in key areas including Astronomy. Gresham's aim was to ensure a practical approach to academic study, emphasising the functional rather than theoretical use of subjects like astronomy, used so much in navigation at the time. Lectures at the College were free, open access and provided in English—way ahead of its time in terms of the concept of accessibility. Gresham College also led to the Founding of the Royal Society (in 1660), being "The focus of scientific life in the capital at the time" (Hoskin). This paper will explore the contribution of the Gresham Professors of Astronomy, continuing the tradition of free lectures both in London and globally via the internet.

### **9.3 ASTRONOMICAL EVENTS**

#### **When Astronomy Gets In Its Own Way**

**Rolf Sinclair (Centro de Estudios Científicos, Valdivia, Chile)**

Things astronomical act like a grand clockwork in the sky that follows steady patterns in time. However, these bright objects we see are not just points of light but have finite dimensions and thus can get in each other's way. As a result some stars can puzzle us by brightening or dimming, or the Sun can frighten us by going out unexpectedly when something else blocks the light. There is nothing unusual about these occultations or transits—they are demonstrations of simple physics—and we take some for granted, like the rotation of the Earth moving us into darkness each night. The periodic dimming of a few bright stars worried mankind for millennia and helped give astronomy a shove. And unexpected events, like a solar or lunar eclipse, can inspire awe

and change the course of history. Now that we can observe through telescopes, and travel by proxy throughout the Solar System, we find the Universe is rife with transits and eclipses. Those taking place within our Solar System have been useful to astronomy (like the recent Venusian transits or the ever-present eclipses of the Jovian satellites), and became of considerable popular interest when they made clear the scale of our planetary system and made us started thinking beyond the confines of Earth. Now we can detect distant exoplanets transiting their parent stars and announcing the presence of other solar systems in our corner of our galaxy, changing speculation about them to popular knowledge and serious discussions of the possible occurrence of life elsewhere. Distant galaxies can make visible ever-further galaxies they are hiding by forming "Einstein Rings" so that we can see around them and make the structure of the universe more evident. I will discuss this range of phenomena, from those visible easily on Earth to those that can now be seen for the first time from instrumented probes in space, and how this has expanded popular knowledge of the Universe we live in. This talk will be well illustrated by a number of examples ranging from eclipses and transits throughout the Solar System and the nearby stars to the visibility of the gossamer-like strands of gravitational fields at the edge of the observable universe.

#### **"A Starry Diamond in a Veil of Light"—The Artistic and Literary Legacy of Donati's Comet** **Daniele Galli & Antonella Gasperini (INAF-Osservatorio Astrofisico di Arcetri, Firenze, Italia)**

Donati's comet, discovered in Florence on June 2, 1858, was one of the most spectacular astronomical events of the XIXth century, widely seen with the naked eye from September 1858 through March 1859. The sight of the comet, with its bright nucleus and its long, curved tail, inspired paintings, watercolours, engravings, and sketches by artists such as William Dyce, Samuel Palmer and William Turner of Oxford.

The influence of Donati's comet can be recognized in the works of several contemporary writers and poets (N. Hawthorne, C. Dickens, T. Hardy, J. Verne), and in the diaries of explorers and travelers all around the world.

Long-lasting traces of the impression left by Donati's comet are found in many forms of popular art and literature (ladies' magazines, children's books, collection cards and advertisements) until the beginning of the XXth century.

This talk analyses a celestial phenomenon as a source of inspiration emphasizing the interconnections among an astronomical event, the artistic sensibility of the period, and the different social and historical environments of the observers.

### 9.4 PRE-COLUMBIAN AMERICA

#### Archaeoastronomy at Jacana: Evaluating the Evidence from the Archaeological Investigations

Angel Rodriguez (Center of Historical Studies)

Some 800 years ago, the Eyeri-Taino people built large, and precisely planned ceremonial centers, one of which contained the largest structures in the Antilles at that time. Such accomplishments reflect a tangible knowledge manifested in the architectural design and by related symbols or iconography of petroglyphs (rock art). The distinctive architectural designs of these structure or ceremonial plazas, called batey, by their builders suggests that they were intentionally aligned toward specific astronomical events.

From 1990 to 2006, two elaborate petroglyphs boulders were observed in different locations on the surface of the prehistoric Jacana Site (coded PO-29), along the Portugues River, a major south coastal river in the Municipality of Ponce, Puerto Rico. As a result of these findings, extensive archaeological data recovery excavations took place between 2006 to 2007 by Espenshade (2010) as part of the Portugues and Bucana Flood Protection Project that was sponsored by the U.S. Army Corps of Engineers, Jacksonville District. Results revealed a rectangular plaza or ball court (40 m x 50 m) bordered on its four sides with aligned boulders. Some of these boulders bare petroglyphs. Most of the engraved boulders were in the north wall, followed by the west and south walls. In this paper, we focus our attention on the analysis of the data that was recovered during the excavations and how that data are relevant to archaeoastronomy. Primarily, discussing the relations of the astronomical alignments of the ball court and its petroglyphs with the seasonal cycles and the symbolic meaning of the rock art in an astronomical context.

#### A Summary of What We Know, Think, and Speculate About Mayan Calendrical Mathematics

Mark Van Stone (Southwestern College)

Despite what we consider technological “deficiencies”—they lacked both metal tools and the wheel—the Maya were surprisingly sophisticated mathematicians. Unlike other ancient civilizations, the Maya used a place-value number system (like ours, and like Sumer’s), which enabled them to manipulate huge numbers with precision. In this realm, the Maya were without peer.

They reveal this knowledge in their religious-political inscriptions and three surviving books. Like most ancient science, it is arcane and disguised... We find it tied to numerology, to historical and mythical events, to the movements of heav-

enly bodies, to their complex calendar. We must sift carefully through Mayan inscriptions to tease out their understanding, and their attitudes, towards numbers and their operations.

In most cultures, science and mathematics are obscure, arcane, played out behind-the-scenes. Not so the ancient Maya. Their public monuments pay substantial attention to matters mathematical, especially where they relate to mytho-historical dates. On any given stone, fully half the inscription is devoted to situating events in time. Uniquely, they specify the precise number of days between events, both historical and mythological. Often these intervals have numerological significance, and many relate to the periodicities of heavenly bodies. Some of these intervals are huge; incorporating millions, sometimes trillions, of years. Unlike any other culture, they record these huge temporal distances precise to the day. Our scientists may talk about events in the Cretaceous Period, for example, but none say things like, a certain Tyrannosaurus laid a clutch of eggs on Thursday, 13 Nov., 62,327,587 BC. (Or BCE!)

Yet the “Maya calendar” is surprisingly “imprecise”—the famous Long Count Calendar, which passed 13.0.0.0.0 last December, is reckoned in “years” of 360 days, for example. But they clearly knew just how far “off” they were. They apparently were fully aware of the exact length of the tropical year, the sidereal year, and eclipse cycles; and there is evidence—still controversial—that they observed and celebrated events reflecting the 26,000-year Precession cycle.

However, evidence is not proof. These clues are scattered, rare, and often not even easy to recognize, by eyes clouded by our modern world-view. The Mayan agenda was profoundly alien to our way of thinking, and further, the body of their science and philosophy left to us is in tatters, just a few tantalizing shreds—or sherds—of a once-rich and diverse astromythological-numerological tradition.

Moreover, there was no single pan-Mayan mythos. An alignment or geometric proportion found repeatedly in one city will be completely absent in others. Local geographical features usually trumped universal or astronomical ones in city planning. Mayan city-states, as distinct from each other as ancient Athens and Sparta, emphasized diverse and often unique features, and often appear to contradict one another.

But we soldier on. The very diversity/disagreement we find so frustrating is simply the fine structure of their world-view, a fine structure I compare to that of the Rings of Saturn. Just as astronomers for centuries imagined the Rings as homogeneous plates, Mesoamerican historians have for too long been, like Procrustes, trying to force all Maya science and religion into a single universal straitjacket.

#### Venus, the Solar Year, and Eclipse Cycles Among the Ancient Maya

Susan Milbrath (Florida Museum of Natural History)

In Mesoamerican códices, Venus is closely linked with the solar cycle in Venus almanacs that integrate five Venus cycles with eight solar years, with Venus returning to the same position in relation to the solar year every eight years. Use of this almanac spans from central Mexico to the Maya area, and it apparently originated in the Late Preclassic period. The earliest clear text reference to the Venus cycle appears on the La Mojarra Stela from Veracruz, where accompanying texts refer to the annual cycle and a solar eclipse. An interest in Venus in the context of the eclipse cycle is also seen in Postclassic texts showing Venus amidst an eclipse almanac in the Dresden Codex. Recent research on the Madrid Codex shows a similar interest in integrating the Venus cycle with eclipse events. Here, there is a focus on a repeating pattern of solar eclipses linking to Venus as the evening star at times of year that overlap with the agricultural cycle, indicating Venus phases and eclipse events were closely watched in relation to the planting cycle.

### 9.5 HEAVENLY BODIES

#### A Selenological History of Lunar Poetics

Clea T. Waite (iMAP, University of Southern California, School of Cinematic Arts)

If you want to understand something about history, philosophy, and passions; the nature of love, persecution, or our capacity for the sublime, then examine the Moon. It has taken centuries of human inquiry to understand what the Moon is, what is there, how it got there, and what it means for us. The quest carries on. Much of religion and science have their beginnings in these questions and these two disciplines went through a period of bitter fighting over the Moon’s place in the universe and the ramifications that defining celestial questions would mean. Science fiction was virtually invented as a ruse in this battle. More recently, the most successful, non-military battle of the Cold War was fought on its surface. Soon, an economic battle for territory and the resources there will begin.

This query reads like a who’s who of science, philosophy, and literature. This review will look at a few select works that have profoundly influenced our knowledge of the universe and have also mutually influenced each other. Because of the significance of their contributions to selenology and lunar poetics, each of the authors reviewed have the honor of a namesake crater upon the Moon: Ariosto, Aristotle, Aristarchus of Samos, Copernicus, Cyrano de Bergerac, Leonardo da Vinci, Galileo, Kepler, Lucian of Samosata, Plutarch, and Ptolemy. Later notables include Jules Verne, and H. G. Wells.

This review will center itself in the early 17th century at the time of Kepler and Galileo and send out its tendrils of influence forwards and backwards in time from there.

#### The Enduring Cultural and Scientific Influence of the Red Planet Mars

Greg Mort (Lowell Observatory)

The mysterious planet Mars has inspired writers, artists, filmmakers and astronomers alike and sent our imaginations and spacecraft soaring to the nearby red planet. Its undeniable lure has played a pivotal roll in shaping our space programs and expanding our desires to search for inhabited worlds both in our own solar systems and around other stars.

This talk highlights the wild and sometimes explosive dramas expressed through the arts surrounding Mars that were initiated in the late 1800’s and continue to inspire, frustrate and haunt us well into the present 21st century.

The Enduring Cultural and Scientific Influence of the Red Planet Mars is a fast paced narrative punctuated by stunning original paintings, sculptures, films writings and music.

#### Planetary Landscapes

Paul Murdin (Institute of Astronomy)

Landscape pictures of the scenery on other planets have been made by low-flying orbiting spacecraft, by Apollo astronauts and by the landing and roving vehicles that have been positioned on the surfaces of Venus, Mars, Titan... I treat the planetary landscapes as art objects as well as valuing them for the science that they reveal. I show how the creators of the images have followed various schools of painting, from the fifteenth to the twentieth centuries, in choosing composition, colour palette and aesthetic.

# Presentations

## TUESDAY

### 9.6 FULLDOME FILMS & PERFORMANCES

#### Moonwalk

**Clea T. Waite (iMAP, University of Southern California, School of Cinematic Arts)**

A rare film combining art and science, Moonwalk is an experimental film for the planetarium. Moonwalk characterizes our placid, heavenly neighbor as a living, scintillating force. The film weaves together literature, history, and scientific data with iconic songs and films, immersing its audience in a grand, audiovisual hyperlink. The film reaches beyond the idealized childhood daydreams of the heavens, past the familiar Apollo footage, and into the roots of culture that weave throughout our daily, personal lives. It reminds us of the Moon's ubiquity, compelling us to reconstruct our own personal history of the Moon; a poem evoking the power, the presence, and the emotional gravity the Moon commands.

Two scenes from Moonwalk were shown as a work-in-progress at INSAP V in Chicago at the Adler Planetarium. This year's conference is the first chance since then to show the finished film at INSAP in a planetarium.

'Moonwalk' was awarded the IBM Innovation Grand Prize for Creation in Art and Technology.

#### Voyager1Now

**G. E. Schwartz & Damian Catera (Rutgers University, Goucher College, Praxis Classics, Word Consortium)**

VOYAGER1NOW is a multimedia immersive live performance piece featuring projected high-definition video (using the Hayden Planetarium Theater's Fulldome), and two artists—one as the "voice" of Voyager 1, the other producing a soundscape with real-time music. VOYAGER1NOW's premiere will be a surreal, aurally-rich hypothetical journey of Voyager 1's return to recount its exploits and to experience the Earth it left thirty-six years ago. This performance will unfold on an emotional and intuitive level, tapping into the nostalgia and awe for Voyager's original mission and aspirations, and our own desires to come to versteyen, an understanding with our own world in the present moment.

#### The Sky from Scratch

**John Kaufmann (Beloit College,)**

"The Sky from Scratch" is an original planetarium performance combining astronomy, imagination, politics and propaganda. Writer/performer John Kaufmann uses his experience in improvisation, planetaria and storytelling to enlist the audience to create original constellations in service of a "Great Leader." Kaufmann plays a "lowly scribe" who needs the "greatest minds of the domain" to identify, name

and "mythologize" original constellations. When the scribe touches the "orb of enthrallment" he becomes a medium for the Great Leader to speak directly to the audience, a theatrical device that allows for contrasting voices in the darkness of the planetarium. As the group creates constellations and stories engineered to frighten citizens into submission, conquer foreign lands and glorify the "Great Leader," audience members may question their role in the manipulation of the masses.

"The Sky from Scratch" is a playful comedy with a political bite. The show defines the basic mechanics of the night sky (daily/annual motion, latitude, etc.) and invites audience members to play within these parameters. Audiences engage with astronomy and their imaginations while questioning the motivation behind past myths and current media messages.

#### Poetry Reading

**AJ Epstein**

I will be reading some pieces of prose and poetry about the stars, myth and my own personal inspiration when I look out into the sky.

### 10.1 TEACHING & LEARNING

#### StarryTelling: Discover the Galileo in You

**Elizabeth F. Wallace (Giraffe 'n' Ant Productions)**

The advantage of introducing astronomical data to the general public through the arts is that it relieves the fear that one is not "smart enough" to understand it.

We all have our own unique ways of navigating the world and gathering the requisite knowledge to do so effectively. Dr. Howard Gardner's multiple intelligence approach to learning celebrates those differences and encourages presentation of subject matter through a combination of the ways we learn best: spatial, linguistic, logical, kinesthetic, musical, naturalistic, interpersonal, intrapersonal and existential, that is, the ability and proclivity to pose and ponder questions including cosmological ones.

StarryTelling™ Festivals are accessible, hometown events which attract K-12 students as well as their multigenerational families. The scientific stories of the universe are told in various ways including dance, visual arts, personal story, music, hands-on science and more. With a cast of presenters and attendees, it is a very interpersonal experience.

StarryTelling™, when used as an arts integration tool in a school or after-school program, encourages the expression of a student's knowledge of astronomy or space exploration specifically through oral narrative. During the creation process of a compelling tale, StarryTellers™ navigate outer space as well as their own inner space.

The teller uses his or her own unique visual storyboard, choice of words, logical construction of plot, use of body language, rhythm of speech or instruments and lastly an interpersonal connection with the listeners. The audience members co-create the story, enhancing it from their personal experiences as well as their imaginations, so that the story as well as the science, magically then belongs to each and everyone.

#### A Global Astronomy Community for Sharing Our Common Heritage

**Mike Simmons (Astronomers Without Borders)**

Astronomy is found in every culture throughout history. Astronomers Without Borders (AWB) brings people together through that common connection. AWB observing programs, both individual local events and online group observing, connect people around the world. A growing slate of AstroArt programs include astronomy-related art, performance, astropoetry, film screenings, and more. Resources are shared both online and physically with projects in developing countries. Ideas come from the member community, incorporating all cultures. Astronomy is the

## WEDNESDAY

common thread and inspiration and the outcome is sharing and understanding—peace-building as much as anything else. Only astronomy has the ability to inspire this kind of universal connection. AWB's motto is One People, One Sky.

#### Finding the Stars in the City

**Ralfee Finn (Hunter College, CUNY)**

This is a multimedia presentation based on interviews conducted with urban students in an attempt to explore how education and information about the sky has the potential to transform awareness of the sky and its rhythms. These interviews are primarily concerned with the question: Is it possible for students living in New York City, where the night sky is barely visible and time is told through digital devices, to have a dialogue with the sky and to be inspired by that conversation? A sample of college students who participated in a course entitled "The Sacred Sky" currently taught at Hunter College, City University of New York, were asked a series of questions regarding their awareness of the sky. Most of them had little or no awareness of it other than as a backdrop to the activity of the city and their busy schedules. After studying the sky through a variety of cultural perspectives, ancient as well as contemporary, including those of religion, myth, and archaeoastronomy, students were asked to identify astronomical symbols in the architecture of New York City. The sky ceiling of Grand Central Terminal, the statue of Atlas that stands in front of the International Building of Rockefeller Center, and the entrance to the Low Library at Columbia University were suggested locations. Finding the stars in the city facilitated a change in the students' awareness of the sky, and this helped them to discover its wider cultural significance. The interviews presented here demonstrate how this shift inspired a transformation of the students' perceptions, both of their immediate environment—New York City—and of the world's rich and diverse celestial traditions.

#### Opening the Universe: Teaching Astronomy to Art & Design Students

**Robin Kingsburgh (Ontario College of Art & Design University)**

Showcasing artwork by students at the Ontario College of Art & Design University, "Opening the Universe" will discuss the teaching of science to art and design students, and the value of incorporating artmaking into the teaching of science. In designing science courses for artists, visual and experiential learning in the classroom and in assignments is primary. Astronomy, with its visual splendour and expansive conceptual nature, is a highly evocative science elective for undergraduate art students. Making art is incorporated within each assignment, where creatively rendering a

scientific idea facilitates understanding, and provides an alternate way for an artist to learn about science. The art produced can range from a response to ideas at a visceral and emotional level, to visualizations that effectively integrate text and image to convey scientific meaning. This science/art making practice deepens students' understanding of the topic at hand, as the choice of how to render an idea visually greatly clarifies thought, and encourages abstract and metaphorical thinking. Art created by students has ranged from painting and video, to Haiku and a 24-hour sound installation simultaneously echoing the movement of the Moon and tracing key moments in a personal history. Science, in particular astronomy, thus serves as a springboard for broader social, cultural, or political commentary, and can lead to a greater reflection on the individual's context within, and relationship to, our Universe as a whole.

### 10.2 CONTEMPORARY ART

#### Red Rovers At Work & Play: Literary & Visual Arts on Mars

##### Alison Hawthorne Deming (University of Arizona)

This talk will explore how Spirit, Opportunity and Curiosity have inspired writers and artists. These exploratory rovers have profoundly changed the imaginative ethos around what might constitute life on Mars. I'll explore artistic images spanning from H. G. Wells' "War of the Worlds" to Kim Stanley Robinson's "Red Mars" and on to the pragmatics of William Fox's "Driving to Mars," along with images by contemporary visual artists. I'll conclude with two brief essays from my forthcoming book, "Zoologies: On Animals and the Human Spirit" ("The Rabbit on Mars" and "Letter from Mars.") While the feats of space exploration are dazzling to the human imagination, they can also appear so technologically complex that the sheer beauty—and comedy—of such enterprise can get lost. The project of Curiosity became cool and approachable and awe-inspiring to the non-scientist when one spectacular "mohawk" became a work of public art.

Images from deep space stir a sense of the sublime, but their scale is forbidding to the tender-hearted. Some people understandably suffer from "cosmophobia." Now with Mars inhabited by our roving familiars, the technological sublime feels closer to hand and entices imaginations to roam. Art, too, has long eyes, and this talk aims to show how art fuels the aspiration to reach beyond our limits.

#### The Urban Skyscraper As Horizon Astronomy

##### John David Mooney (John David Mooney Foundation)

This presentation delineates the historiography and the iconography of my urban public sculptures which use skyscrap-

ers as today's standing stones, markers for horizon astronomy. From 1977 to the present time, my work has engaged the public to "look up and see." Art becomes transformative in context and gesture.

For Chicago's Garfield Conservatory directly west of the city's eight-mile long skyline, I am developing a viewing platform as part of a large-scale astronomical work which will use the skyscraper silhouette to the east as markers for both solar sunrises and the nighttime stars.

From ephemeral works in the sky and on the water to large-scale permanent rooftop sculptures in Los Angeles, Atlanta, and Europe, viewers are oriented to the "Milky Way," the "Summer Triangle," constellations, and planetary phenomena which are part of the new cultural landscape.

#### The Story behind Asteroid Patersonewen 14060

##### John G. Hatch (Western University)

A pioneer of abstract art in Canada in the 1950s and 60s, Paterson Ewen returned to figurative art by the end of the 1960s. After his divorce in 1968, the Montreal-born artist moved to London, Ontario, where he engaged in an emerging and vibrant national art scene, and started a new body of work depicting earthbound and celestial landscapes, which would dominate his visual career until his death in 2002. Many of these works are monumental in scale and were inspired by Japanese woodcuts; in fact, one of the most unique aspects of Ewen's work of this period is the method of their making that involves plywood as a support whose surface would be gouged by a router, producing often dramatic textural effects. Image-wise, Ewen produced one of the richest and most involved series of modern works inspired by celestial phenomena, ranging from Morehouse's comet and solar eruptions to Galaxy NGC 253.

### 10.3 MYTHS, DIETIES, & SUPERHEROES

#### Batammaliba Reading Time Zones Chasing the Shadow of the Sun

##### Aimé Dafon Segla (Université d'Abomey-Calavi, Benin Republic)

For the Batammaliba from northern Republic of Benin and Togo (West Africa), the Sky is the domain of their Supreme God, the "Sun," commonly called "Kuiye." They believe "Kuiye" is /Sky Owner/ and communicates through its two sons who were the first humans on earth. These two men, originally created by "Kuiye on earth" returned to stay at their father's side in the "Sky" and are said to be the daily responsible of the Supreme God's solar disk pulling along East-West passage. Using foundational archaeology of batammaliba's cosmo-

logical concepts in this paper, we show how time zones naming and special spatial division in batammaliba village alludes to Kuiye's metaphor of original creation and how it is also a landscape of memory. We demonstrate that, what the cosmos has inspired communities and cultures here is logically reminiscent of human practices in cultural astronomy since Ancient and Modern Astronomers.

#### A Distant Planet: Superman, Astronomical Phenomena, and the Birth of Comics

##### Brad Ricca (Case Western Reserve University)

In 2012, Neil deGrasse Tyson made headlines when he appeared in a Superman comic book and pinpointed a real planet (located in Corvus) that matched the description Superman's homeworld, the fictional planet of Krypton. This story tracked all over the world. Why? I will look at the figure of Superman, whose backstory— orphan from an exploding planet—is somehow known by everyone from the age of eight on. I will look at how specific astronomical phenomena (in the sky and in the news) may have inspired Superman's young teenaged creators in the 1930s to create this iconic modern myth—a myth, like many, grounded in astronomy. My goal is to show that comics—which we normally think of as juvenile, throwaway entertainment—actually tried to base themselves (and certainly were inspired by) actual astronomical events in the thirties and forties, made more accessible to the public by new scientific explanations, including a real supernova that may have inspired the destruction of Krypton.

I will also do a walkthrough of famous astronomical phenomena in comics (Oa, the Blue Area, cosmic rays, Earth-2) to show how the medium of comics is just as involved in an ongoing interpretation of the sky as fine art can be—and indeed can be looked at as a kind of popular amateur understanding of complicated scientific phenomena that creates a modern, scientifically-based mythology. Comics are mostly fantastical, but when it comes to the sky, they can be more factual than we may think.

#### Wherefore the Star-Crossed Lovers Weaving Maid and Oxherd?

##### David Pankenier (Lehigh University)

The earliest textual reference to the star-crossed pair Weaving Maid and Oxherd occurs in the Book of Odes (ca 700 BCE), where it is already clear that the reference is to two stars. Throughout East Asia everyone is familiar with the moving story of the young lovers' forbidden liaison and their painful exile to opposite banks of the Sky River. Only their annual conjugal visit on the one night of the 7th day of the 7th month offers any consolation. There is no controversy about their astral identities as our Vega (α Lyr) and Altair (α

Aql). After briefly highlighting the salient astral-temporal facts preserved in the myth, this talk will focus on explaining its original significance as an ancient teaching story about the seasonal stars, which will take us back to the dawn of Chinese civilization.

#### She Who Draws Our Eyes

##### Safron Rossi (Opus Archives & Pacifica Graduate Institute)

In exploring the inspiration of astronomical phenomena upon human culture we are invited, perhaps beckoned, to reflect on Urania, the Greek Muse of Astronomy. Heavenly One or Heavenly Bright, Urania teaches mortals the shape and wonder of the cosmos, "men who have been instructed by her she raises aloft to heaven for it is a fact that imagination and power of thought lift men's souls to heavenly heights" (Diodorus Siculus, Library of History 4. 7. 1).

Yet in cities the heavenly lights are dimmed, flooded by another source of light which that of culture, and that is the domain of Aphrodite. So it is to her we must turn to understand what draws our eyes up to the heavens above the dazzling city lights. And as Aphrodite Urania her cultural and aesthetic domain is connected to the order of the cosmos itself, "the triple Moirai are ruled by thy decree, and all productions yield alike to thee: whatever the heavens, encircling all, contain, earth fruit-producing, and the stormy main, thy sway confesses, and obeys thy word..." (Orphic Hymn 55 to Aphrodite).

My presentation will be a mythopoetic cultural excavation of the gods and ideas in our passion for astronomy; how and where we see Urania and Aphrodite in our fascination in the cosmos, they who inspire us to gaze upwards, city dwellers, planetarium devotees and silent field star-gazers alike.

### 10.4 FILM, ANIMATION, & MUSIC

#### Science and Symphony Films

##### José Francisco Salgado (Adler Planetarium)

José Francisco Salgado is an astronomer and visual artist who uses art as a vehicle to communicate science in non-traditional venues such as art museum and orchestra halls. He collaborates with symphony orchestras, composers, electronic, and chamber musicians to present films that provoke curiosity and a sense of wonder about the Earth and the Universe. These films have been presented with live music in more than 90 concerts in 14 countries with orchestras such as the Boston Pops, the Chicago Symphony Orchestra, the San Francisco Symphony, and the National Czech Symphony Orchestra. They are also presented with chamber musicians such as harp duo Beyond Pluck and electronic musician Tom Bailey. José Francisco will present a sample of some of his latest works produced since INSAP VII.



### **Pleiades Visions**

#### **Matthew Whitehouse (The University of Arizona)**

Pleiades Visions (2012) is my new musical composition for organ that takes inspiration from traditional lore and music associated with the Pleiades (Seven Sisters) star cluster from Australian Aboriginal, Native American, and Native Hawaiian cultures. It is based on my doctoral dissertation research incorporating techniques from the fields of ethnomusicology and cultural astronomy; this research likely represents a new area of inquiry for both fields. This large-scale work employs the organ's vast sonic resources to evoke the majesty of the night sky and the expansive landscapes of the homelands of the above-mentioned peoples. Other important themes in Pleiades Visions are those of place, origins, cosmology, and the creation of the world.

This presentation will focus on "Mauna Kea," the concluding movement of Pleiades Visions. The movement is named after Mauna Kea, a dormant volcano and major astronomical observatory site located on the Big Island of Hawai'i. "Mauna Kea" creates a dramatic musical landscape reflecting the physical presence of Mauna Kea, the splendor of the night sky as viewed from the volcano's summit, and Mauna Kea's importance as a center for astronomical research. "Mauna Kea" is also a musical journey through the opening lines of the Kumulipo, a creation chant of the Native Hawaiian culture; the opening of the chant references the Pleiades. The movement also points indirectly to the modern astrophysical understanding of the Pleiades as containing hot, young stars. The presentation will begin with a brief introduction to the overall research basis for Pleiades Visions, followed by a detailed analysis of "Mauna Kea." Conference participants will then hear "Mauna Kea" via a high-quality recording of a live performance.

### **Unlocking the Universe: The Contribution of Henrietta Leavitt—A Harvard College Observatory "Computer."**

#### **Pangratios Papacosta (Columbia College Chicago)**

Henrietta Leavitt's 1908 discovery became the crucial key that enabled astronomers to discover a much larger and a more dynamic universe, beginning with Hubble's 1924 and 1929 historic discoveries. This session is a combination of a power point presentation on the life and work of Henrietta Leavitt along with selected film clips from an upcoming Henrietta Leavitt documentary produced by P. Papacosta and filmmaker Paul Hettel. The documentary has been a six-year project whose primary intention is to redress the historical injustice done to women astronomers in general and Henrietta Leavitt in particular.

### **10.5 KEYNOTE DINNER**

#### **Inspiration Today: Music, Astronomy, and Popular Culture**

##### **Andrew Fraknoi**

In this illustrated talk, I will explore some sources of astronomical inspiration in our present day, focusing particularly on a variety of examples of music inspired by serious astronomy (as opposed to simply a quick allusion to spooning in June to the light of the Moon). I will discuss operas based on the life and work of astronomers, six songs based on a reasonable understanding of the properties of black holes, constellation pieces written by composers from around the world who are or were active amateur astronomers, the song that compares walking on the Moon to being in love, the little-known rock song that became a reference in the *Astrophysical Journal*, pieces that base the patterns of the music on the rhythms of astronomical phenomena, and a number of other pieces of classical and popular music. We'll also take a brief (and light-hearted) look at other ways that astronomy has become part of popular culture, including advertising, drama, fiction, philately, etc. The audience will be encouraged to name their favorite examples and we will together reflect on the reasons astronomy continues to capture the popular imagination. (For a published catalog of astronomical music, see: <http://dx.doi.org/10.3847/AER2012043>).

### **11.1 MURALS**

#### **Stars on the Ceiling**

##### **E.C. Krupp (Griffith Observatory)**

When principles of cosmology are mimicked in architecture, ceilings usually operate as stand-ins for the sky and display stars, constellations, and other celestial objects overhead. From the burial chambers in Egyptian pyramids and tombs to the main concourse in New York's Grand Central Terminal, architects and designers have turned the ceiling into the sky and miniaturized the universe on earth. The Osiris chapel on the roof of Ptolemaic Egypt's Temple of Dendera, ancient Chinese tombs, painted rock shelters in Navajo territory, the cupola above a hot bath from Medieval Jordan, elaborately illustrated ceilings in Italian cathedrals and palaces, and a variety of public buildings in America all brought the sky inside to transmit messages about relationships between the building, the people who use it, and the heavens. In these interior environments, the symbolic function of the astronomical ceiling is driven by the thematic function of the building. At Griffith Observatory in Los Angeles three signature spaces are equipped with astronomically illustrated ceilings—two painted in 1934 as part of the original design and a third painted in 2006 for the major renovation and expansion. In content and location, these prominent murals function symbolically to convey meaning through public display and unexpectedly prompt people to think more expansively about the universe. This artwork is familiar in Los Angeles and recognized as another element of a stylish, iconic landmark, but its use in a public observatory puts it outside the range of most commentaries on public art. Although experienced by more than 75 million persons over the last 78 years, these celestial murals are not well known beyond Griffith Observatory. Their history, content, character, meaning, and purpose are detailed here.

#### **Astronomy on the Walls**

##### **Jessica Santascoy (Astronomy Outreach Consultant)**

Can a mural be used for astronomy outreach? We'll explore a mural called "Children's Minds Unlock the Universe/Mentes Infantiles Revelaran Los Secretos Del Universo" by artist Carlos Callejo, located in a public library in El Paso, Texas. The mural depicts Mayan and Aztec astronomical themes and contemporary space flight. How does this mural get local youth interested in astronomy?

El Paso, Texas is 80% Latino/a, the per capita income is under \$17,000 USD per year, and the mural is in a neighborhood that is about a mile away from the international bridge to cross into Ciudad Juárez, México. These features are of particular interest to those working in astronomy outreach, as Latinos are underrepresented in astronomy. Discussing the "Children's Minds" mural and outreach strategies could lead to similar outreach tactics in other underserved areas.

The presentation will spur dialog on these topics:

- How can understanding a community's demographics help with outreach?
- Why is a non-Eurocentric perception of astronomy essential to outreach?
- What are some possible next outreach steps, once a mural or other public artwork is made available? How can the mural be an active site of engagement and dialog?
- How can digital technology and social media be used for outreach using a mural or other public artwork?

The hope for this presentation is to have a conversation where we gain useful insight on astronomy, art, and outreach.

### **Edwin Austin Abbey's "Passage of the Hours"—Astronomy as History**

#### **Patricia Likos Ricci (Elizabethtown College)**

The "Passage of the Hours" (1909-11) in the Pennsylvania State Capitol at Harrisburg is one of the most original and least known astronomical ceilings in the United States. Designed by the American artist Edwin Austin Abbey (1852-1911) to complement the Italian Renaissance style architecture of the House of Representatives, the mural combines two classical traditions of representing the night sky: a celestial map with the constellations of the zodiac and the personifications of the Hours. Set in a shallow dome 24 feet in diameter, Abbey's constellation figures float in a dazzling firmament where the Milky Way streams between the Sun and the Moon. The artist placed the goddesses of the Hours around the dome's circumference in the position of the numbers on an astronomical clock. He depicted the twelve daylight Horae of Greek mythology as dancing maidens and, to complete the diurnal cycle, added a nude woman robing and disrobing the dark cloak of Night in twelve successive stages like the separate frames of an early moving picture.

As in Italian Renaissance architecture, the celestial ceiling in the House of Representatives was part of an iconographic program affirming the cosmological origins of a polity. The vision of the stars was thematically linked to Abbey's mural on the rostrum wall of the first public reading of the Declaration of Independence in 1776 from David Rittenhouse's observatory in Philadelphia which the colonial astronomer constructed to study the transit of Venus in 1769. Abbey included a portrait of Rittenhouse holding his telescope among the worthies in the adjacent mural of "The Apotheosis of Pennsylvania." Contemporary as well as historical events encouraged Abbey's use of astronomical imagery: the depiction of a comet on the periphery of the starry dome may record the much anticipated return of Halley's Comet in 1910.

### 12.1 HISTORIC ARTWORKS

#### **Astronomical Dating of Monet's Paintings on the Normandy Coast**

**Donald Olson (Texas State University)**

Claude Monet (1840-1926) is famous for landscapes accurately capturing the changing nature of seas and skies. Monet created almost 2,000 paintings during his long career, and several hundred of these works depict the skies above the spectacular cliffs, arches, rocks, harbors, and beaches on the Normandy coast. Our Texas State group made a research trip to Normandy in the summer of 2012 and found dozens of the locations where Monet set up his easel. Our photographs demonstrate how astronomical considerations of daylight, twilight, night skies, and tides can be used to enhance our understanding of the artist's creative process. Monet himself said, "I need the Sun or the cloudy weather to coincide again with the tide, which must be low or high in accordance with my motifs." Astronomical methods can be used to help in dating these works, many of which have uncertain dates in the existing catalogues and literature about Monet in Normandy. Analysis using the direction of sunlight and the direction of shadows, combined with calculations of lunar phases and tide levels, meteorological records, and the artist's letters, enables us to determine the exact date and the precise time, accurate to the minute, when Monet observed the sky that inspired a painting.

#### **The Eclipse Mural Series by Howard Russell Butler for the American Museum of Natural History and the Hayden Planetarium**

**Jay M. Pasachoff (Williams College) & Roberta J. M. Olson (New-York Historical Society)**

There is a rich trove of astronomical phenomena in works of art by artists from the greater New York area, a trend which is even more pronounced in the oeuvres of New York City residents through the present day. A case in point is the trio of oil paintings depicting the 1918, 1923, and 1925 total solar eclipses based on observations in Oregon by artist (and former physics professor) Howard Russell Butler. They resulted from a U.S. Naval Observatory expedition and were long displayed in the former art-deco building of the Hayden Planetarium of the American Museum of Natural History, the location of this conference. Since they have been in storage for many years, these once famous works are now virtually forgotten. Based on our research as an astronomer who has seen 57 solar eclipses and an art historian who has written extensively about astronomical imagery, we will discuss Butler's eclipse triptych—together with nine other astronomical paintings by him in the AMNH collection not

currently exhibited—to explore their place in the history of astronomical imaging.

#### **Edward Burne-Jones' "The Days of Creation"—A Cosmic Utopia**

**Liana De Girolami Cheney (SIELAE, Universidad de Coruna)**

Edward Burne-Jones (1833–1898) was a Pre-Raphaelite artist and designer, who collaborated with William Morris on many decorative arts (stained glass windows, book illustrations, ceramic and tapestry designs). He was a founding partner in Morris, Marshall, Faulkner, and Co. Firm. Burne-Jones composed for the Morris firm, *The Days of Creation* between 1870-76. These paintings were executed in gouache and gold paint, and cartoons were made for tile and in stained glass, for the Church of St. Editha at Tamworth in Staffordshire.

Burne-Jones' creation was highly praised and elegantly described by Oscar Wilde: "The picture is divided into six compartments, each representing a day in the Creation of the World, under the symbol of an angel holding a crystal globe, within which is shown the work of a day."

This paper will examine how Burne-Jones visualized an unusual celestial creation where angels holding magical spheres unveil the divine manifestation for the creation of a terrestrial realm. He crates a cosmic utopia of the natural world.

#### **Landscape By Moonlight: Peter Paul Rubens and Astronomy**

**Michael Mendillo (Boston University)**

In the last years of his life, Rubens (1577-1640) lived happily with his wife and children on his Het Steen estate. During this period he worked and re-worked a painting that had special meaning to him—*Landscape by Moonlight* (1635-40), now at the Courtauld Gallery in London. After a highly successful career painting religious and secular portraits, allegories and occasional landscapes, Rubens put an extraordinary amount of effort into this final landscape. He was well known as a person who would file away in his memory ideas and themes that he would use in future works. In this paper, I will review his attention to the visualization of Nature (e.g., *The Rainbow Landscape*, c.1636), and his personal connections to Galileo, Peiresc and Elsheimer, as a prelude to exploring the choices he made about depicting celestial objects within the cloudy skies in his *Landscape by Moonlight*.

#### **Astronomy as Muse: the Astonishing Paintings of Remedios Varo**

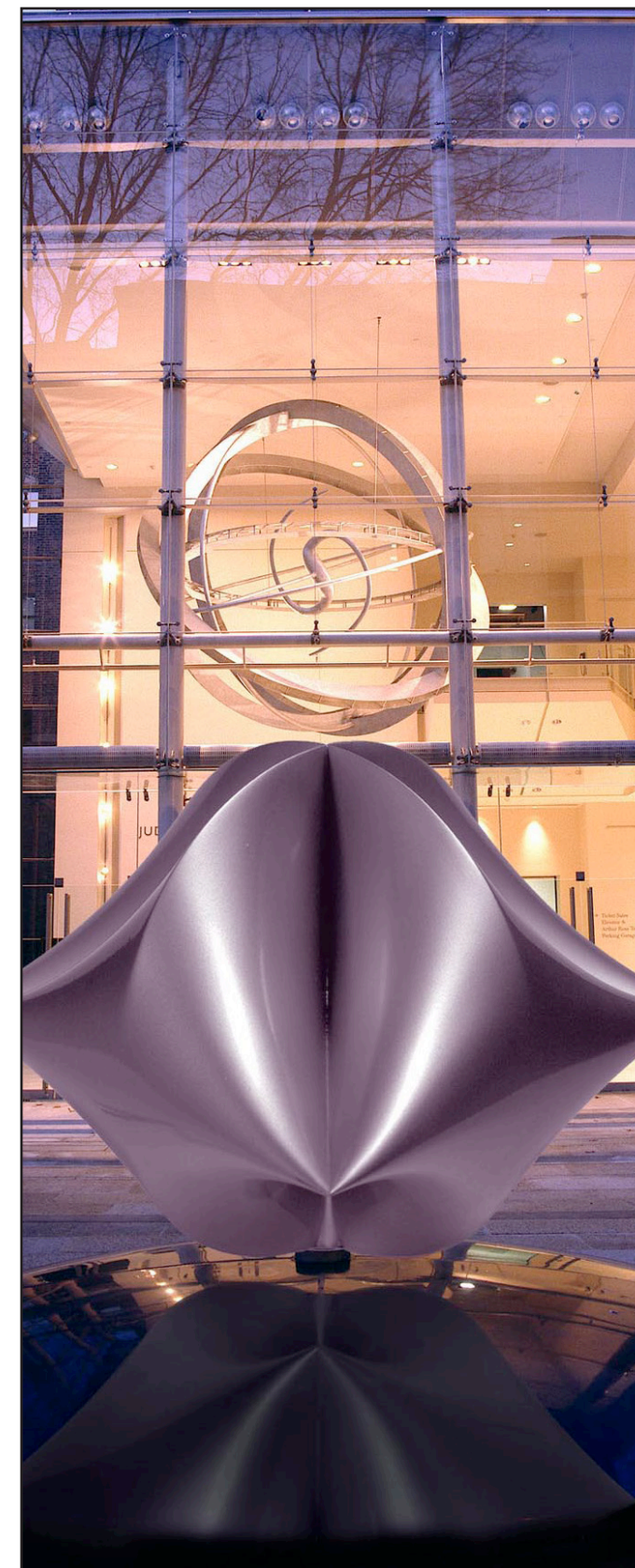
**Alan Friedman (Museum Development and Science Communication Consultant)**

Spanish exile Remedios Varo (1908-1963), working in Mexico City from 1942 until 1963, painted precisely detailed fantastic worlds that have intrigued art critics and scientists alike. The first major shows of her work in the United States took place not in art museums, but at the New York Academy of Sciences and the National Academy of Sciences. While art critics have typically described her work making references to magic and surrealism, many of her most famous paintings are accurate metaphoric portrayals of 20th-century science. Her favorite science writer was astrophysicist Fred Hoyle, and his popularizations of contemporary physics and astronomy are keys to appreciating Varo's achievement.

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# Posters

## **A Multicultural Astronomy Resource Guide for Astronomy Instructors**

**Andrew Fraknoi (Foothill College)**

In the U.S., college and high-school level introductory astronomy courses are taken by over a quarter of a million students every year. For many of these students, this will be their terminal science course for their degree and their last opportunity to cement their personal and intellectual views about science and scientists. Yet in very few of these courses does a student get to see faces (and hear about contributions) that are from non-European or non-US cultures. One reason is that instructors have few resources (and hear very little during their graduate training) to expose them to the contributions of other cultures. Through the NASA Science Missions Directorate Heliophysics Education and Public Outreach Forum, we are putting together a resource guide to help instructors from all backgrounds learn more about contributions from both genders and all cultures to the development of astronomy. The guide (to be published so it is freely and widely available) will include stories, biographies, history, activities, and teaching techniques. It will be vetted by those who work in multi-cultural astronomy and on diversity issues. Anyone interested in becoming part of the review team for this project is asked to contact the present author at: [fraknoi@fhda.edu](mailto:fraknoi@fhda.edu).

## **Cosmic and architectural visions of Bruno Taut**

**Marea Atkinson (University of South Australia)**

The integration of the firmament and architectural spaces, have origins in ancient sites worldwide, as noted in the Thematic Study on the Heritage Sites of Astronomy ICOMOS-IAU publication in 2010. With the emergence of the International Starlight Initiative in Spain in 2007, to defend the quality of the night sky and the rights of future generations to observe the stars. This initiative raises questions about our lost connections to the observable night sky and the consequences, as we inhabit cities without the beauty and presence of the starry sky.

This paper looks at the time of WW1, and the response to war from visionary architects in Germany. In particular the drawings and architectural projects of the German architect and writer Bruno Taut (1880-1938) reveal multi-sensory environments, utopian visions and an engagement with the cosmos. This paper discusses Taut's Glass Pavilion (1914), and extracts from his book *Alpine Architektur* (1919) of drawings and ideas, influenced by the writer Paul Scheerbart, featuring the use of imaginary glass structures to reflect the light from the cosmos.

Marea Atkinson will present an art installation inspired by Bruno Taut, featuring an engraving of a city map, transpar-

ent structures and areas of star reserves that re-establish an imaginary connection with the City of Stars to the firmament.

## **The Helical Rising of Sirius and its Relationship to the Egyptian Goddess Sopdet**

**Robert K. Tarquinio (Bright Star Pictures LLC)**

The ancient Egyptians (Kemetians) used astronomy to establish and maintain an astronomical calendar based on the heliacal rising of the star Sirius (Sopdet). The heliacal rising of Sirius is when Sirius can be seen prior to sunrise for the first time each year. Sirius remains visible only a short time before the sky gets too bright to see it. This annual reappearance of Sirius fell close to the summer solstice and coincided with the time of the Nile's inundation (Krupp 1994:21). *Starry Night Pro Plus* (ver. 6.4.3) astronomical software (Simulation Curriculum Corp. 2009) was used to generate sky chart of the night sky during 1544 B.C. period. The ancient Egyptians associated Sirius with their goddess Sopdet whose festival is celebrated as "the coming of Sopdet" (Seawright, 2004, 2012). *Archaeoastronomic Chronometry* (Tarquinio 1999) was applied to determine the first heliacal rising of Sirius (Sopdet) to mark the coming of the New Year and when to prepare for the rising of the River Nile and inundation of the Nile River Valley for the year 1544 B.C. The results show that in the Year 1553 B.C. Sirius (Sopdet) heliacal rose on 7 July at 6:44:16 a.m.

Opposite: Hall of the Universe in the Rose Center for Earth & Space. © AMNH/D. Finnin

# Artwork

## The Chemisphere - A Star Map

**Carrie Paterson (California State University Fullerton)**

I propose to present an original artwork—a Star Map—that replaces Western-centric constellations with skeletal formulas for scented molecules. Using organic chemistry and the art of perfumery, the artwork is embedded with fragrances that make it a multi-sensory experience for the viewer, who explores space with their olfactory sense.

The Star Map is organized using the brightest heavenly bodies like Vega, Sirius, and the Andromeda Galaxy to represent carbon atoms, but also incorporates gas clouds and nebulae into the chemical structures. These hypothetical suggestions map the particularities of the Earth environment and human experience through scents that all embodied creatures on Earth can recognize: plants, flowers, blood, fecal matter, tar, etc., as well as several important precursors of amino acids critical in the production of DNA, now found to be plentiful in the formation of interstellar clouds. At least one scented precursor to amino acid has already been found in great quantities in interstellar space, ethyl formate, which gives rum its smell and raspberries their flavor (discovered by Max Planck Center for Extraterrestrial Physics in 2009). In 2012 the NASA Ames Research Center used computer models to simulate the early production of planets in our solar system and has found that organic compounds important for life on Earth form easily in the intergalactic medium as well. Astrobiological implications aside, this information is reflected in my Star Map cartography, meant not only to map our location but our specific embodiment as creatures of Earth.

The Star Map presents a response to the alienation of people from their planet, space travelers or not, and offers a multi-sensory experience of exploration. Through visual/olfactory devices such as this I try to suggest the mutability of our navigational tools and the need for reorientation, even with the most familiar lights guiding our way.

## Indigo Skies: Remapping the Universe

**Elisabeth Long (University of Chicago)**

A pair of artist's book projects examines the process by which we come to know the night sky and through it, our own minds. Tied together thematically by their use of astronomy as a metaphor and aesthetically by their use of handmade, hand-dyed indigo paper and traditional printing technique to create artistic renditions of imaginary night skies, these works explore the role of the imagination in our sense-making of visual phenomena.

"Mapping the Universe of the Imagination" starts with the human compulsion to tie astronomical mapping to storytelling—stars are not just stars, they are parts of constellations

and each constellation has its own story. The figures that we trace between pinpoints of light on an inky background are projections of our own imagination—our own attempt to make sense of the vast sea of stars by populating it with familiar images. Each constellation represents a choice—a choice to connect certain dots, particularize them into an image and, in turn, relate them to a story. To a certain extent that choice is arbitrary—why those dots and not these dots? Why that story and not this one? Mapping the Universe of the Imagination re-draws the lines, imagining new constellations and creating new stories that map a new universe inside the artist's mind. Originally a geodesic dome housing a walk-in night sky that could literally be read by opening sections of the sky to reveal books telling the story of each new constellation, the artist will present several sections of the installation and related artistic material.

"The Phases on the Far Side of the Moon" explores the connection between what one sees and therefore believes, and what one believes and therefore sees. This artist's book tells the story of a character who receives a telescope that shows the viewer what is impossible to see from our vantage point—the far side of the moon. The project explores how we confront the new or unexpected and the process of either assimilating or rejecting it. The book takes the form of a box which the reader can explore—each side opening to reveal different phases on the far side of the moon and the inside including a telescope, a volvelle that measures these mythical lunar phases, and the character's observational notes on his nightly viewings, tracing his move from disbelief to the eventual alteration of his mental paradigms to make sense of this unfamiliar lunar cosmology.

Both of these projects represent the artist's interest in the history of astronomy as a rich field for artistic exploration and for understanding the role of the imagination in the process of observation and comprehension.

## Celestial Symbols On Roman Coins

**George Beke Latura (Independent Researcher)**

After the assassination of Julius Caesar, his lieutenant Marc Antony minted coins that showed legionary standards bearing celestial symbols—the planetary stairway to the heavens. The planetary gods marched into battle with the soldiers of Rome and promised them a blessed afterlife should they fall in combat. The ladder to the sky led to the heavenly gates at the intersection of the Milky Way and the path of the Planets, an intersection already seen on coins of the Republic, and found for centuries on coins of Roman emperors.

At one celestial intersection, the twin stars of Gemini guard the gates of heaven, and Castor and Pollux already appear on the earliest denarius of Rome. With great artistry and wit,

over centuries, the engravers of the Republic depicted the Dioscuri (twin saviors), who reportedly saved Rome at the battle of Lake Regillus and then miraculously appeared at the fountain of Juturna in the Forum, where a great temple was then built in their honor. In one astronomical allusion, a silver coin shows the Twins riding side-by-side while a small dog runs below them—the constellation Canis Minor. On a beautiful denarius of Servilius, the Dioscuri sit on horses prancing in opposite directions, with their lances crossing behind their backs. Again, we have an allusion to the crossroads in the heavens that stood for the celestial portals.

Octavian would have his great-uncle Julius declared a god and, as his heir, he took upon himself the role of universal ruler, an office he advertised on his coins with a heavenly sign: Capricorn steering the course of the cosmos. The Zodiac consists of the constellations along the ecliptic, and the principal gods of the pagan world—the Wanderers, or Planets—Venus, the Sun, the Moon, Mars and Jupiter – often graced the coins of the Empire. Even coins of Constantine show Mars marching into battle with the emperor and Jupiter or Sol offering him the celestial sphere with intersecting lines—control of the very gates of heaven.

Such Roman coins—spanning centuries—prove that Rome, the greatest city of its era, was indeed inspired by astronomical phenomena.

## The Nature of Paint

**Ken Cro-Ken (Independent Artist)**

I am an ecosystem artist who uses paint to bring the invisible forces more into view. My eco-sensitive palette recreates the push-pull forces that shape and mold all things. As a result, I create microscopic and telescopic views of the earth and places scattered throughout our universe. Self-similarity led me to realize that if I wanted my mind to wonder into the far reaches of the universe, I would have to draw closer to nature. I not only to show how space looks but more importantly, how it moves.

My "Speed Element" palette is a portal through which I peer into the universe at scales great and small using paint as my lens. Microscopes, telescopes, the Internet, and even eyeglasses are portals through which technology affords us the ability to see farther than in any prior century. Rather than see the world and then paint, the opposite is true. My work is revelatory not representational and as such, I seek similar occurrences in nature. I ride nature's coattails into the far stretches of the universe.

Like a planet's surface is a visual record of past events so too do Speed Element experiments come to apparent rest. It would be more accurate to call a painting that comes to rest a "painted". It is the video that captures images that eluded capture by the canvas an could more accurately be called

the "painting". Simply put, I manipulate space, time and matter... and the matter is not just paint.

## A Personal Almanac

**Marilyn Gottlieb-Roberts (Miami Dade College)**

My almanac self-portrait pictures a life as lived under the stars of rural Georgia, Miami, West Africa and other places. It is informed by oral star traditions like those I learned as a child from my grandfather on our Georgia farm and those I later learned from cattle nomads in the West African Sahel.

Presented as eight pairs of panels, each pair is devoted to one of the four astronomical seasons or four cross-quarter days as experienced on earth. The paired sets portray and correspond in a chronological order the decades 1940 to present:

- The left-hand panel of each set shows a landscape drawn under the stars (height of Polaris reveals the earthly location of my memory), moon and planets as they appeared at midnight on the season's first night;
- The other panel describes the season's sky lore and remembers related personal experience.

My life thus pictured in rotation from spring equinox to Groundhog Day tells a "seasons of life" allegory in the stars.

# Participants

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# Navigation & Maps

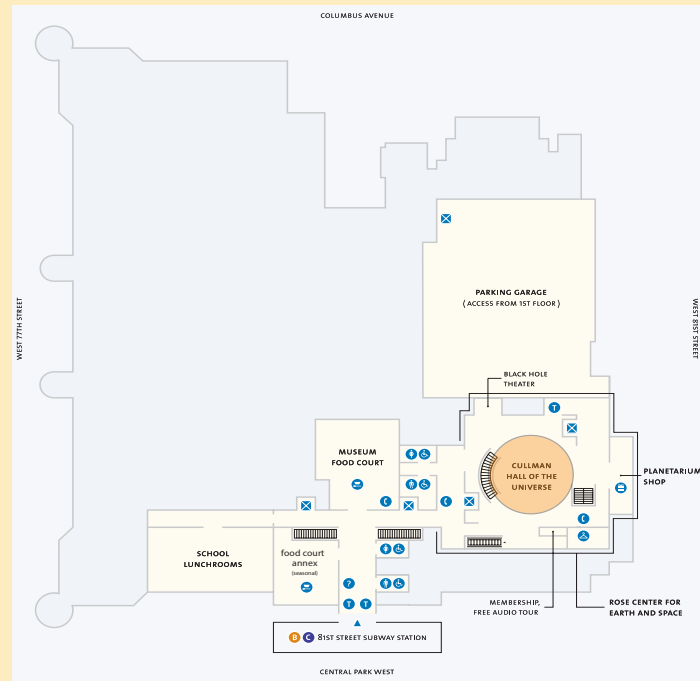
AMNH is a large institution with many interconnected buildings tucked into its tight campus. The oldest structure dates from the 1870s, while the Rose Center opened in 2000.

Navigating the various halls can be challenging, and may result in pleasant, unplanned detours from time to time.

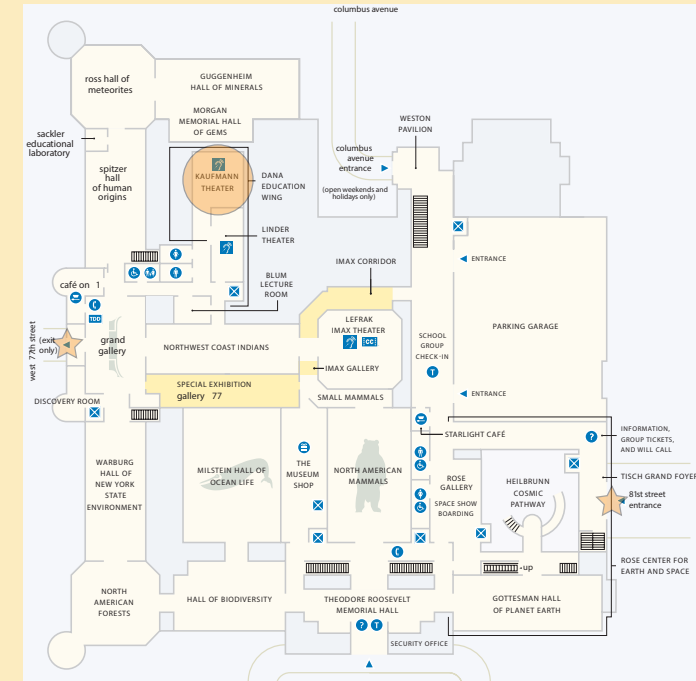
On these maps, orange circles mark the primary rooms we'll be using during the conference.

Stars mark the two entrances we'll be using on the first floor: the 77th Street entrance in the mornings and the 81st Street entrance in the evenings.

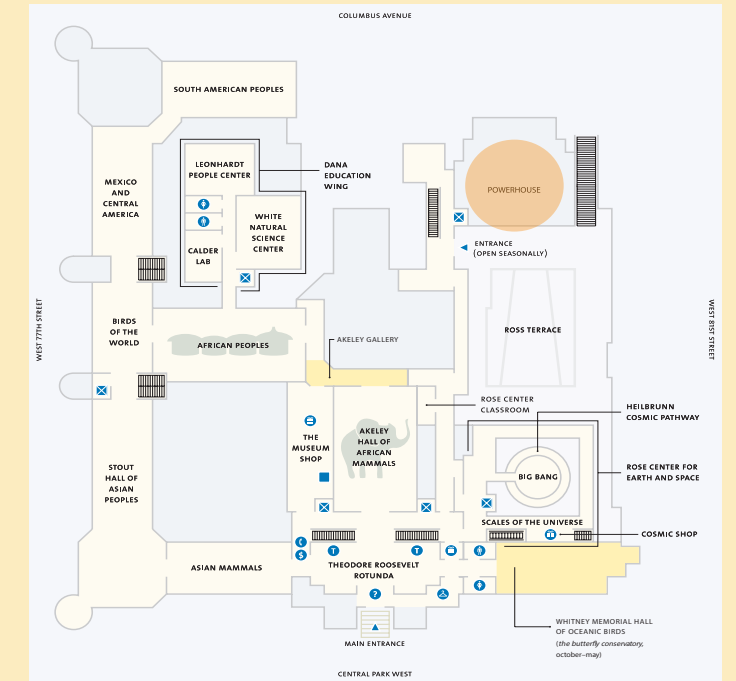
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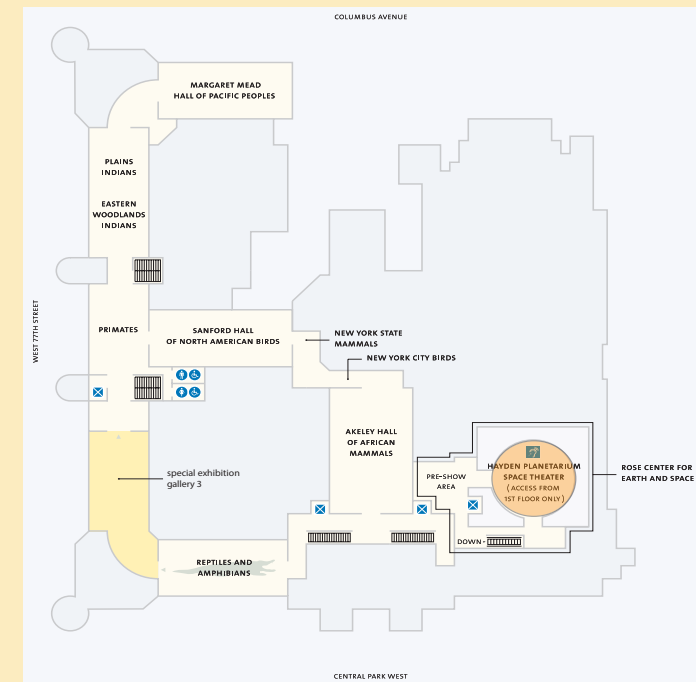
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## 2 SECOND FLOOR



## 3 THIRD FLOOR



## 4 FOURTH FLOOR

