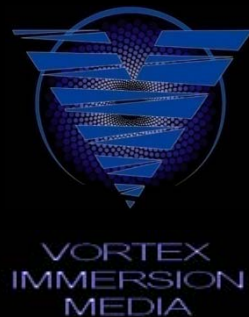




The **BIG** Picture:

Fulldome Production & Market Overview

Griffith Observatory
May 18, 2009



Ed Lantz
IMERSA

Ed@imersa.org
www.imersa.org





The **BIG** Picture

Sponsored by:

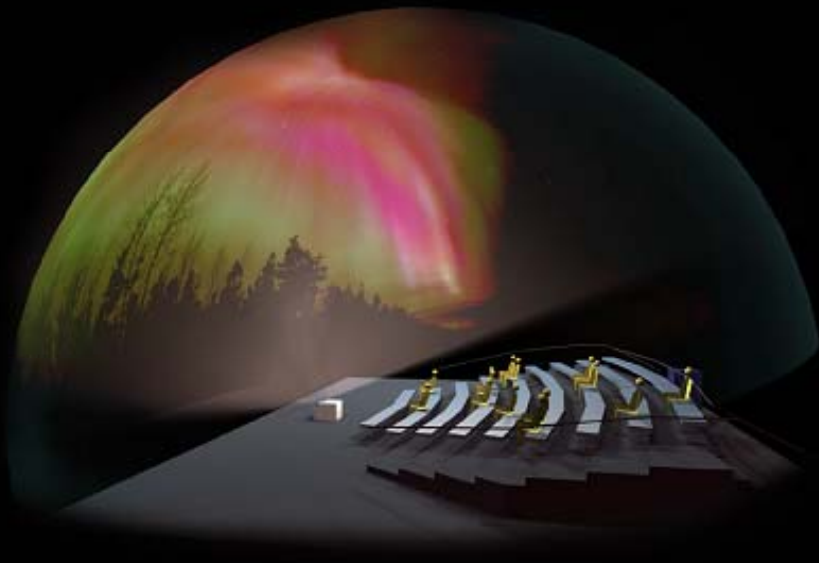


Digital Dome “Full dome” Theaters

More than a planetarium...

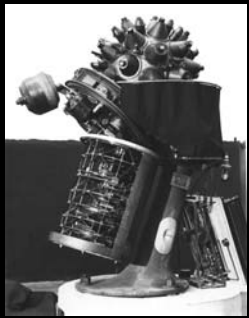
More than a movie theater...

It's a portal into cyberspace,
virtual environments
and a new venue for
digital storytelling



Digital domes are the closest thing yet to actually
“being there,” allowing experiential storytelling
through the eyes of the storyteller.

Digital Dome Evolution



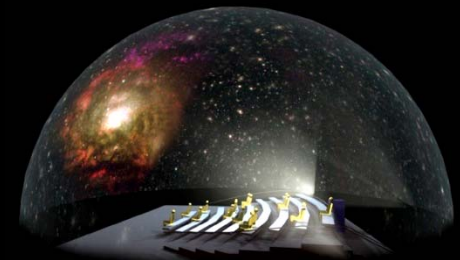
1923
Carl Zeiss's
"Model 1"
Planetarium



1973
Omnimax:
Planetarium &
Large-Format Film



1983
Evan's & Sutherland's
Digistar 1
Hemispheric Video



1996
GOTO Virtuarium
Digital Dome

Sampling of Fulldome Theaters



Volkswagen Autostadt
Wolfsburg, Germany

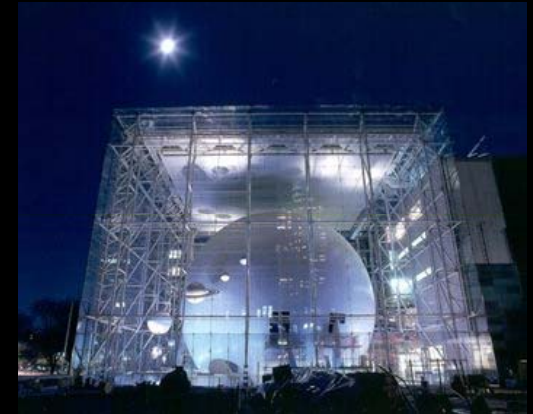
Morrison Planetarium
California Academy
of Arts and Sciences
San Francisco, CA



Papalote Museo del Niño
Mexico City



Bibliotheca Alexandrina
Alexandria, Egypt



Hayden Planetarium
Rose Center for Earth and Space
American Museum of Natural History
New York, NY

Stereoscopic 3D Digital Domes



Images Courtesy Sky-Skan



- 'Imiloa Astronomy Center: Hilo, Hawai'i
- Infitec 3D Stereo
- Opened Jan. 2008
- Integrated by Sky-Skan

- Foundation for the Hellenic World: Athens, Greece
- Infitec 3D Stereo
- Opened 2007
- Integrated by SEOS

Portable Domes



VORTEX Mobile Dome

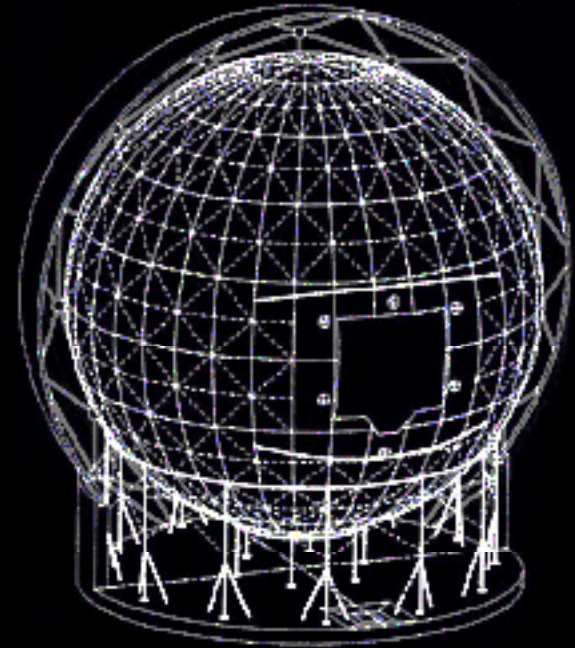
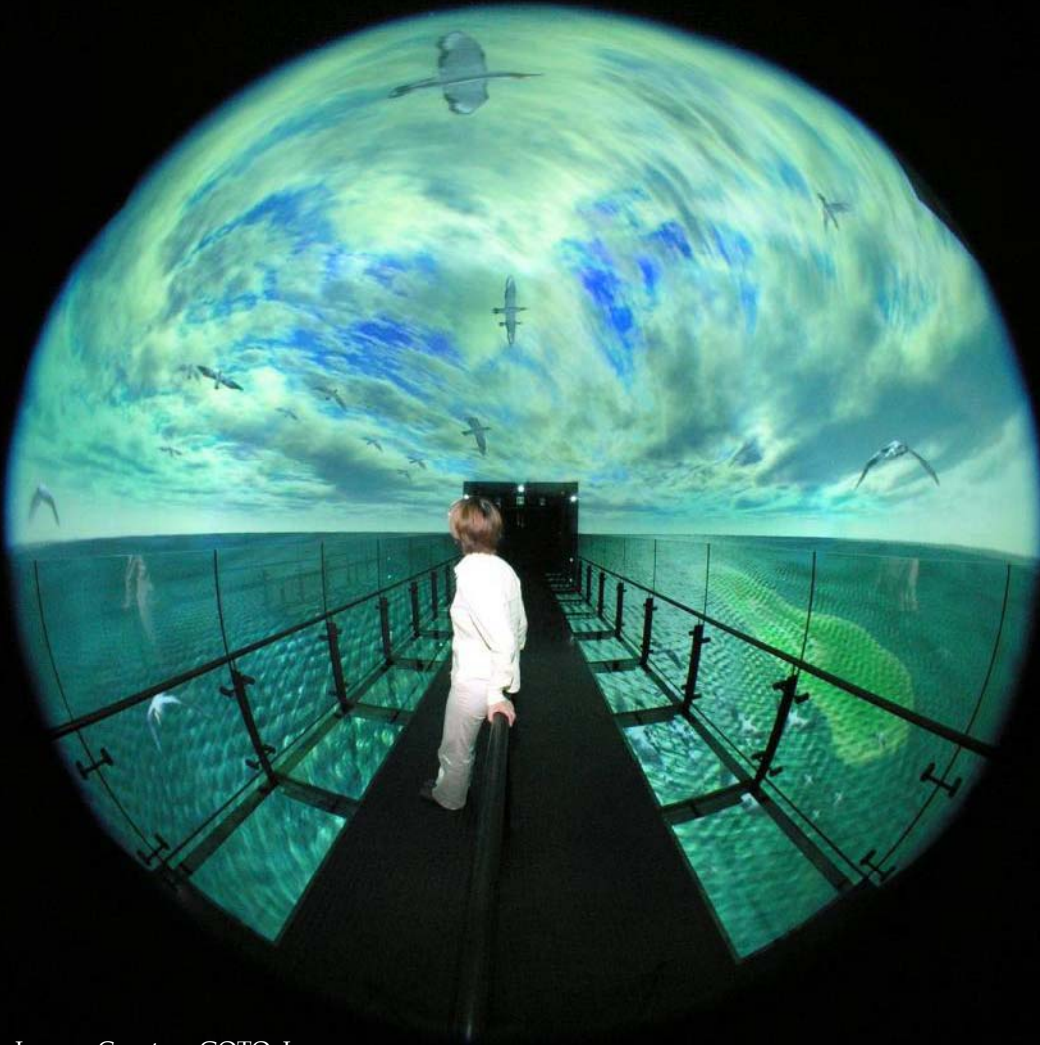


SciDome™

- Dome Production Environments
- Educational Planetariums, Portables, Art Exhibits
- Tradeshows, Nightclubs, Special Venues

THEATER 360

National Museum of Nature and Science, Japan



12.8m, 360° spherical display
(Courtesy GOTO, Inc.)

Other Fulldome Applications



Images Courtesy Vortex Immersion Media

Images Courtesy Obscura Digital

- Tradeshows
- Nightclubs
- Concerts
- Dance Parties
- Restaurants
- Spas
- Corporate

A New Medium...



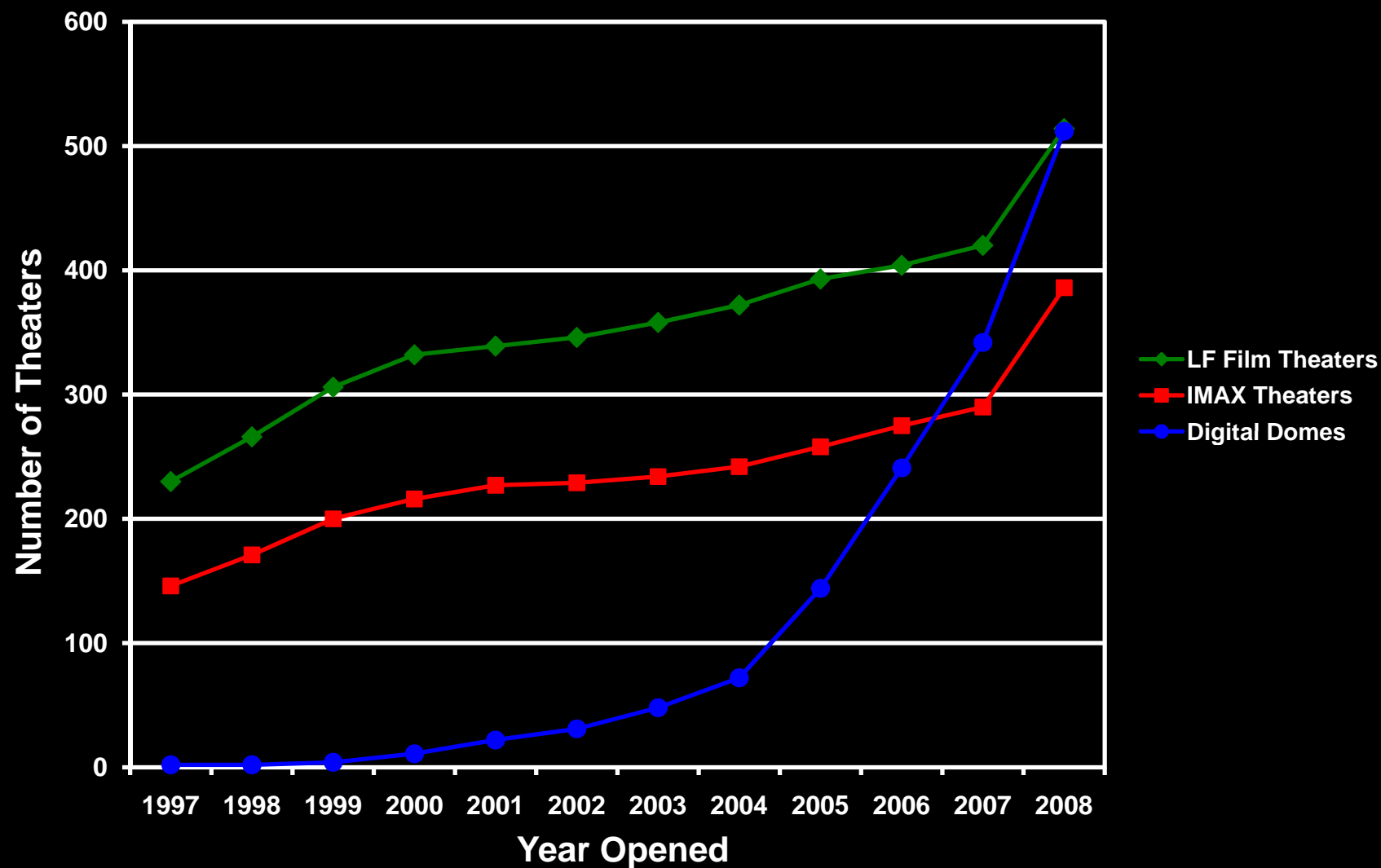
- 4K x 4K Immersive Cinema Productions (up to 8K)
 - 30 fps typical, 60 fps available on most systems
 - Spherical rendering & editing tools
- Real-Time 3D Performances
 - Growing libraries of datasets
 - Audience interactivity
- Surround Audio
 - Up to 23.1 audio channels
- Industry Standards Emerging

Full dome Theater Breakdown

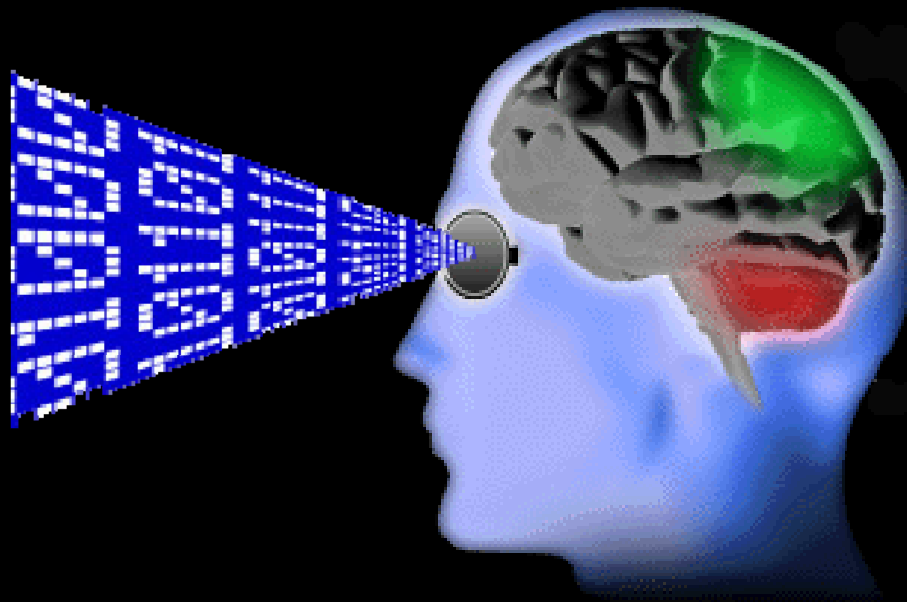
- 546 Theaters Worldwide
 - Half in U.S.
 - 36% are in Museums & Science Centers (US)
 - 22% are in School Districts (US)
 - 26 million annual attendance
- 58% are Single-Lens Fisheye Systems
 - Small and portable domes
- 3300 Planetariums Worldwide
 - 110 million annual attendance
- Over 100 Show Titles



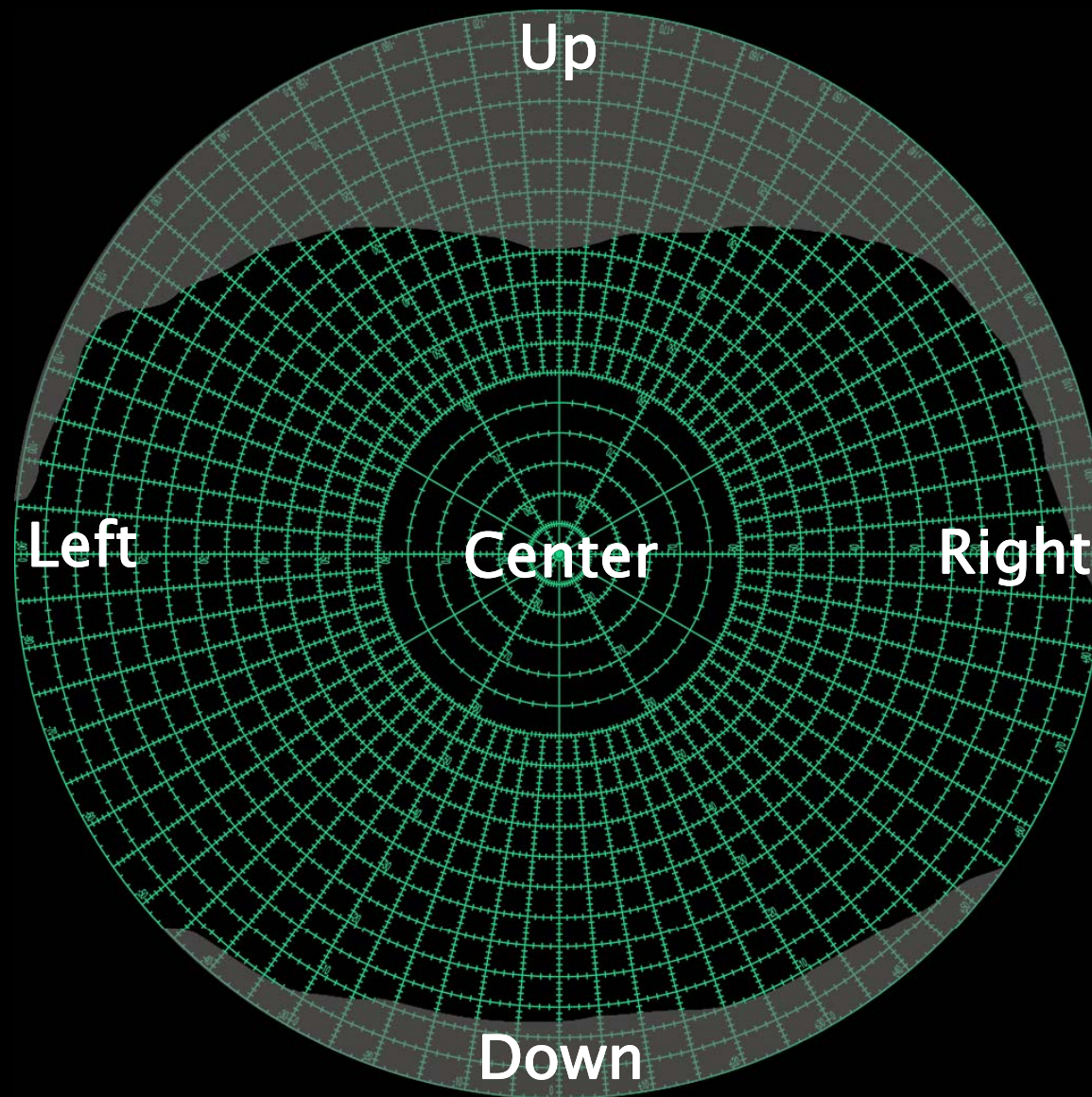
Fulldome Theaters Worldwide



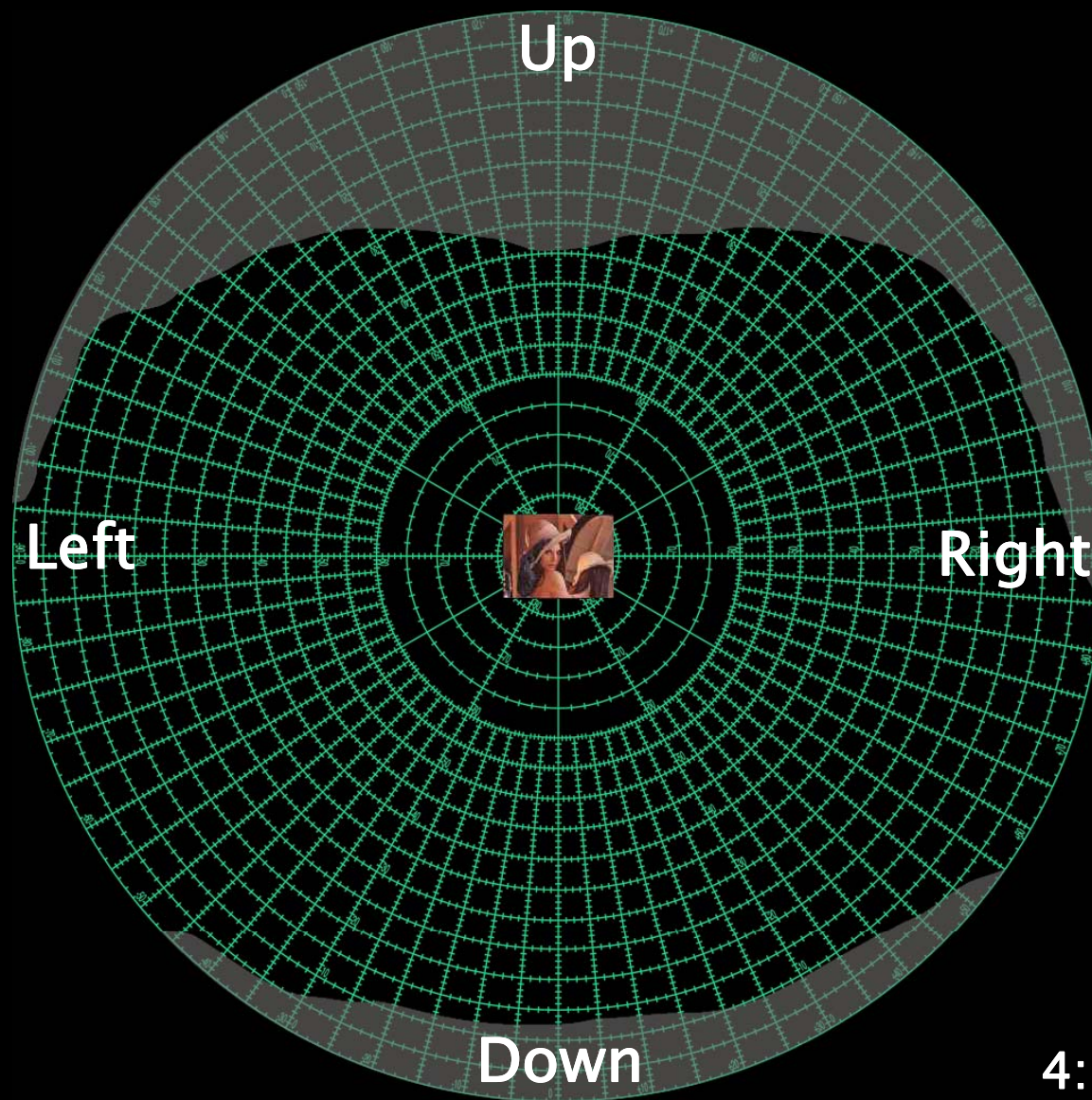
Immersive Theaters Provide a Wideband Interface to the Brain...



Powerful Surround Video and Audio Experience

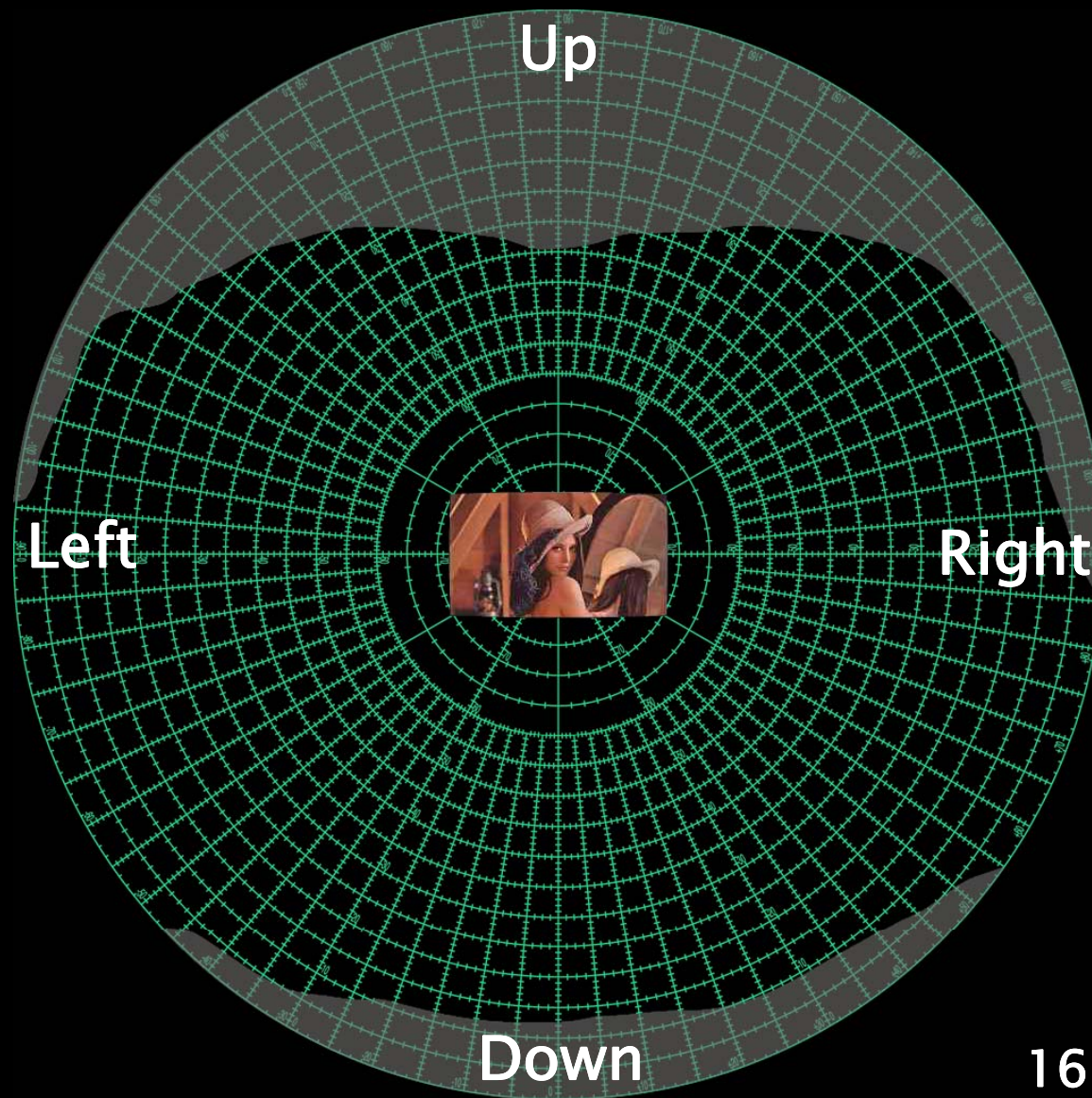


Field of View:
Human Eye



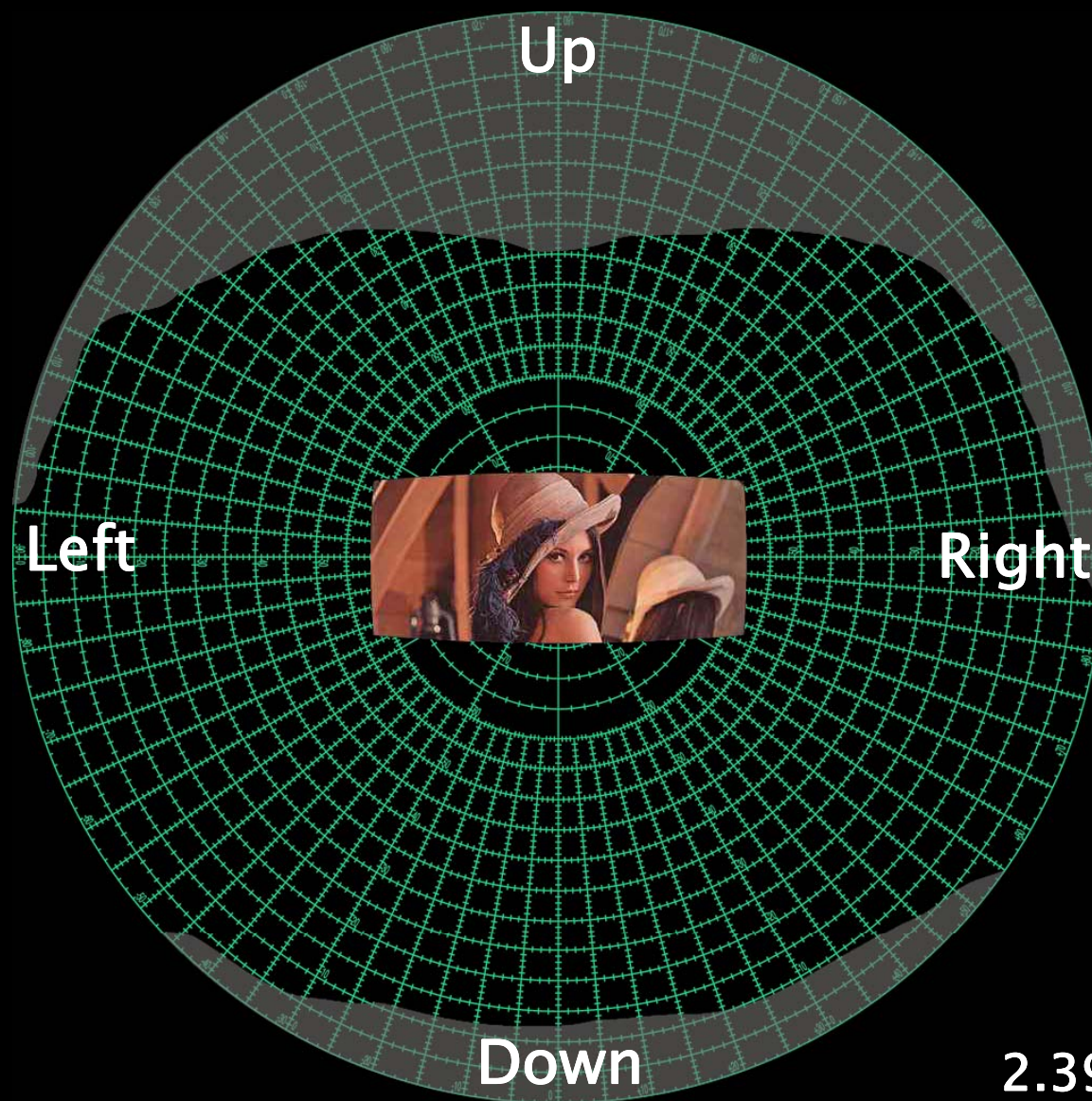
Field of View:
Television Set

4:3 aspect
18 deg FOV
3 screen widths



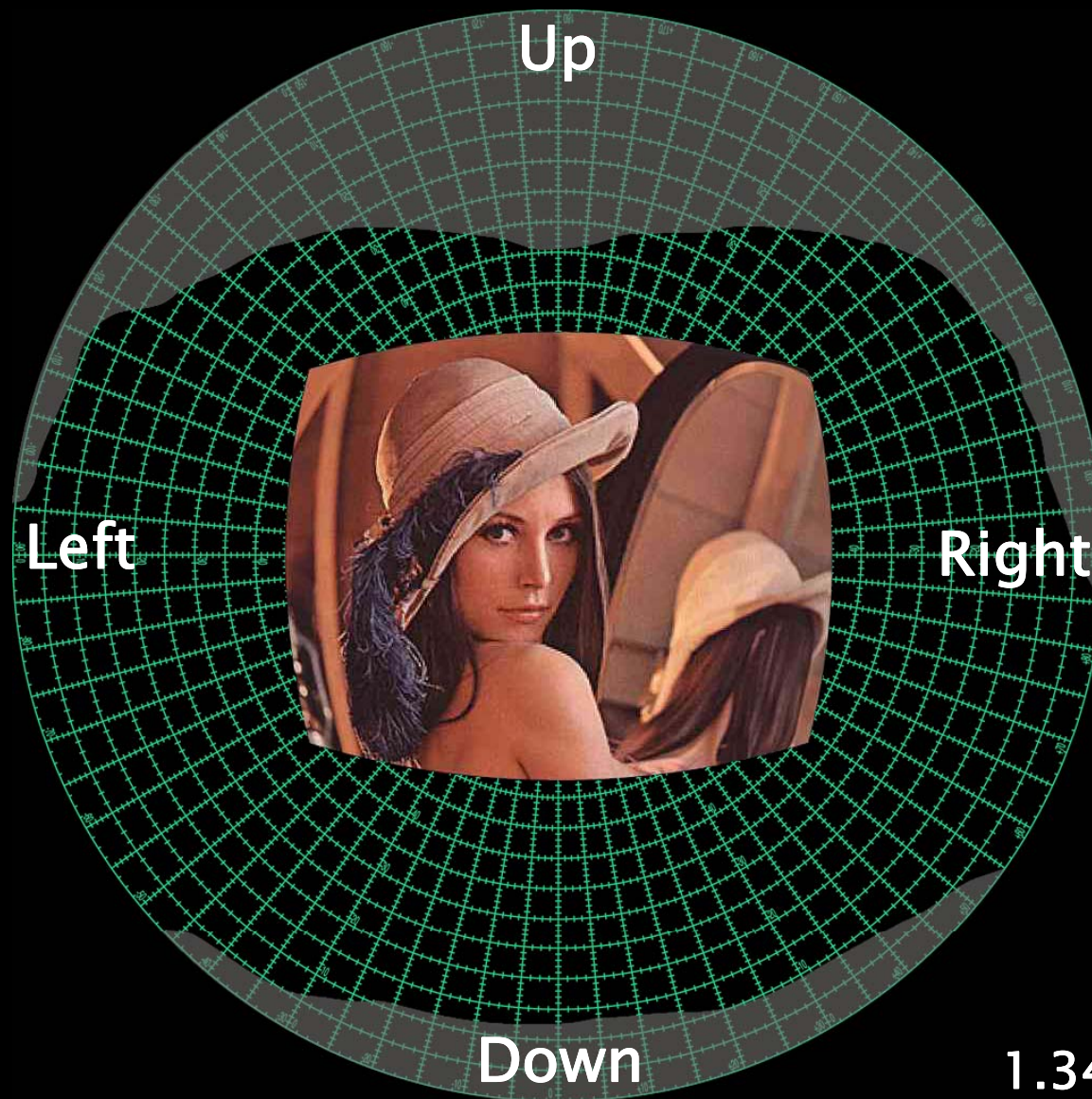
Field of View:
HDTV

16:9 aspect
36 deg FOV
1.54 screen width



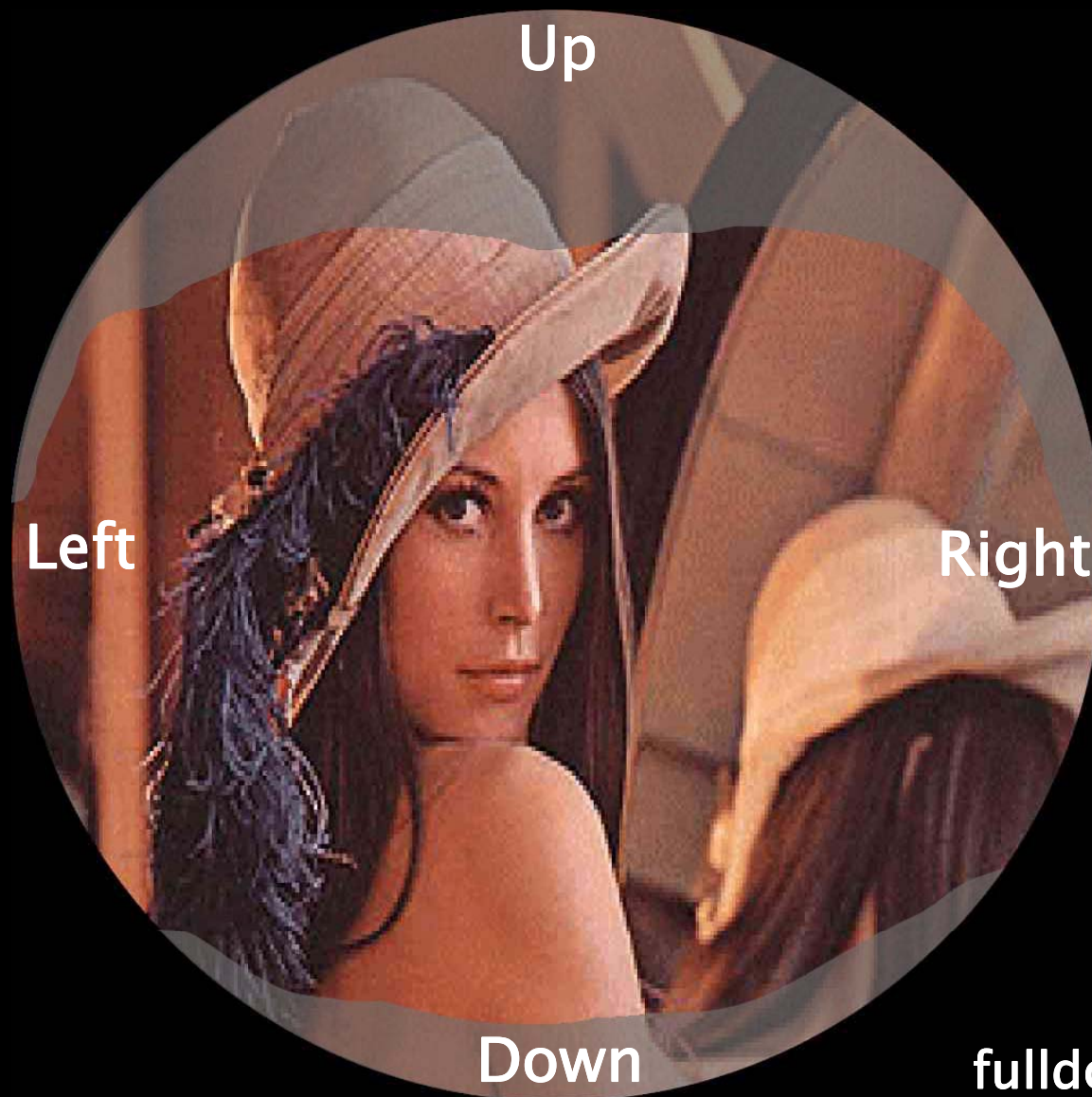
Field of View:
Cinema

2.39:1 aspect
62 deg FOV
2 screen heights



Field of View:
15/70 (IMAX)

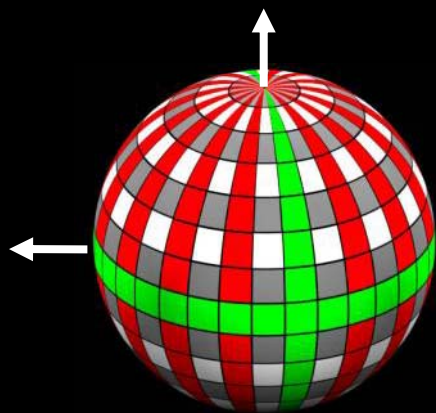
1.34:1 aspect
90 deg FOV
0.5 screen width



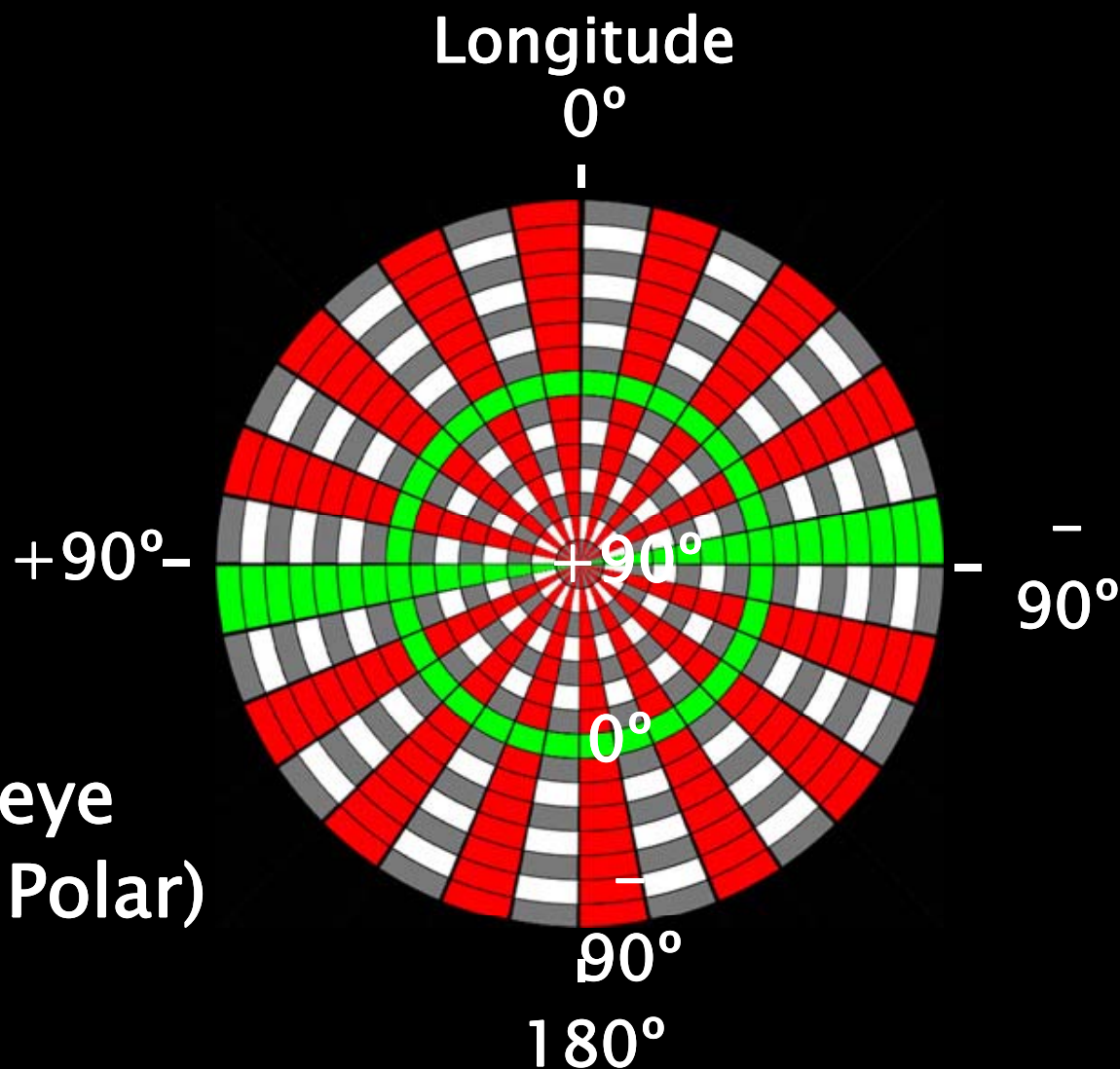
Field of View:
Full dome

fulldome aspect
180x360 deg FOV
Dome Center

Dome Master Format



Polar Fisheye
(Equidistant Polar)



Spherical & Panoramic Photography



Panoscan Digital
Panoramic
Camera

www.panoscan.com



Spherical Fisheye
with Pano Bracket

www.bophoto.com



GigaPan
Multigigapixel
Panoramic
Photography

www.gigapansystems.com

Spherical Live Action



RED Camera
w/Fisheye

www.dome3d.com

000866
00:00:36:02



2300x2300
24 FPS
2968 frames
2:03:16



4K Time Lapse
Fisheye

www.PMWCreative.org



Ladybug®3
Spherical Digital
Video Camera

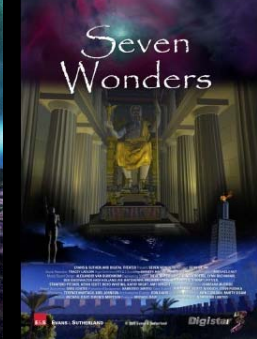
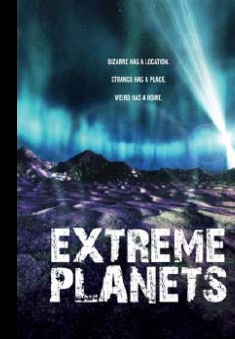
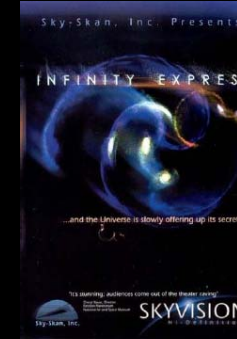
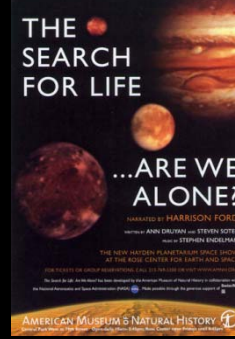
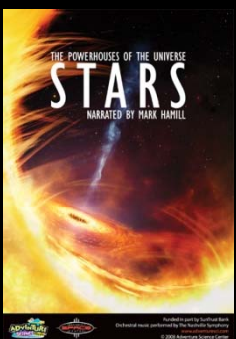
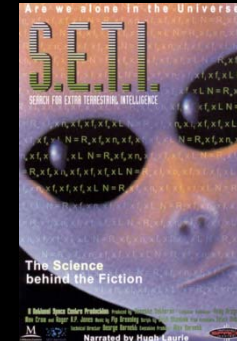
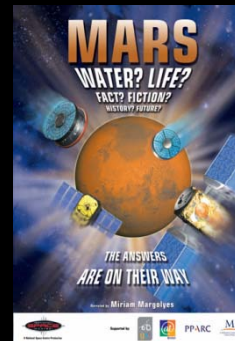
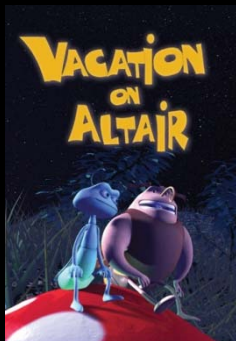
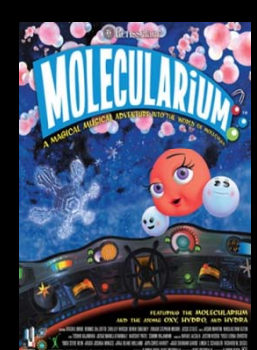
www.ptgrey.com



Immersive
Media's
Dodecahedral
Video Camera

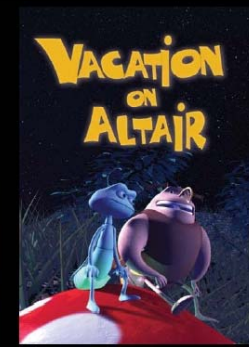
www.immersivemedia.com

Immersive Cinema Productions

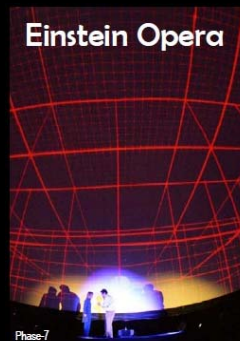


Immersive Cinema Productions

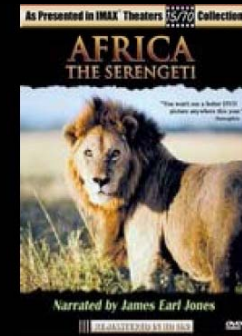
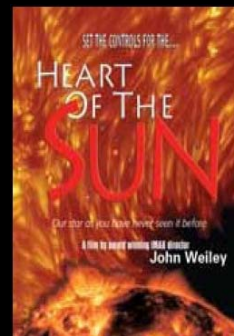
Children's Programs



Music Programming



Digitized IMAX Films

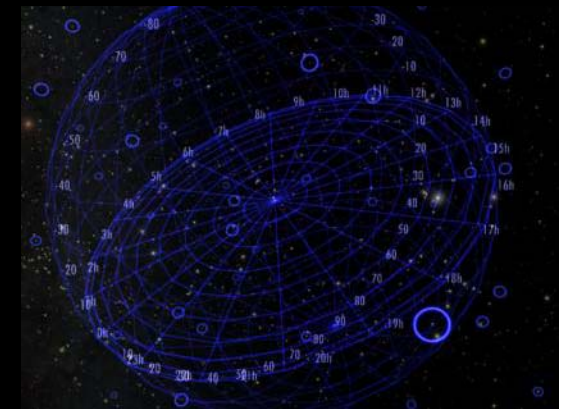
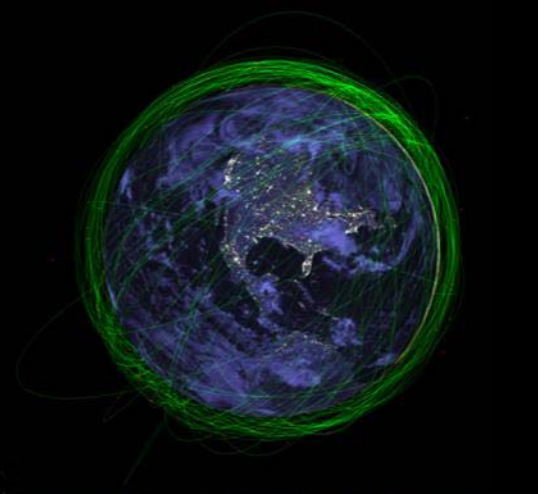


Immersive Cinema Productions

- **24-minute 4K animation can cost \$150K to \$1m+**
 - Most are between \$300k to \$600k = \$15-\$25K/min
- **Annual license fees:**
 - Large domes \$25K+
 - Medium domes \$15K - \$25K
 - Small domes \$5K - \$12K
 - Portables \$2K - \$5K
- **Distribution fees 25%**

Digital Planetariums

Real-Time Navigable, Scientifically Accurate
Astronomical and Astrophysical Datasets



Real-Time SciArt Productions



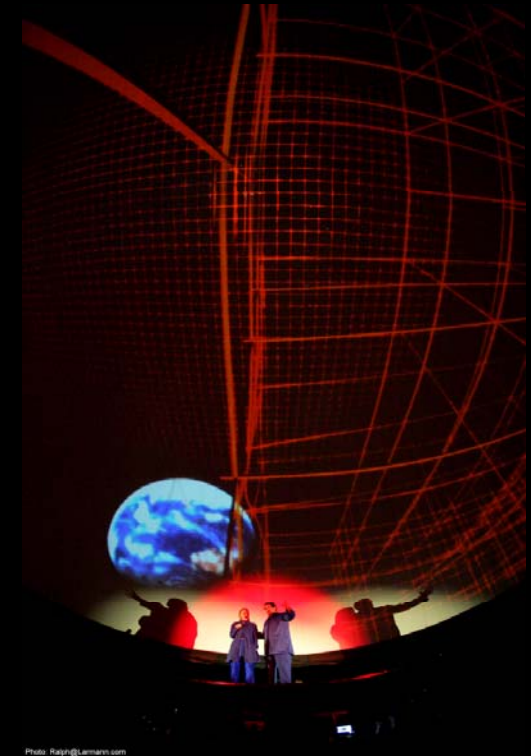
Prof. Tom Duscher's ICH2
live interactive performance
Kiel Planetarium, Germany



J. Walt Adamczyk
Real-Time 3D
Visual Music Performance
Glendale Community
College



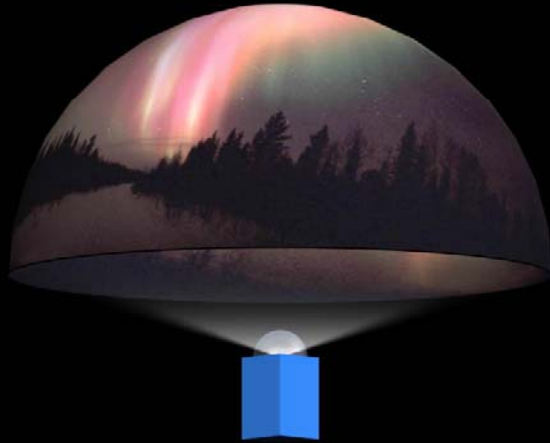
Bella Gaia
Kenji Williams
& Dr. Kachun Yu
Denver Museum
of Nature & Science



c-the speed of light
phase7
Berlin, Germany

Real-Time Interactive
SciArt Performances

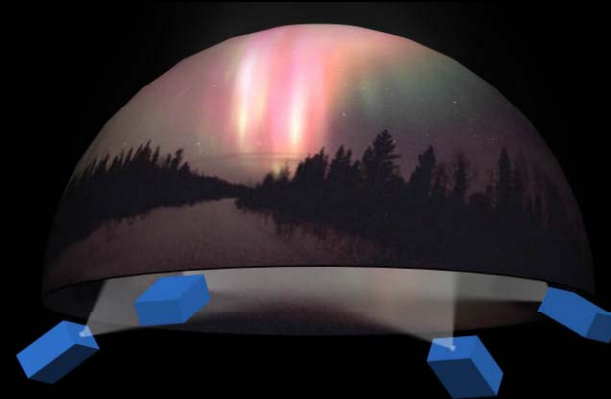
Spherical Projection Formats



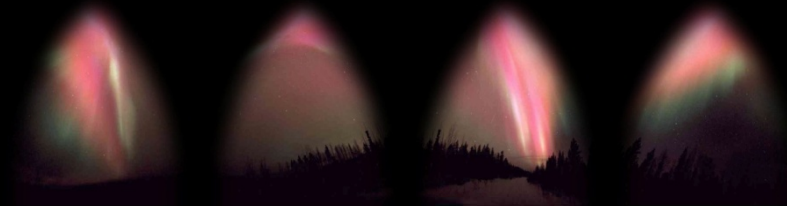
Single Projector



Single Frame
(Fed by one or more servers)



**Edge-Blended
Projectors**



Sub Frames Fed by Separate Servers

Truncated Hemisphere



**SXGA+
Fisheye System**

1400 x 1400 Dome Master (t)

1.2M pixels on dome

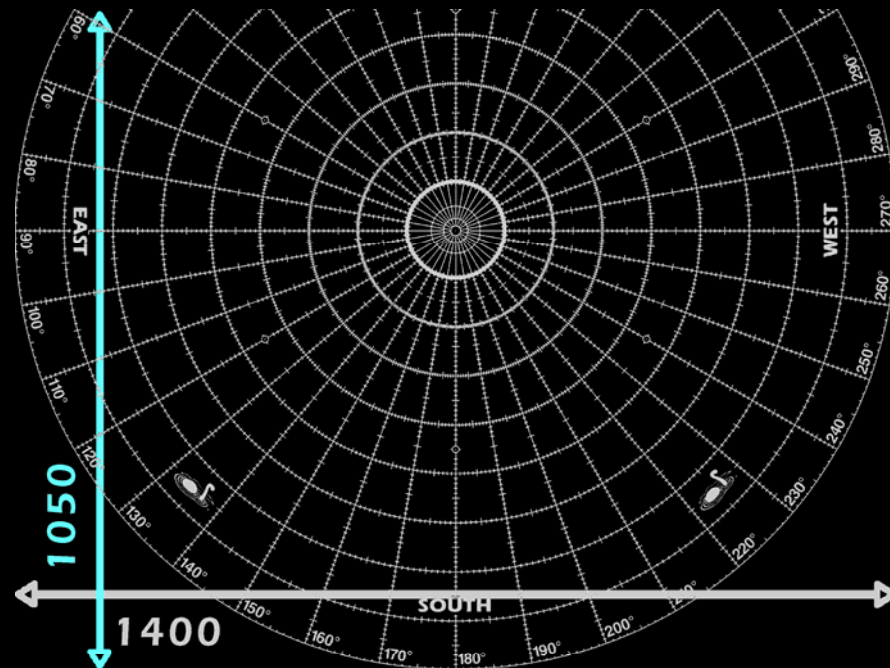
7.8 pixels/degree

Up tp 16,800 lumens

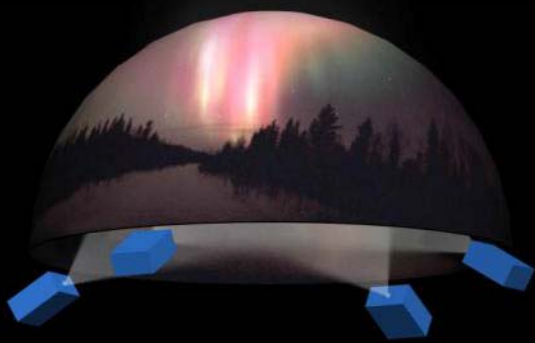
>1500:1 contrast

1 projector (DLP)

1 channel @ 1400 x 1050

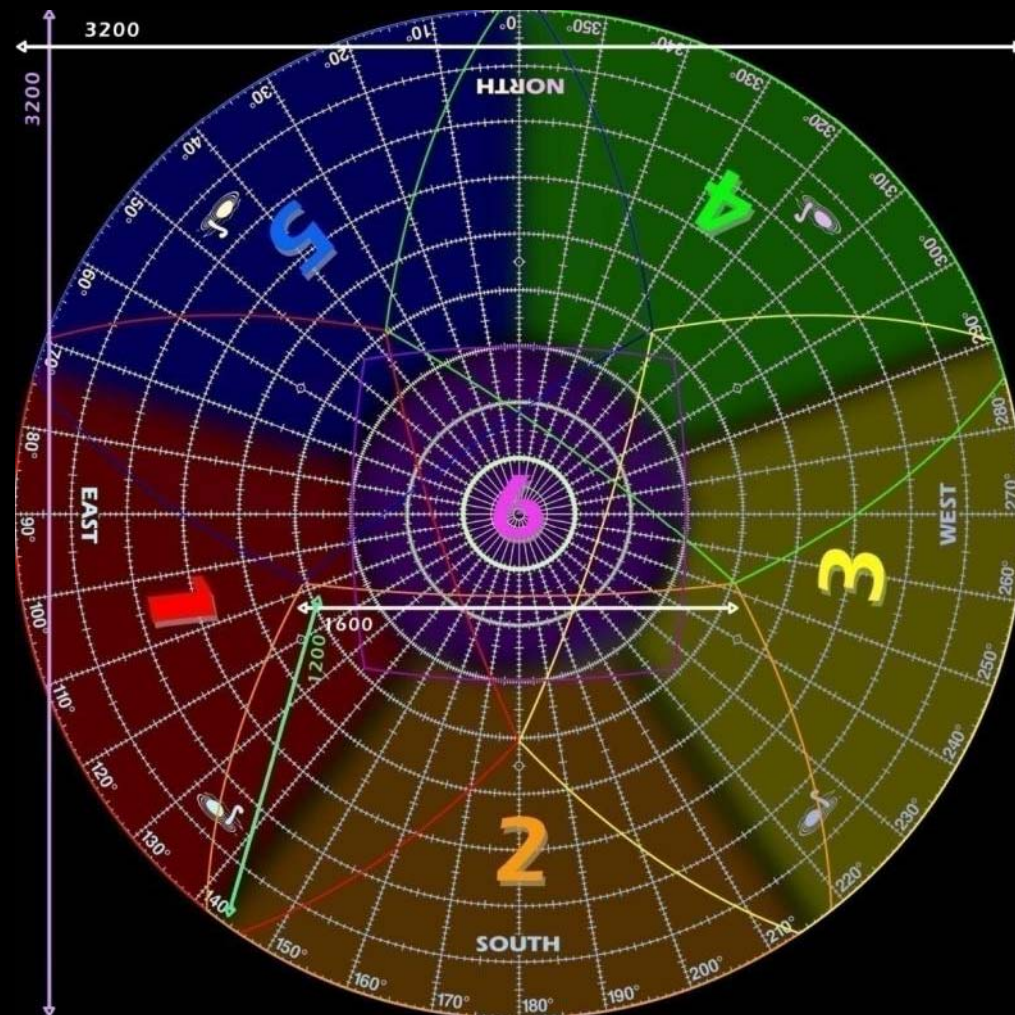


DLP Projector Edge-Blend

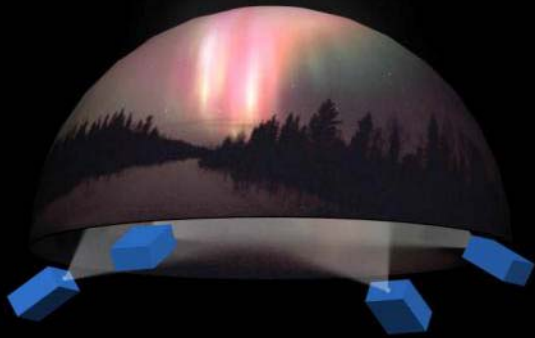


6-Projector Edge-Blend (DLP)

2880 x 2880 Dome Master
6.5M pixels on dome
16 pixels/degree
29,250 lumens
>1800:1 contrast
6 projectors (DLP)
6 channels @ 1400 x 1050

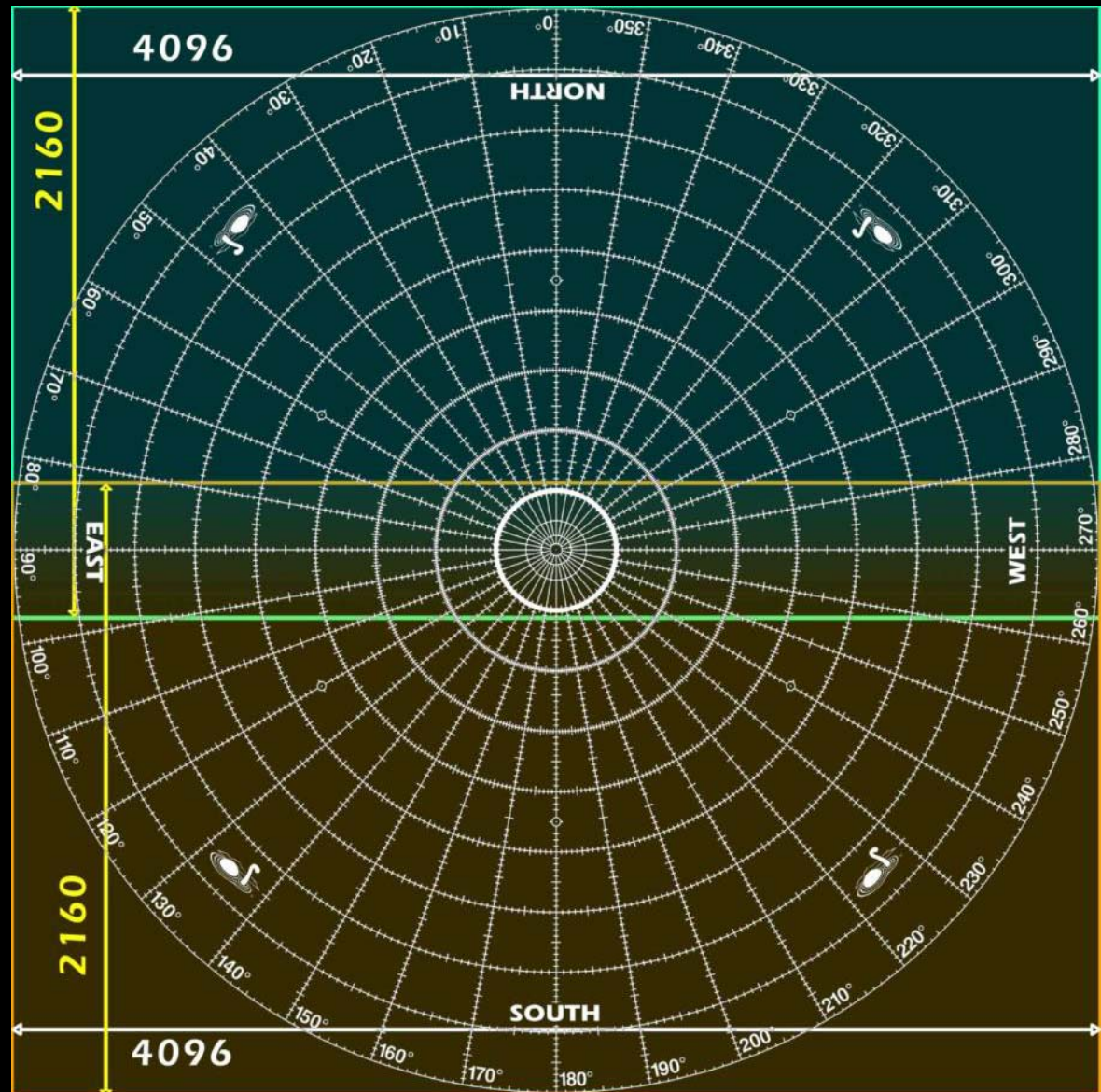


Dual 4k Fisheye with Edge-Blend



Dual Fisheye System

4096 x 4096 Dome Master
13M pixels on dome
22.7 pixels/degree
14,900 lumens
1800:1 contrast
2 projectors (Sony SXR4 4k)
8 channels @ 2k x 1k





Immersive Media Entertainment, Research, Science & Arts

IMERSA is an international non-profit professional organization that celebrates and promotes immersive and full-dome media for education and entertainment in planetariums, schools, museums, cinemas, events and attractions.



Founding Sponsors





IMERSA Goals

Develop industry standards, guidelines & recommended practices

Fund/program development for research, arts, & other programs

Professional development including educational resources and programs, certifications, and awards

Professional communication and collaboration through events, online networking and an annual conference

Industry research, including market and industry statistics, historical records, original research and product evaluations

Outreach to the media, the public and other trade organizations to raise awareness of and promote the immersive medium

Advance the immersive arts by showcasing artists, promoting immersive galleries and exhibitions, archiving critical works, and supporting the DomeFest fulldome art festival

Giant Screen Digital Standards Efforts

- IMERSA – Scalable specification up to cinema quality dome.
- DISCUSS – Digital Immersive Screen Colloquium for Unified Standards and Specifications
 - Led by John Jacobsen of White Oak
 - Seeking NSF Funding
- GSCA Technical Standards Task Force
 - Led by Andrew Oran of FotoKem



DomeFest 2009

September 25-27, 2009, Albuquerque, New Mexico, USA

Full dome Film Festival

The Making Of... Presentations

Technology Demonstrations

IMERSA Day

- Keynote address
- Panels on Show Production and Distribution
- "State of the Dome Address" by Mark Petersen
- Vendor-sponsored workshops in portable domes or classrooms
- IMERSA Fulldome Standards meeting



Find out more at:

IMERSA.org

wikipedia.org/wiki/Fulldome

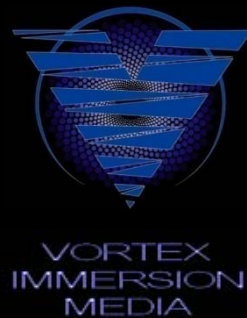
extranet.spitzinc.com/reference

groups.yahoo.com/group/fulldome/

lochnessproductions.com



Thank You!



Ed Lantz
IMERSA

Ed@imersa.org
www.imersa.org

