SCIENCE IN MOTION

CHANDRA'S 6-YEAR SYMPOSIUM
November 2-4, 2005

April Hobart, Animator
Chandra X-ray Center
PROCESS:
Static Data to Animated Story

- Chandra Image/Scientist’s Paper
- Storyboard
- Drafts to Final Animation
- Release
X-ray & Visible Data

NGC 6240
Merging Black Holes

X-ray and Visible Data
Full movie:

Credit: X-ray: NASA/CXC/MPE/S.Komossa et al.;
Optical: NASA/STScI/R.P.van der Marel & J.Gerssen
Challenge: Merging Disks

NGC 6240
Merging Black Holes
Challenge: Basing Animation on Actual Simulation Data

NGC 6240
Merging Black Holes

LISA Gravitational Waves Simulation
Full movie:
http://hea-www.harvard.edu/~cxo/media/science_in_motion/BH_Merger/lisa2.avi

LISA Simulation data
Final Animation

Final Merger Movie
Full movie:

NGC 6240
Merging Black Holes

Simulation credit: Josh Barnes (U of Hawaii)/John Hibbard (NRAO)
Perseus
Soundwaves in Outerspace
CHANDRA X-RAY OBSERVATORY

Challenge: Scientist/Artist Communication

Perseus: Soundwaves in Outerspace
Challenge: Scientist/Artist Communication

Perseus
Soundwaves in Outerspace

Approximate timing: panels 1–3 (4s), 4–5 (2s), 7–8 (3s), 9–11 (2s), 12–13 (3s), 14–16 (2s), 17–18 (4s)
Challenge:
Scientist/Artist
Communication

Perseus
Soundwaves in
Outerspace

Notes: the two (subtle) changes are to make the region B a slightly brighter red than the ambient gas and to make smooth changes between the two colors, especially between regions A and B.
Challenge:
Accuracy vs.
Coolness Factor

Perseus
Soundwaves in
Outerspace

Perseus: Early Version of Animation
Full movie:
http://hea-www.harvard.edu/~cjmmedia/science_in_motion/Perseus/Perseus_test1.mov
Final Animation

Perseus
Soundwaves in Outerspace

Perseus: Early Version of Animation
Full movie:
http://hea-www.harvard.edu/~cxnmedia/science_in_motion/Perseus/Perseus_test1.mov
News Story

**Perseus**

*Soundwaves in Outerspace*

Perseus: News Story
Full movie:
CHANDRA X-RAY OBSERVATORY

MS 0735+561
Supergiant Cavities
Challenge:
A New Look

MS 0735+561
Supergiant Cavities
Challenge: A New Look
-Dusty Disk

MS 0735+561
Supergiant Cavities

Dusty Disk Inspiration
Full movie:
http://hea-www.harvard.edu/~cxcmedia/science_in_motion/Supergiant_Cavities/esa_1christensen.mp4

Animation: ESA & Hubble ESA Information Centre
(M. Kornmesser & L. L. Christensen)
Challenge:
A New Look
-Dusty Disk
-Better Angle

**MS 0735+561**
Supergiant Cavities

Superiant Cavities: Early Version of Animation
Full movie:
http://hea-www.harvard.edu/~cxmedia/science_in_motion/Supergiant_Cavities/early_angle.mp4
Challenge: A New Look
- Dusty Disk
- Better Angle

MS 0735+561
Supergiant Cavities
Challenge:
A New Look
-Dusty Disk
-Better Angle
-Improved Cavities

MS 0735+561
Supergiant Cavities

Supergiant Cavities: Final Animation
Full movie:
http://heasarc.gsfc.nasa.gov/heasarc/data/chandra/MS0735.html
News Story

**MS 0735+561**

Supergiant Cavities

Supergiant Cavities: News Story
Full movie:
Orion
Superflares
Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares

Flares in orion: X-ray Data Timelapse
Full movie:
http://hea-www.harvard.edu/~cxnmedia/science_in_mOTION/Orion/data_timelapse.mp4
Challenge: Many Renditions
Support: Many Resources

Orion
Superflares
CHANDRA X-RAY OBSERVATORY

Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares
Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares

More Dusty Disk Inspiration
Full movie:

Animation credit: Robert Hurt (Spitzer)
Challenge: Many Renditions
Support: Many Resources

Orion
Superflares
Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares
CHANDRA X-RAY OBSERVATORY

Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares
Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares

Real Flare Footage
Full movie:
http://hea-www.harvard.edu/~cxmedia/science_in_motion/Orion/flare_example1.mov
Challenge:
Many Renditions

Support:
Many Resources

**Orion**
Superflares

Real Flare Footage
Full movie:
http://hea-www.harvard.edu/~cxnmedia/science_in_motion/Orion/flare_example2.mov
Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares

Early Flare Test
Full movie:
Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares

Late Flare Test
Full movie:
CHANDRA X-RAY OBSERVATORY

Challenge:
Many Renditions

Support:
Many Resources

Orion
Superflares

Flares in Orion: Early Version of Animation
Full movie:
CHANDRA X-RAY OBSERVATORY

Challenge: Many Renditions

Support: Many Resources

Orion Superflares

Asymmetrical flash

Brightness of flash

Time (seconds)

Screen white-out
Final Animation

Orion
Superflares

Flares in Orion: Final Animation
Full movie:
Where is Chandra?

Tour of the Milky Way in Perspective
Challenge: Where are we anyway?

Where is Chandra?
Tour of the Milky Way in Perspective
Challenge: Where are we anyway?

Where is Chandra?
Tour of the Milky Way in Perspective
Challenge: 2D to 3D Galaxy

Where is Chandra? Tour of the Milky Way in Perspective
Where is Chandra?

Tour of the Milky Way in Perspective

Virtual Voyage of the Milky Way: Local Group of Galaxies to Milky Way Center
Full Movie:
Where is Chandra?
Tour of the Milky Way in Perspective

Virtual Tour of the Milky Way

Take a virtual voyage from Earth through the Milky Way galaxy to the outer reaches of the Local Group of galaxies.
Thank you!