

A new approach to dome projection

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Current options

- Multiple tiled CRT projectors.
- Multiple tiled digital projectors.
- Fisheye lens and digital projector (single or twin)

Multiple tiled and edge blended projectors are not suited to portable domes and have a high cost of ownership for small fixed planetariums.

Fisheye lens

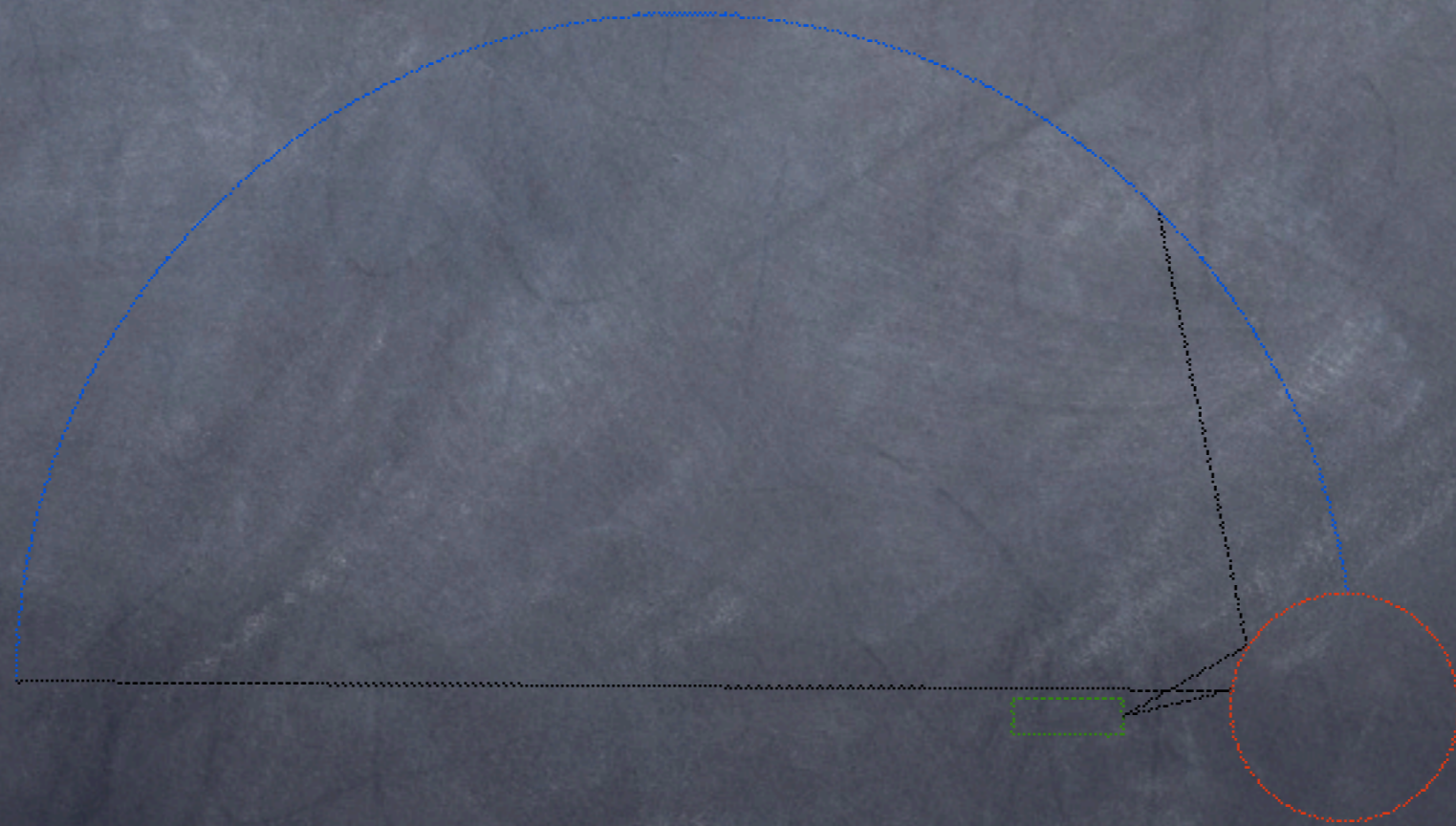
- Simple setup and alignment.
- No special computer hardware requirements.
- Play back existing fisheye content directly.
- For pixel efficiency they generally use truncated fisheye images, don't cover the whole dome.

Fisheye lens and projector are offered by a number of companies but these are mostly all sourced from one company, elumenati.



Spherical mirror

Replace the fisheye lens with a spherical mirror!

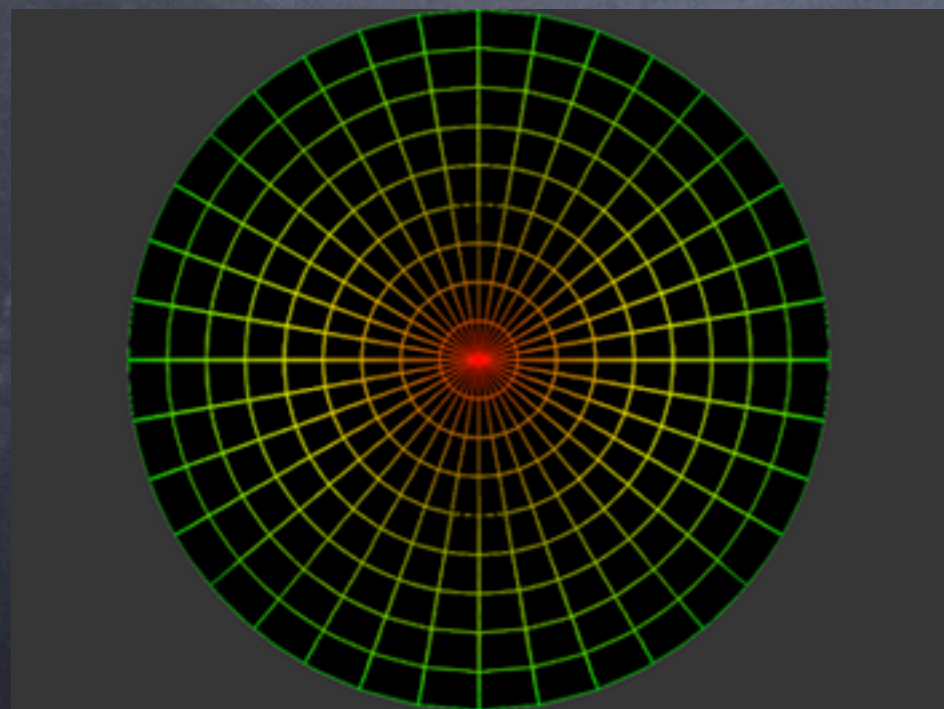


Advantages over fisheye

- Cost.
- The center of the dome can be used by the audience.
- Flexibility to choose and upgrade projectors based on personal preferences (brightness, contrast, resolution).
- Flexibility to vary the area of the dome that is projected onto.
- Longer projector life span.

Converting movie content

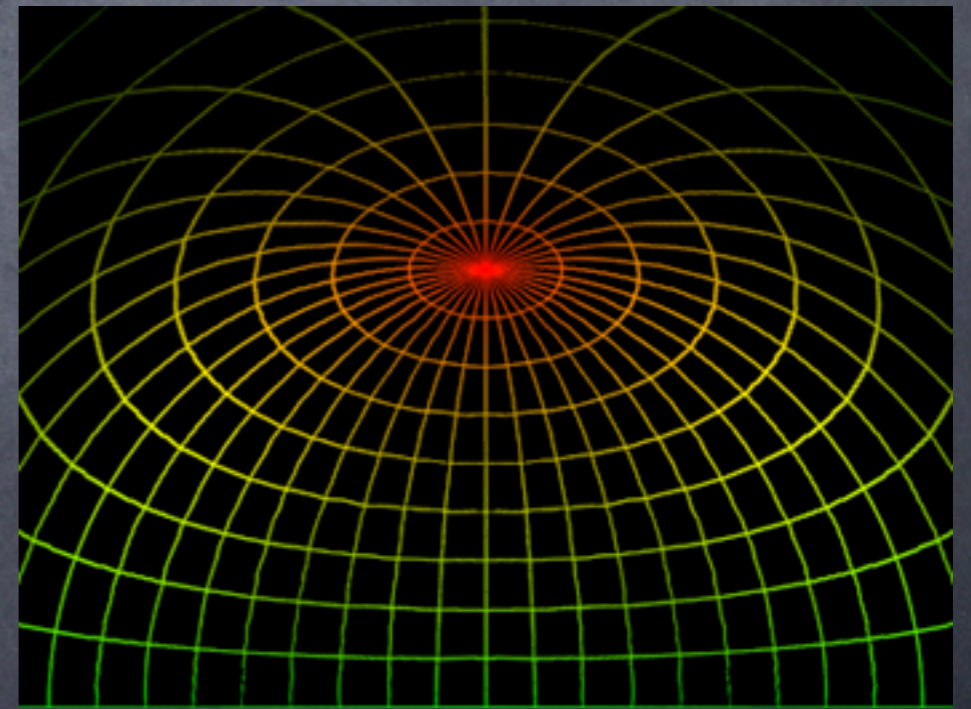
- Planetarium movies generally exist as fisheye projected frames.
- Extract frames, warp fisheye, build new movie.
- Includes correction for intensity variation.



Fisheye



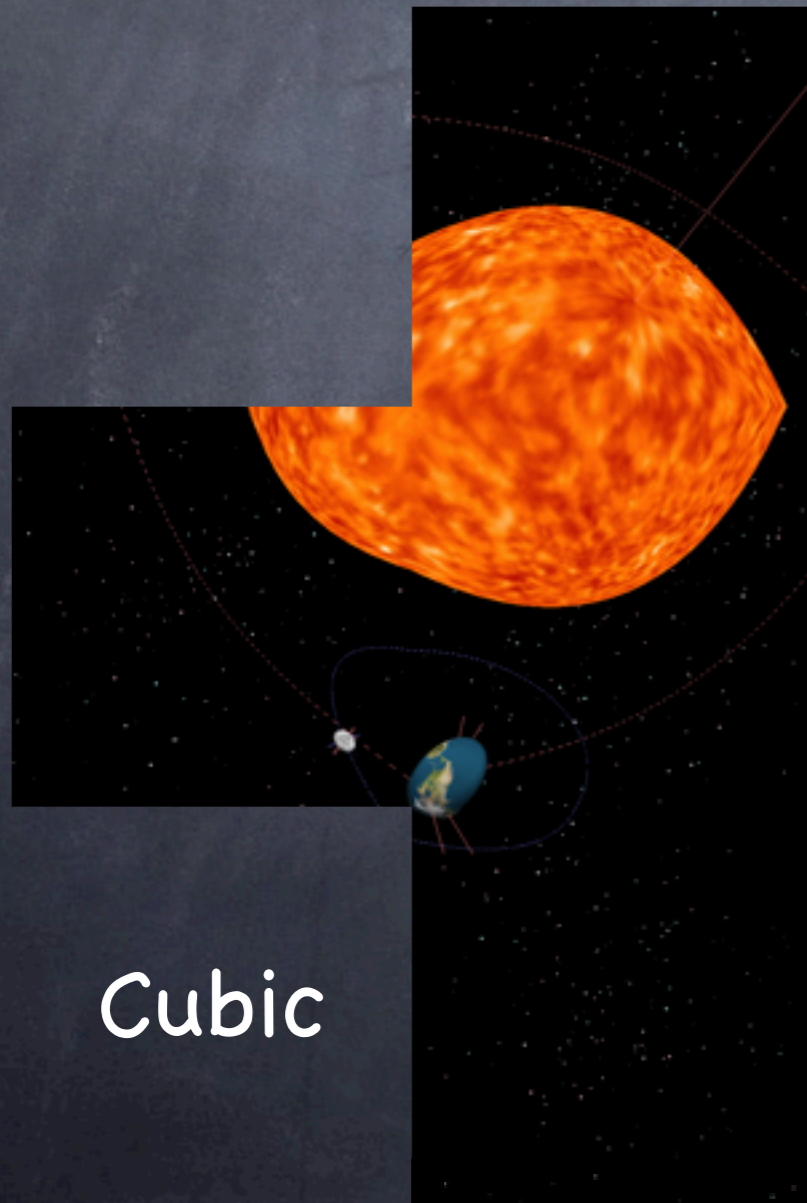
uvxy
warp map
file



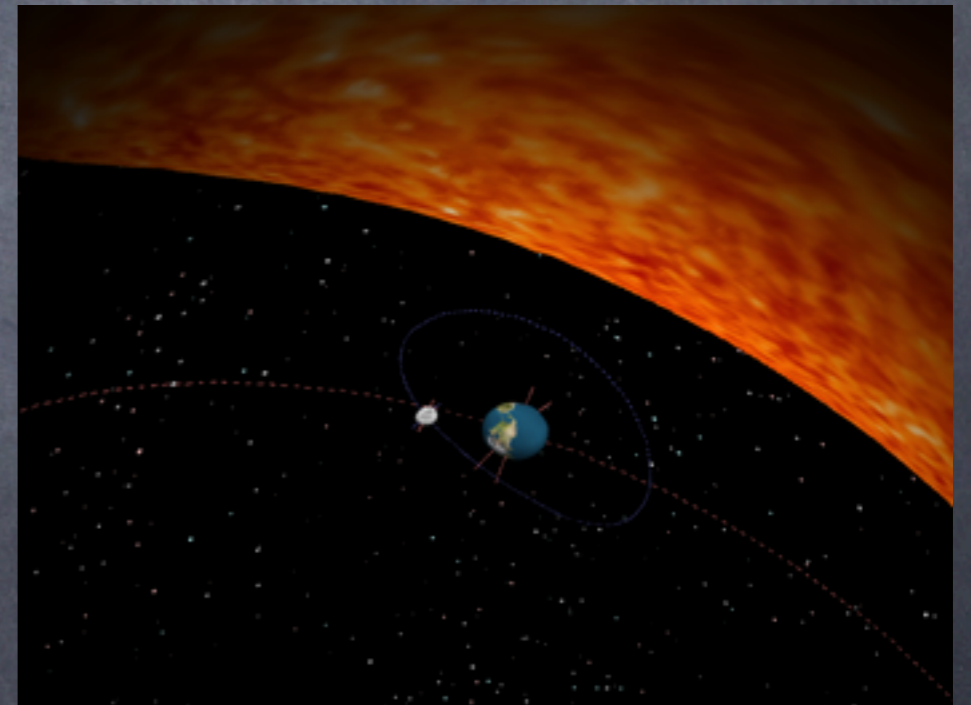
Warped

Interactive content

- Warp using xyuv mapping files.
- Two approaches, cubic texture and geometry warping.



xyuv
warp map
file

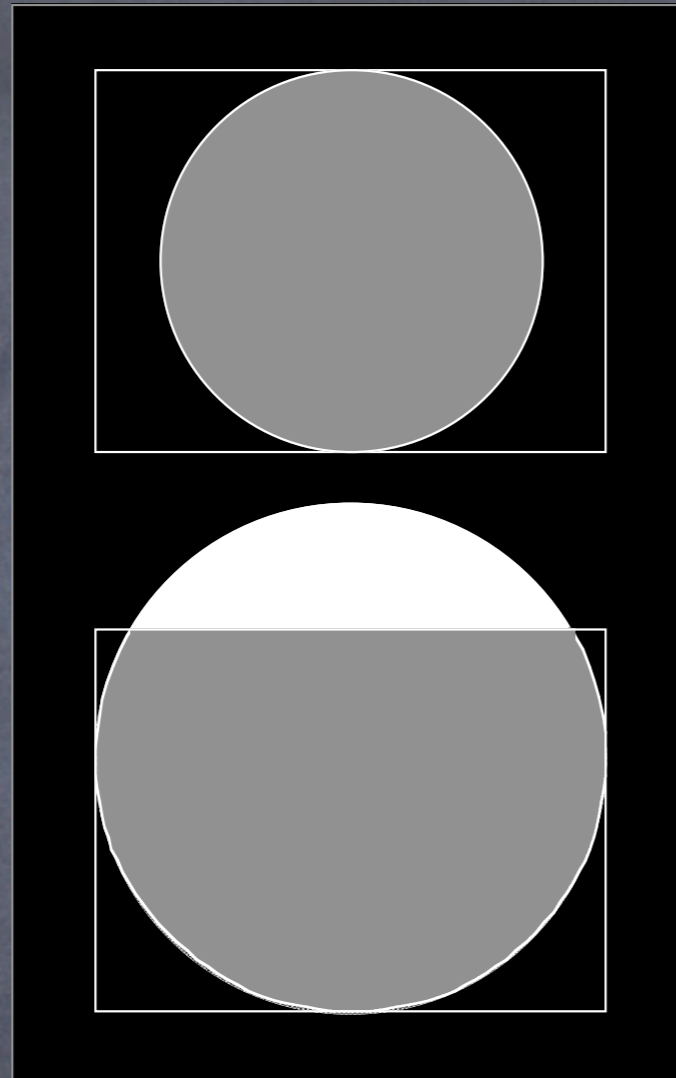


Warped

Pixel efficiency and dome coverage

Full
fisheye

59%

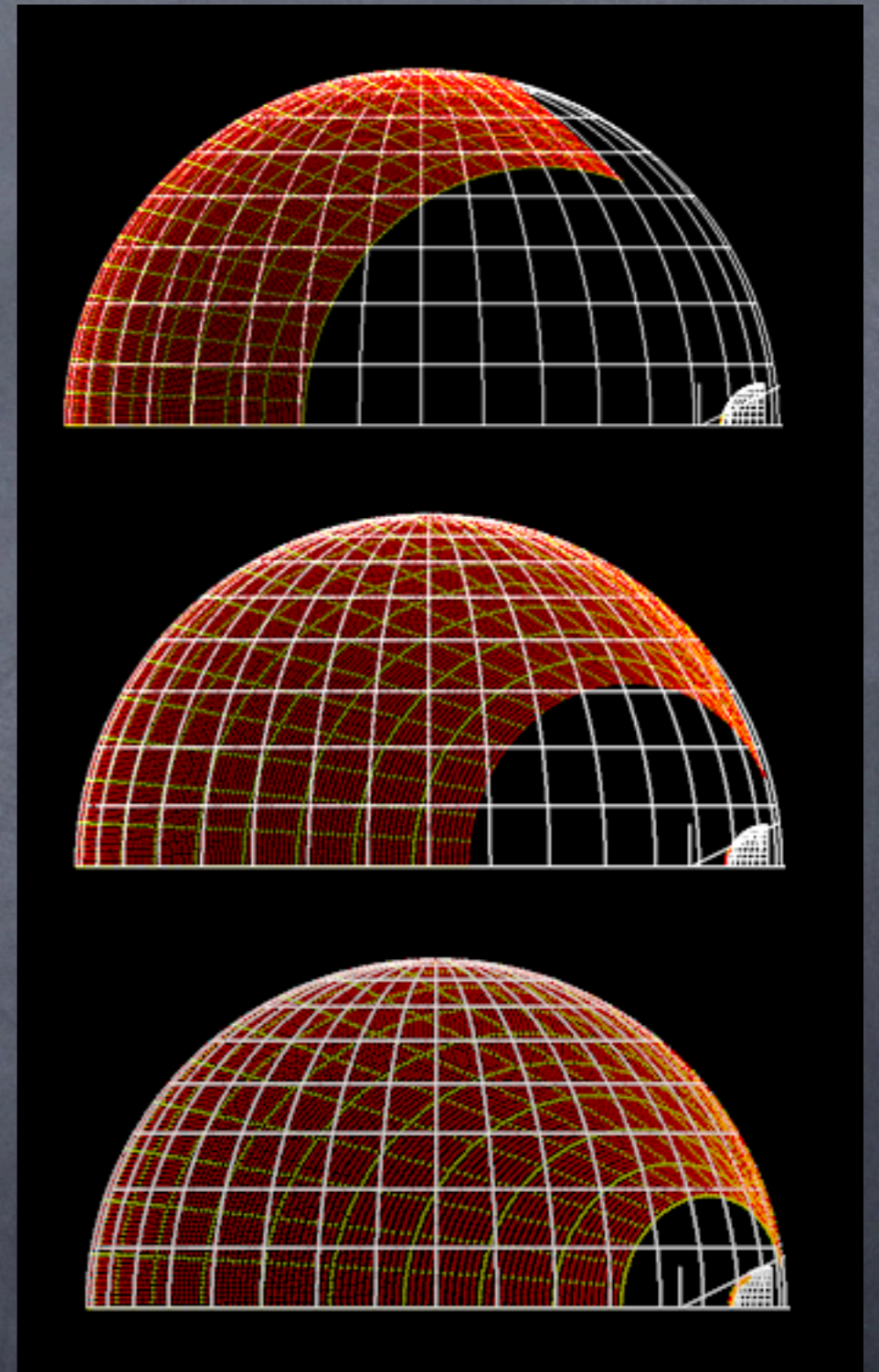


Truncated
fisheye

84%

Mirror: All pixels are used (100%)
but not equally efficiently.

The exact coverage is adjustable.



Projector options

- Must be able to focus on a small image area.
- Require a good depth of focus.
- Contrast: 2000:1
- Brightness: > 2000 ANSI

• Resolution	4:3	XGA	1024x768	\$4K
		SXGA	1280x768	\$8K
		SXGA+	1400x1050	\$18K
		UXGA	1600x1200	\$60K
		QXGA	2048x1536	\$150K
	16:9	WXGA	1280x720	\$4K

BIG - sample warped movie

