

What has Photogrammetry got to do with it?

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VIDEO
TSF Showreel 2013

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Let's go back.....

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The Birth of Photography



William Henry
Fox Talbot 1835

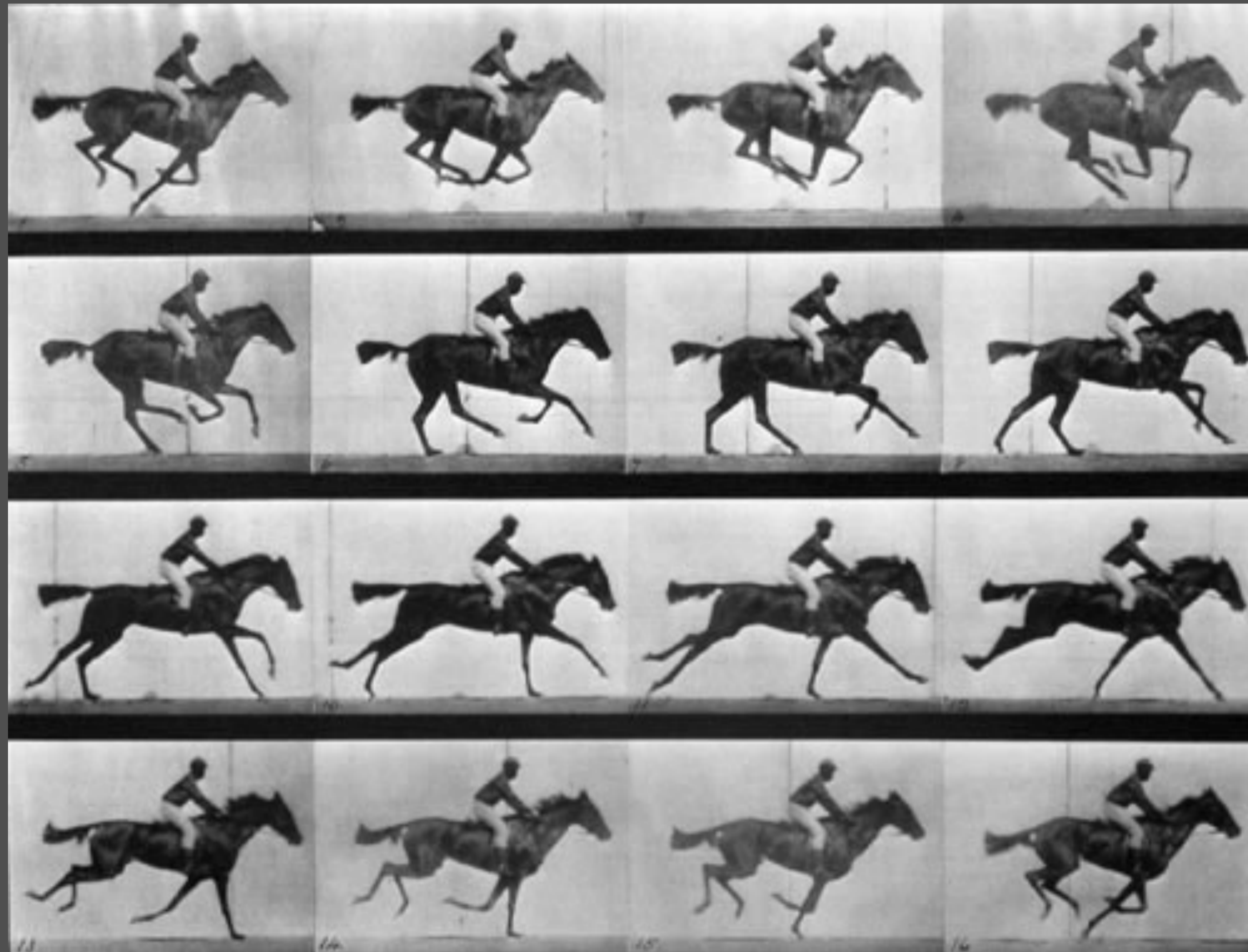
Victorian 'Natural
Philosopher'

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Evolution

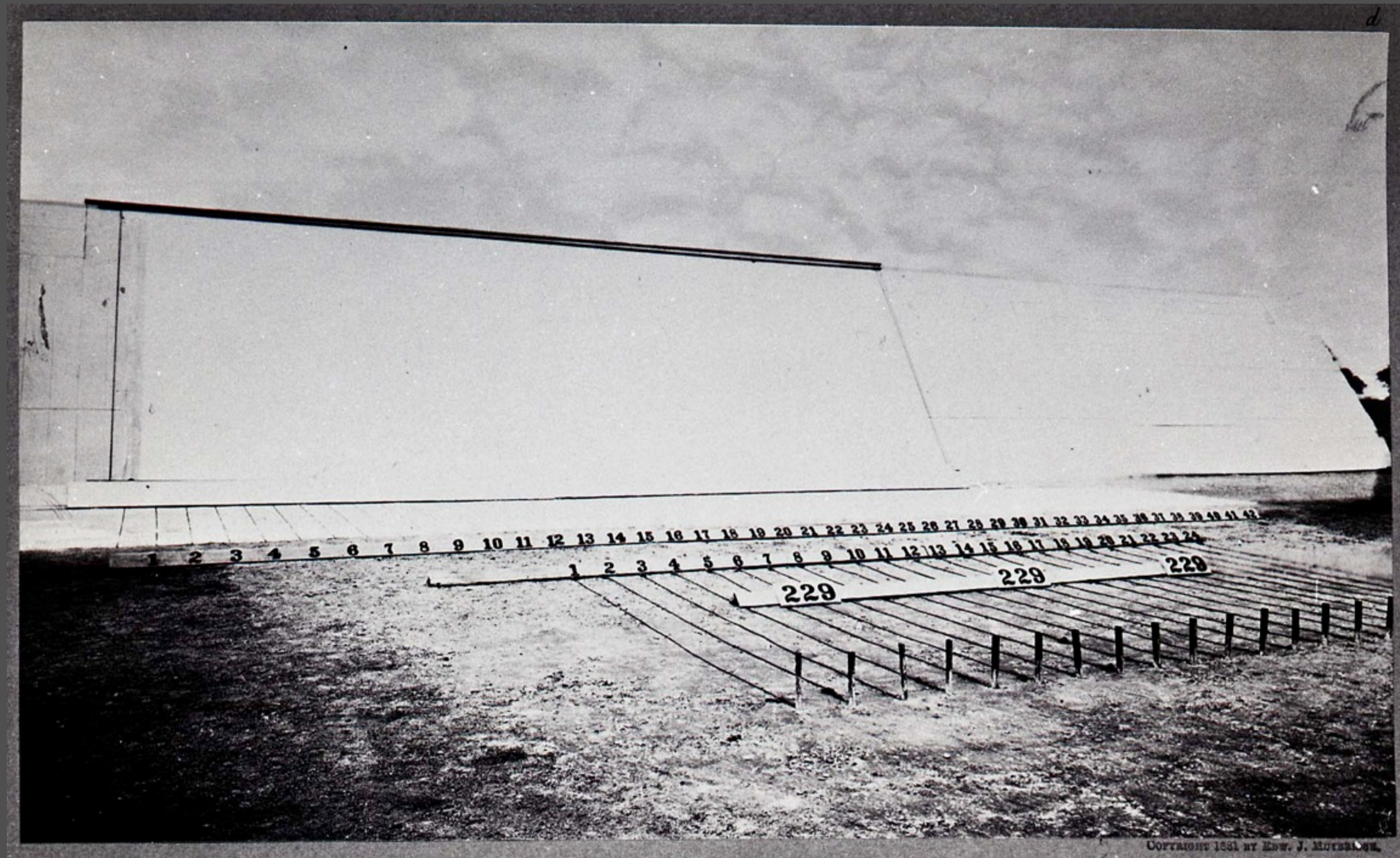
- The photographic process
- The photographic camera
- Lots of cameras
- Lots of images
- A new visual language

Edweard Muybridge 1830-1904



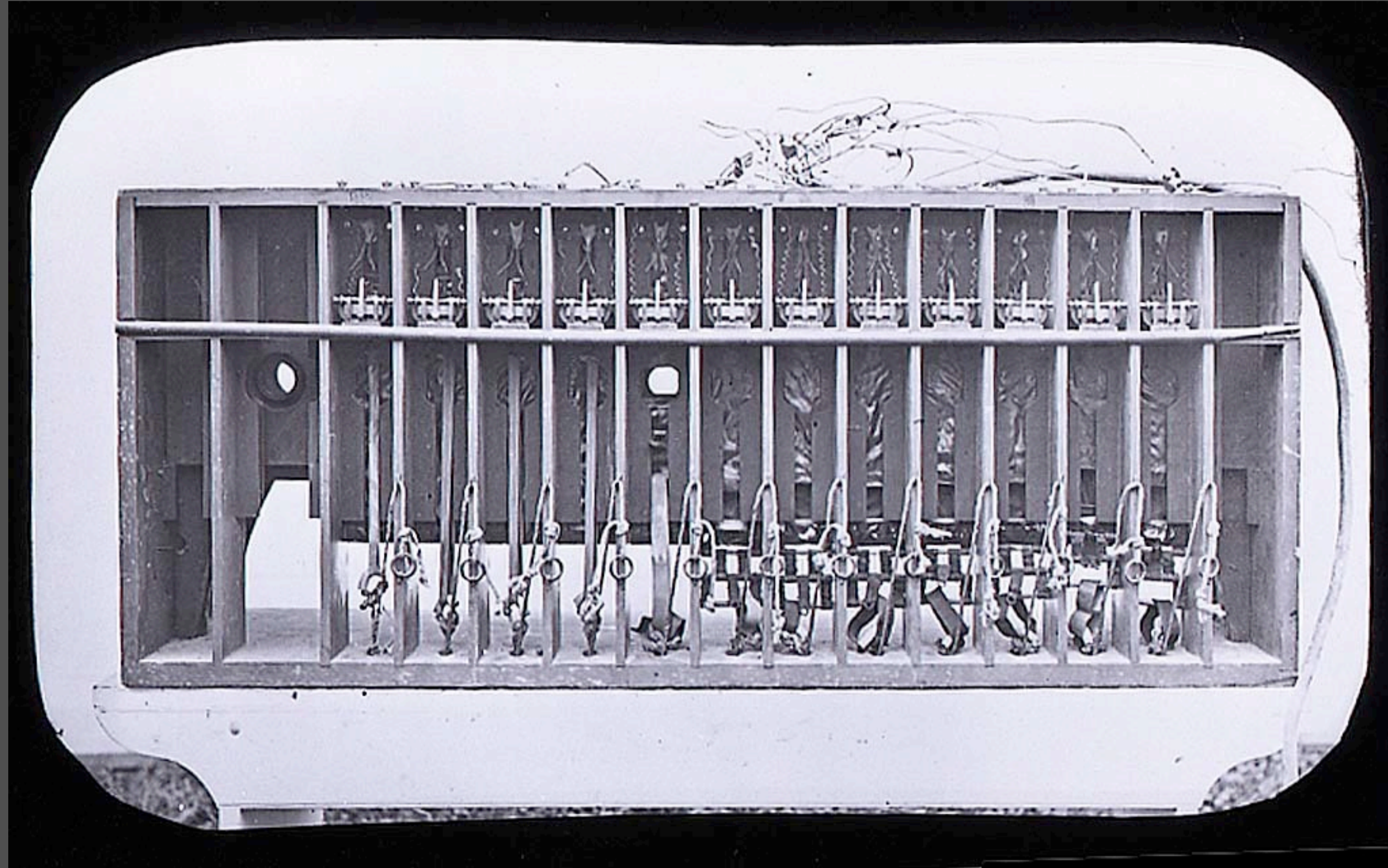
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Edweard Muybridge 1830-1904



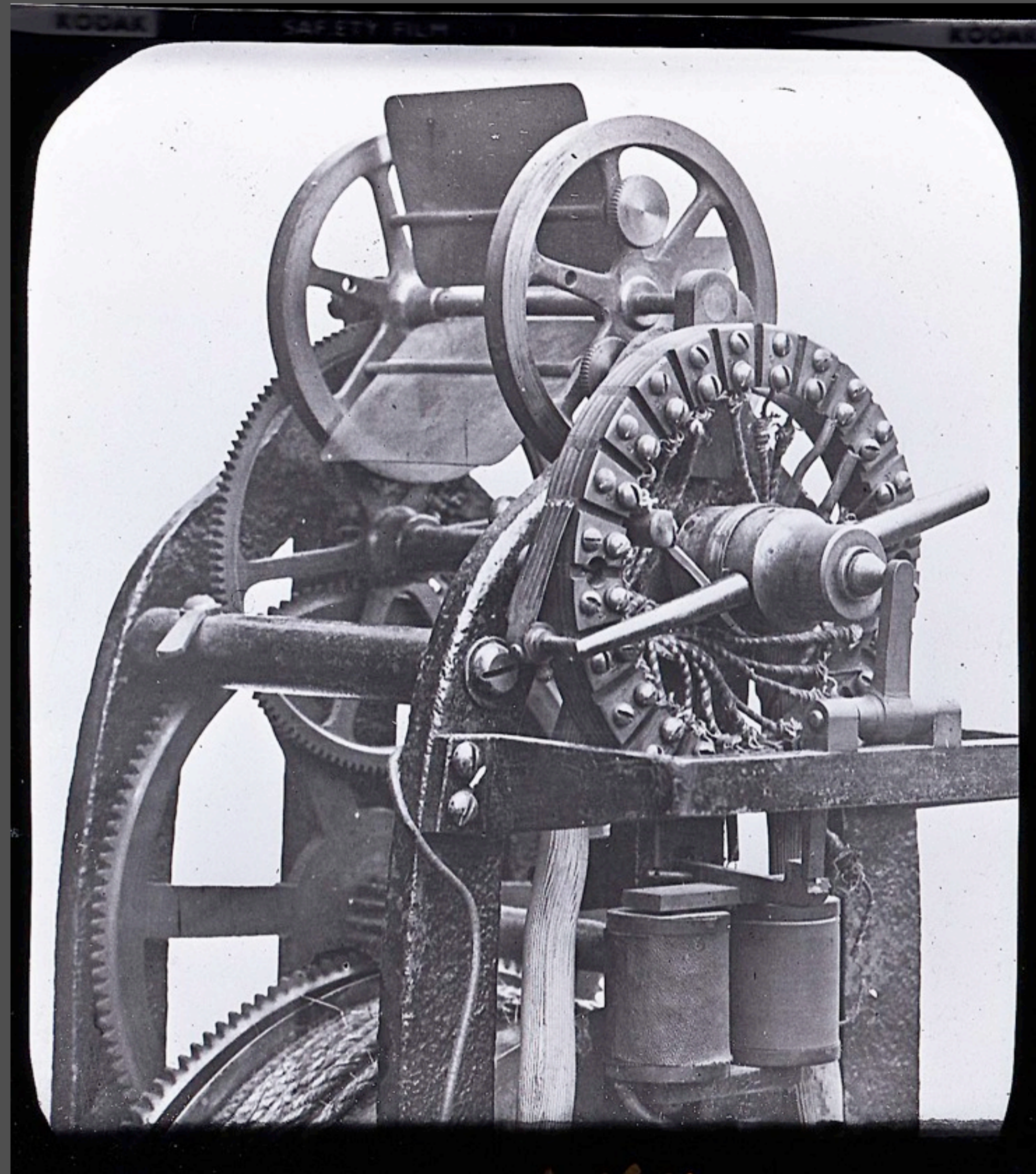
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Edweard Muybridge 1830-1904

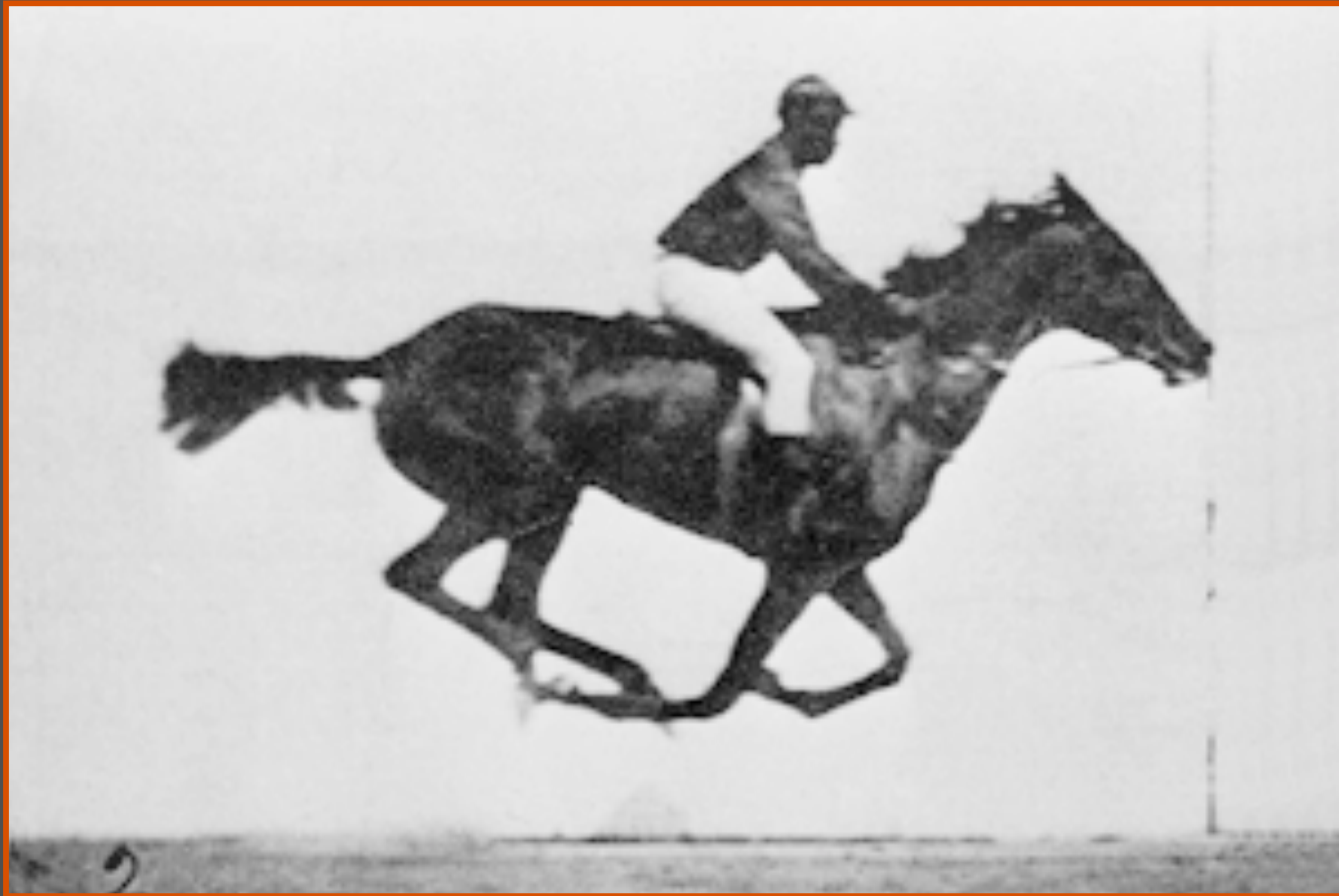


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Edweard Muybridge 1830-1904



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VIDEO
Muybridge animated
sequence

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Result!

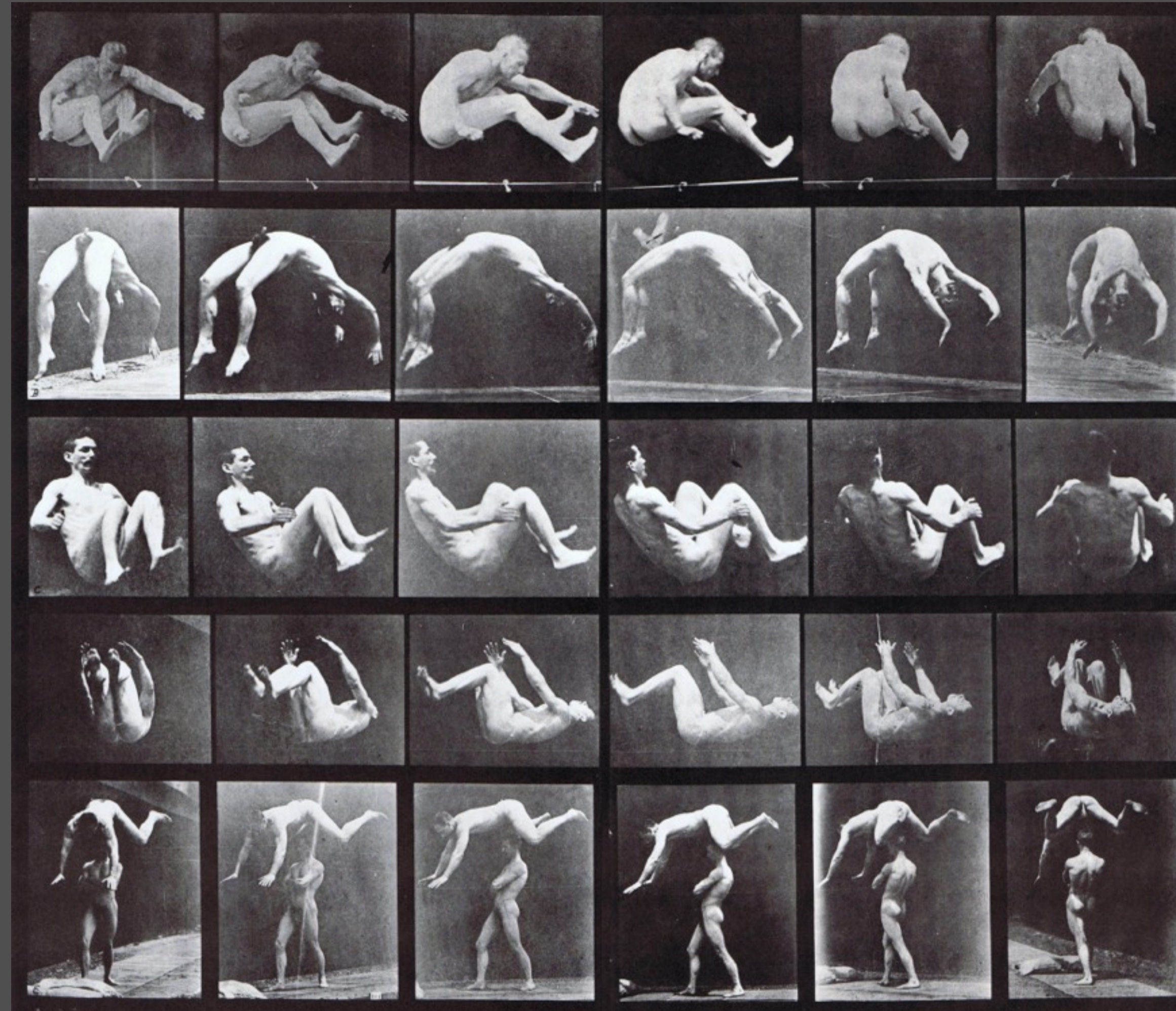


The Stanford
wager was
probably a myth

but that's not the
point....

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Something was overlooked!



Muybridge's
simultaneous
series

Frozen-time
analysis of bodies
in motion

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Nadar - 1820-1910



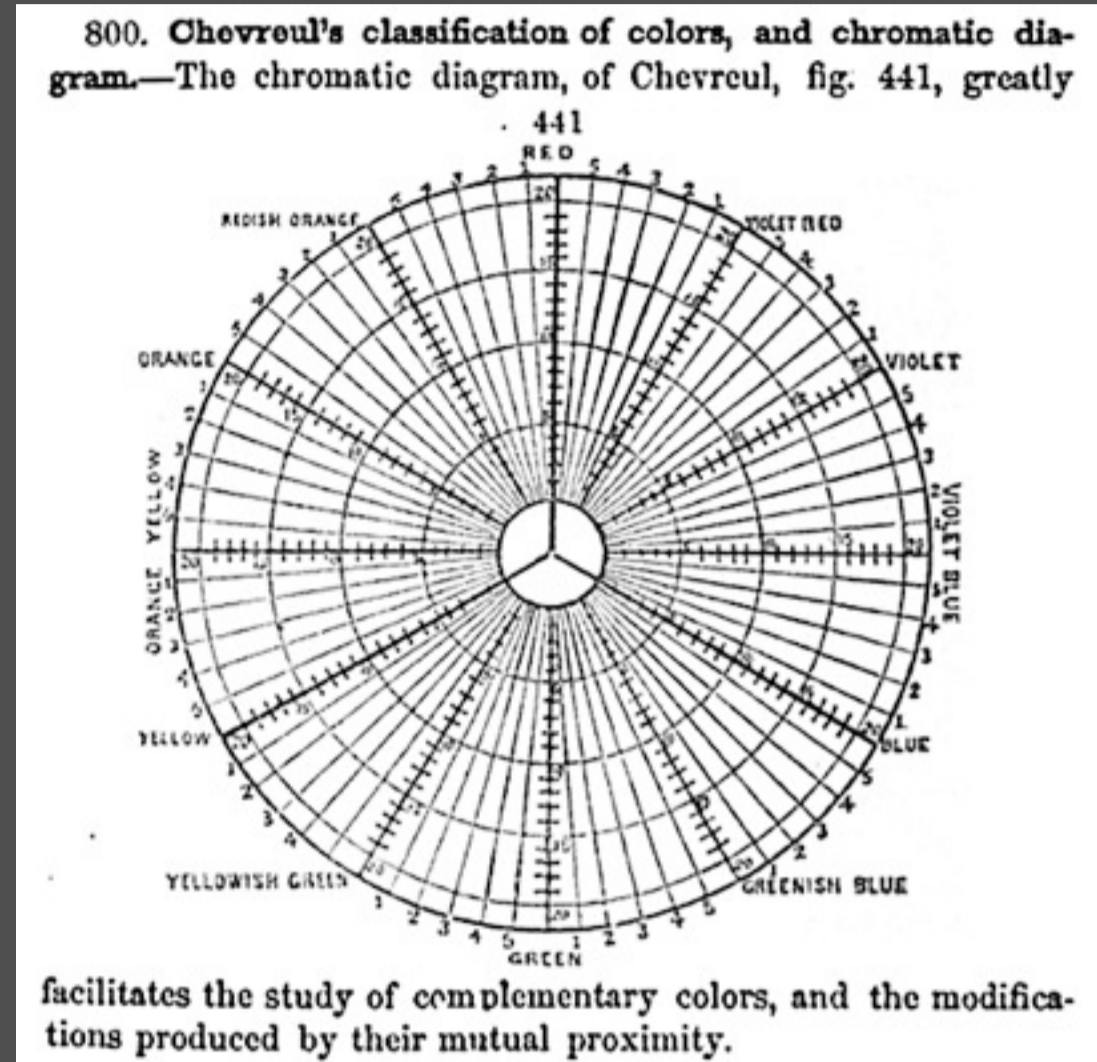
Nadar
360° capture

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Camera Array and *Simultaneity*...

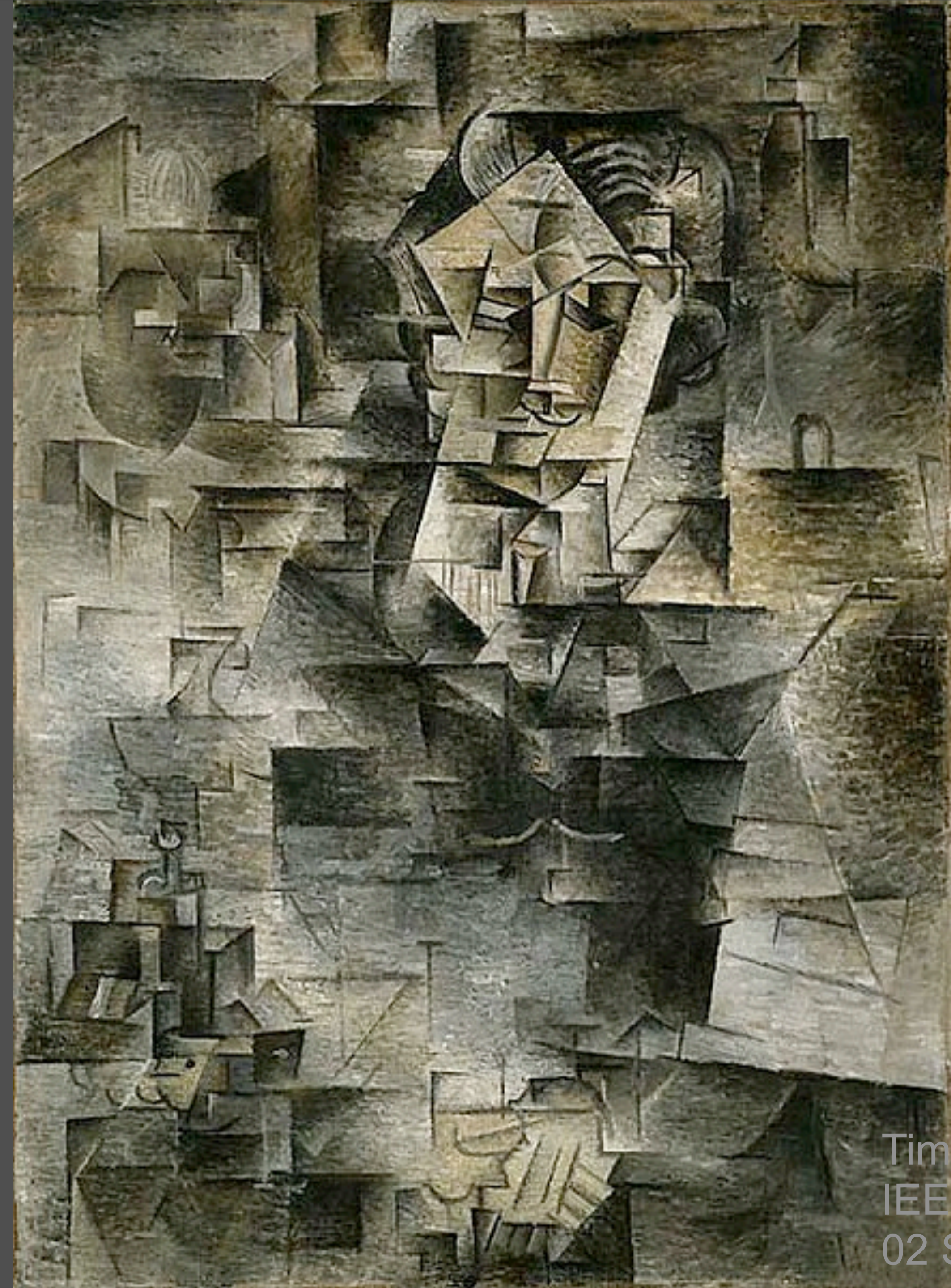
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“Many Different Views Exist and are Related”



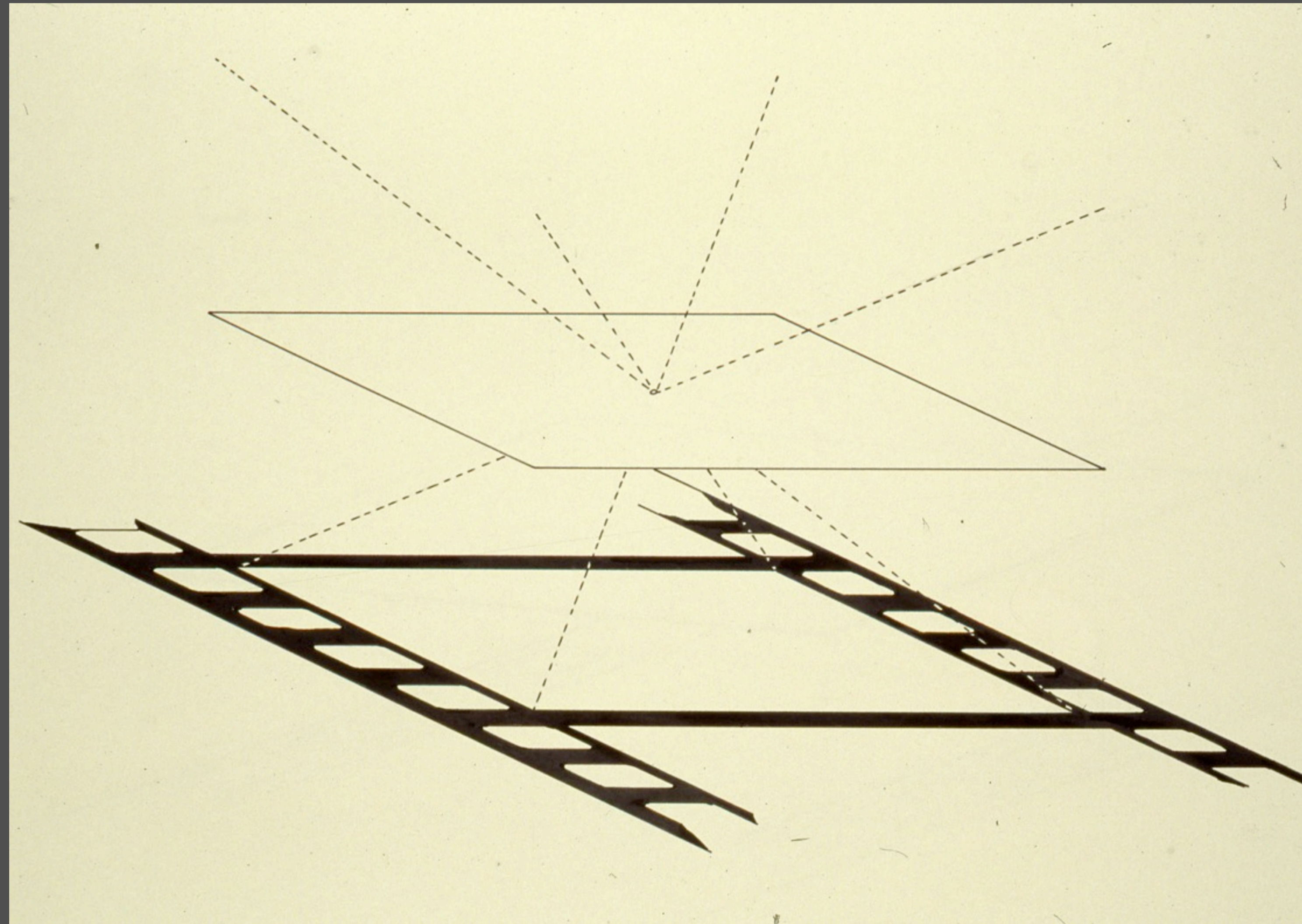
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Cubism Picasso 1910



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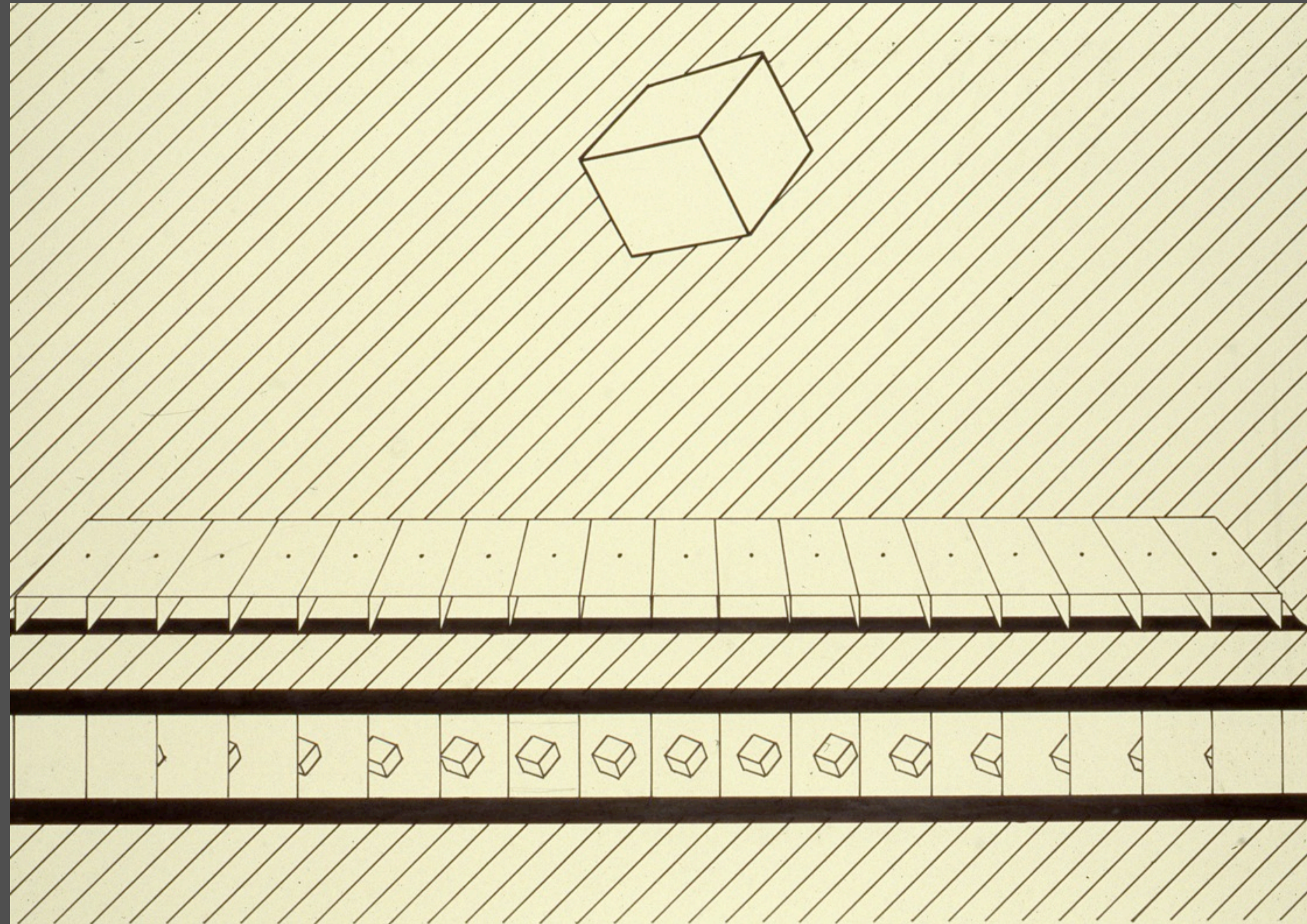
Pinhole



Concept drawing for
Time-Slice Camera

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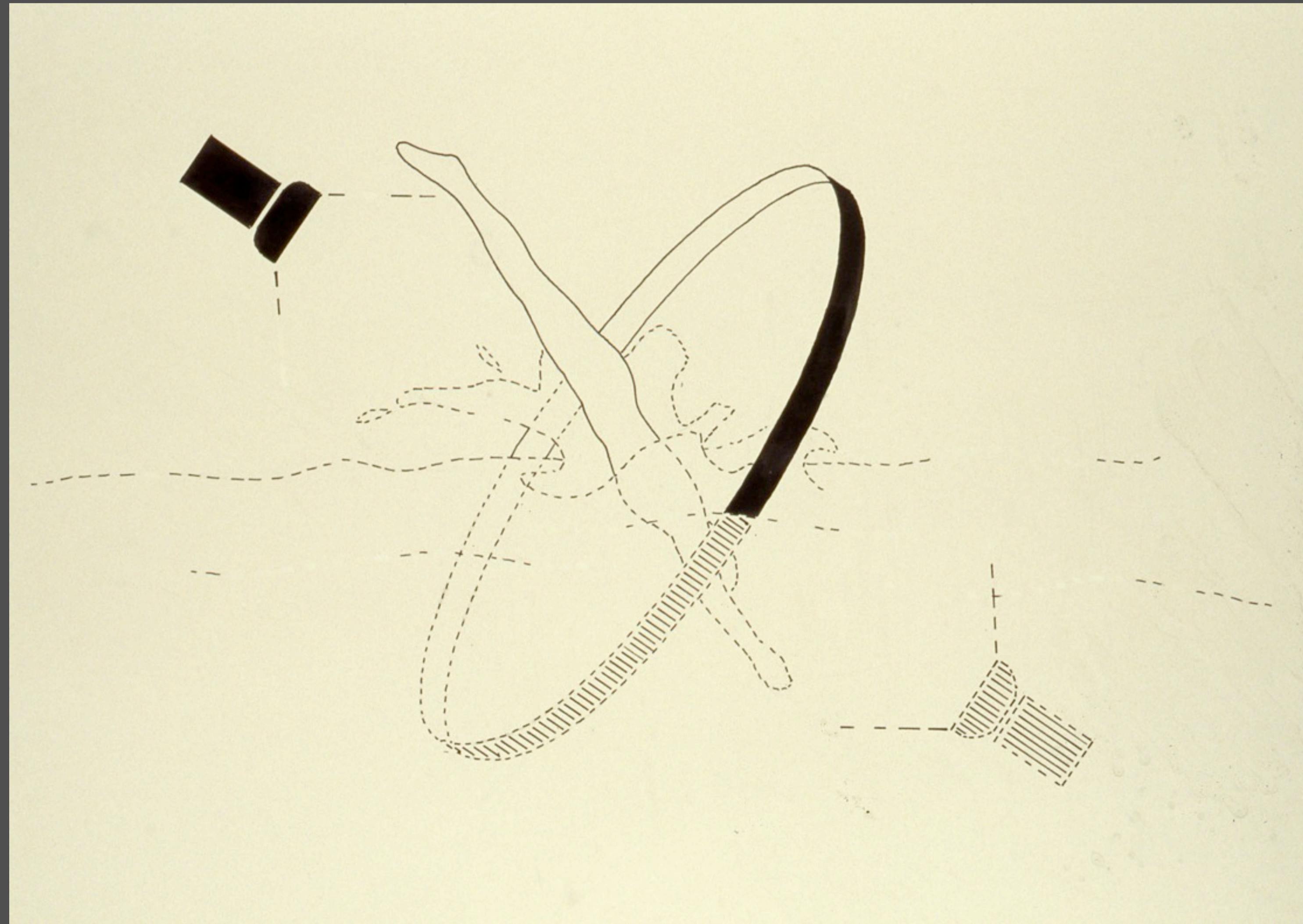
Simultaneity



Concept drawing for
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Cubist simultaneous Film



Concept drawing for
Time-Slice Camera

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Cubist simultaneous Film

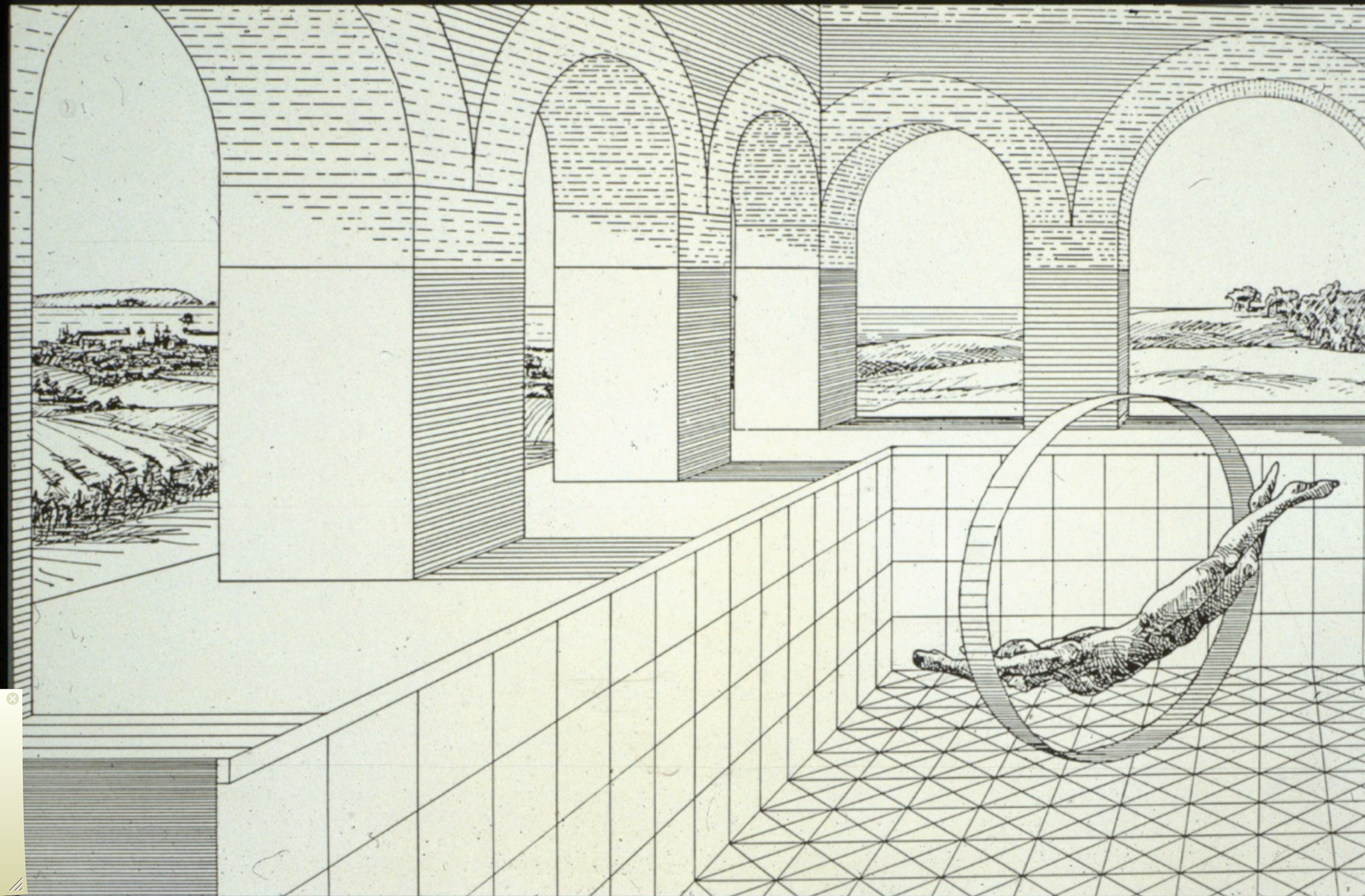


16mm Motion
Picture Film

VIDEO
First Time-Slice camera
(linear) 1980

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Cubist simultaneous Film

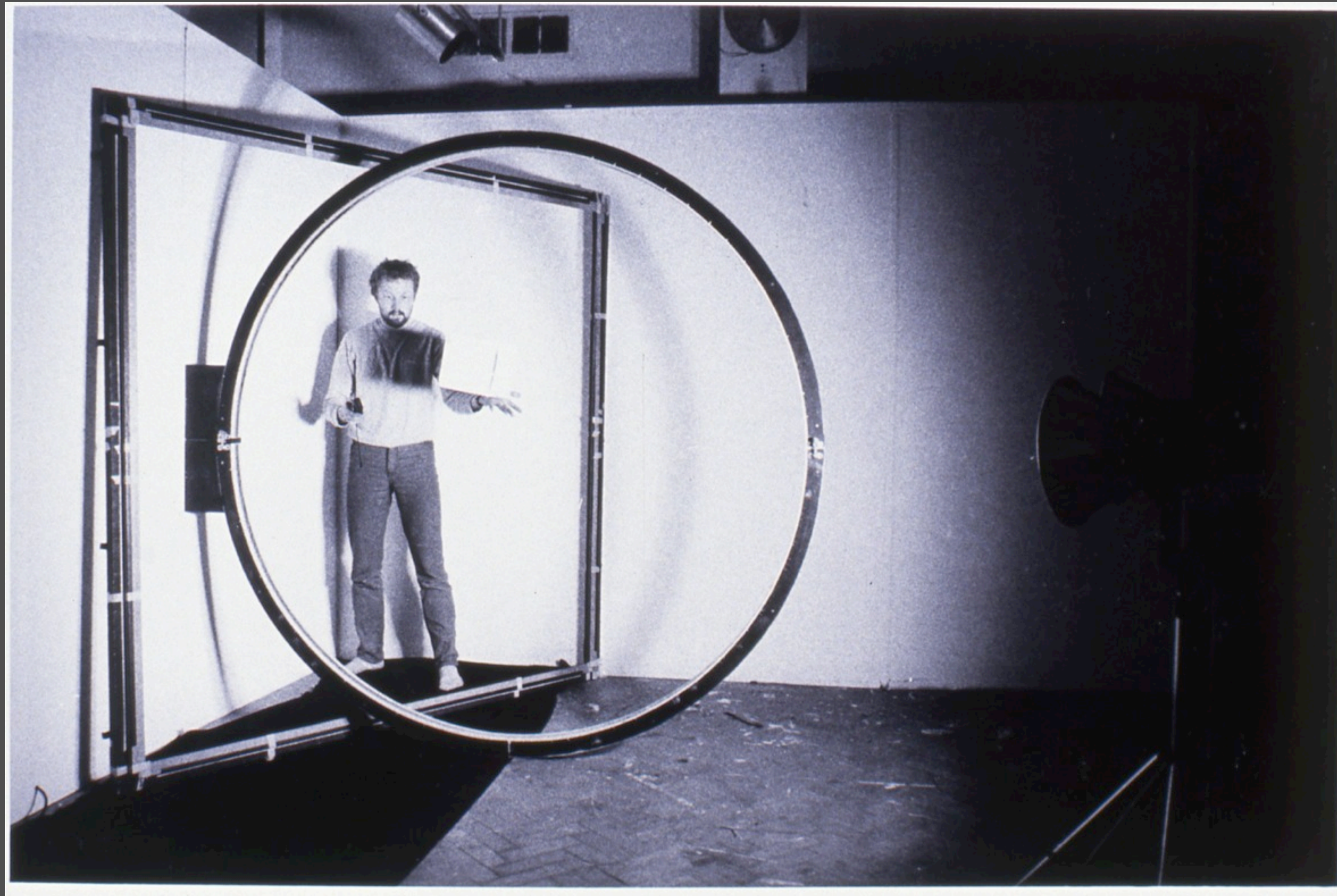


Concept drawing for
Time-Slice Camera

Birth of the Time-
Slice Camera

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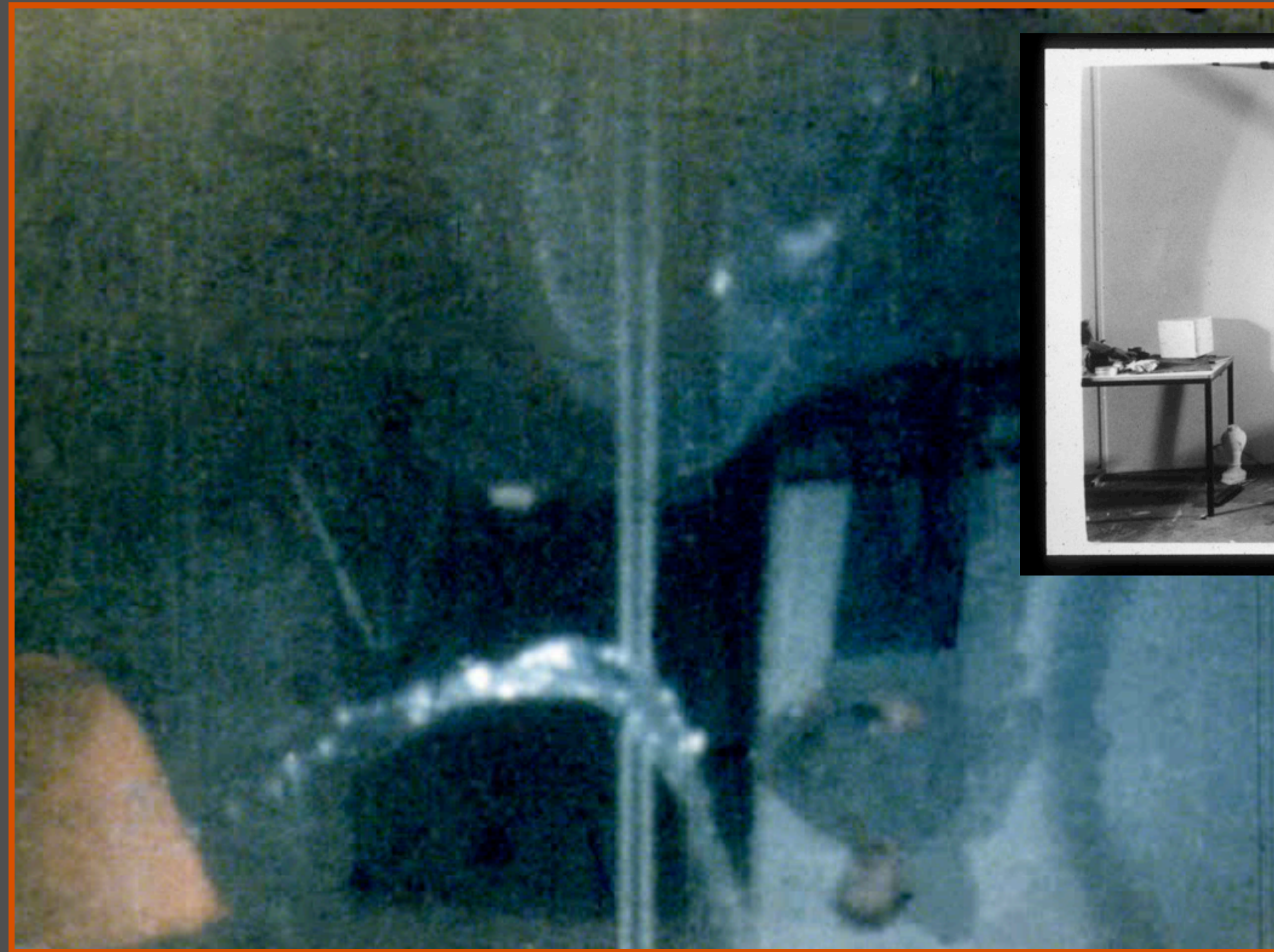
Time-Slice Camera 1981



Time-Slice Cameras 1981
Square
Circular
University College
London

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Time-Slice Camera First Movie



VIDEO
First Time-Slice movies
(circular) 1981
"Splash"
British National Video
Archive, Tate Gallery,
London

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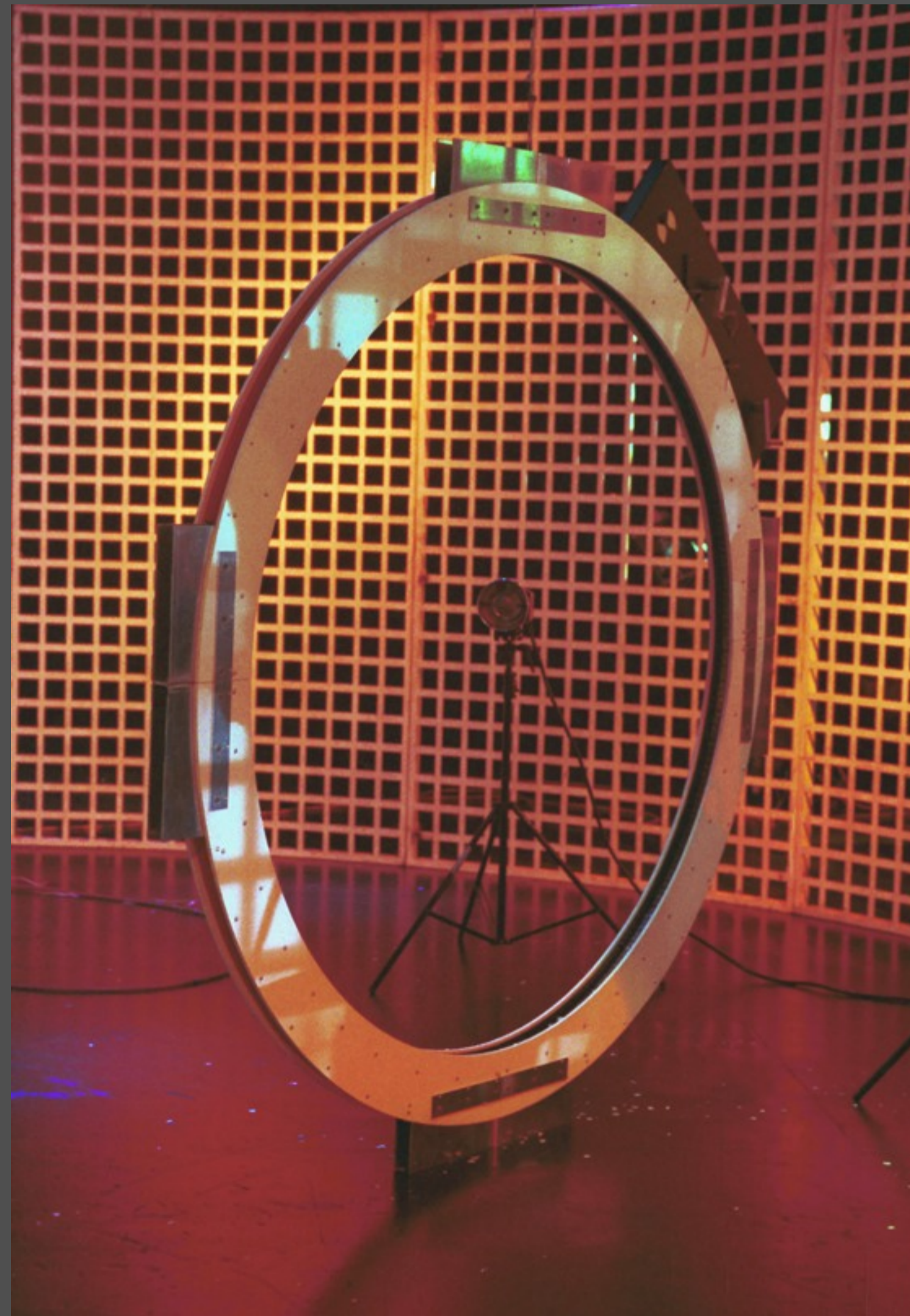
Time-Slice Camera Second Movie



VIDEO
First Time-Slice movies
(circular) 1981
"Jump"
British National Video
Archive, Tate Gallery,
London

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Time-Slice Camera May 1993



BBC TV Tomorrows'World
Time-Slice Camera
May 1993

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BBC TV Tomorrows' World - May 1993



Live TV Show

BBC TV Tomorrows'World
Time-Slice Camera
May 1993

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Is the Dog Dead?

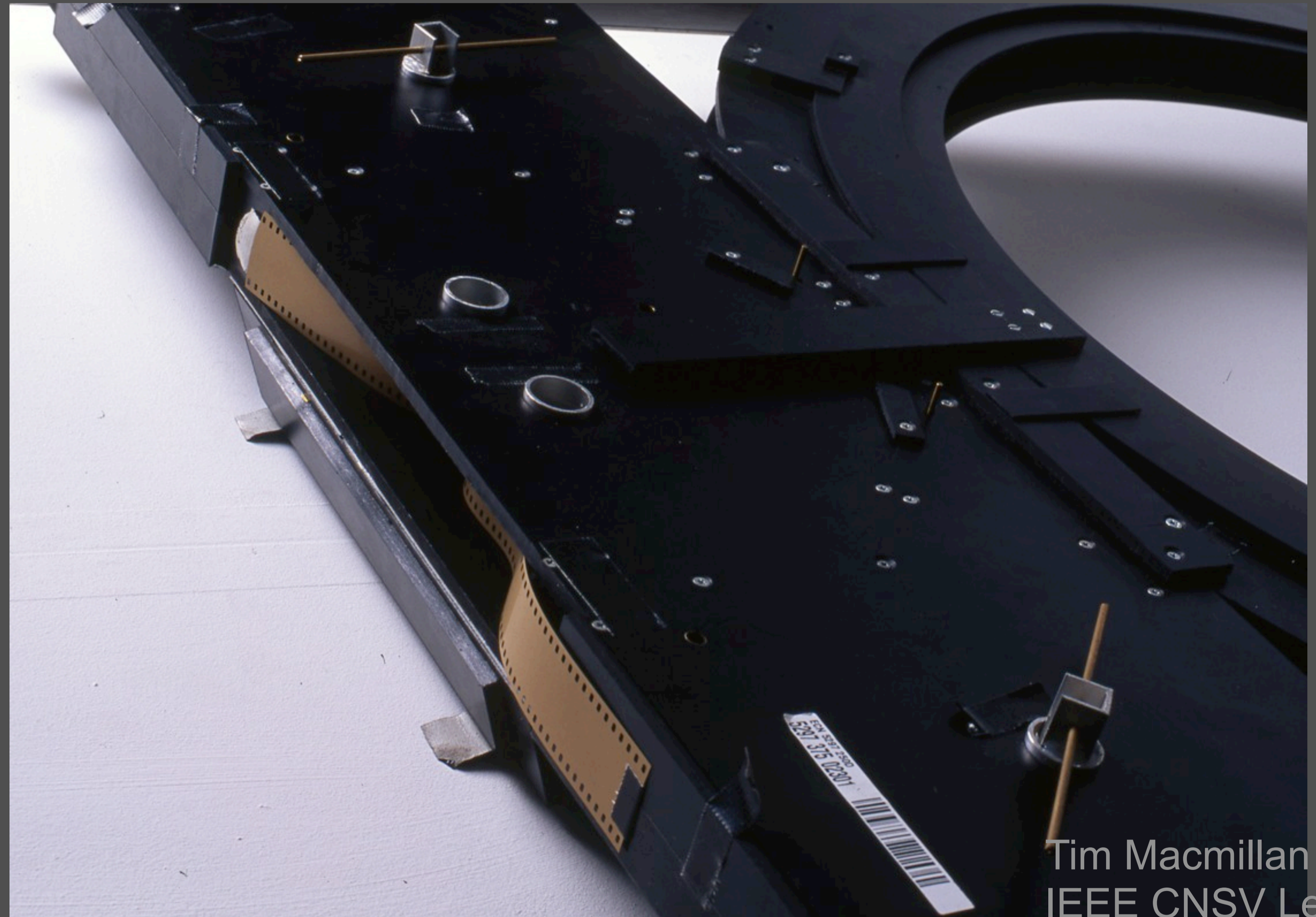
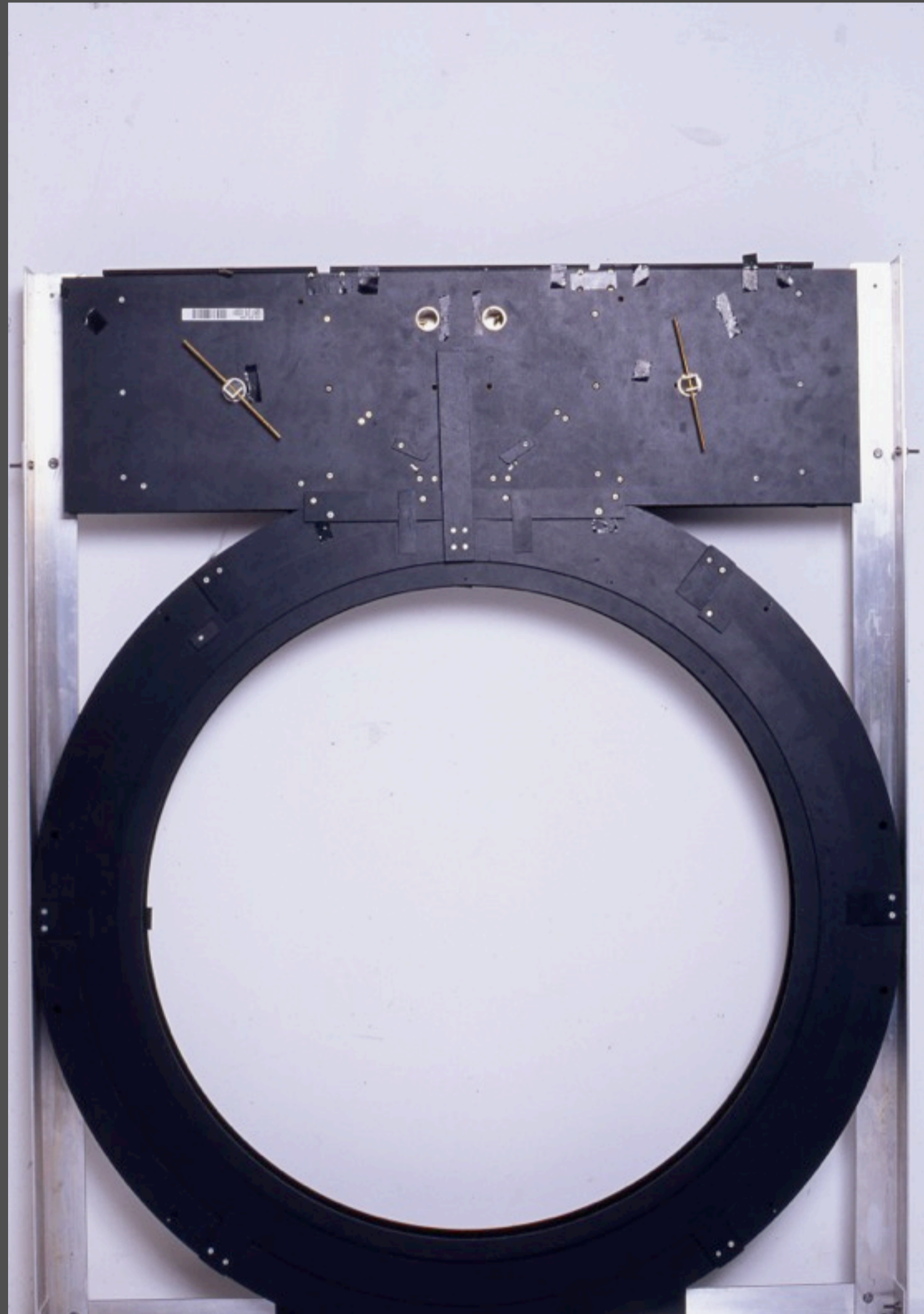


BBC TV Tomorrows'World
Time-Slice Camera
May 1993



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The "Insect" Camera



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1/50000sec Flash Exposure



Cross-hair IR
Trigger

Kodak Plastic
Lenses

Hand-made Flash
System

Time-Slice Camera
(Insect)

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The "Linear" Camera - 1995



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First TV Commercial created with Array



Time-Slice Camera
"London Static"

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The "Josephine" Camera - 1996



120 x 35mm Lenses

3m radius arc

35mm motion-picture

Vistavision 8-perf frame

Programmable shutter
system

Modular construction

Heat/humidity
compensation

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The “Josephine” Camera - 1996



BBC Natural History
“Supernatural” Series.
Dolphins



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The “Josephine” Camera - 1996



Nat. History
Documentary

Location Filming

4 BBC Series

BBC Natural History
“Supernatural” Series.
Dolphins

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The “Josephine” Camera - 1996



TV Drama

Motion plus
frozen-time plates

"Merlin" TV Series

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The “Josephine” Camera - 1996



Time and motion effects

'Josephine' Camera
Phased Shutter

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Camera Array and Motion Estimation

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SLR Camera Array



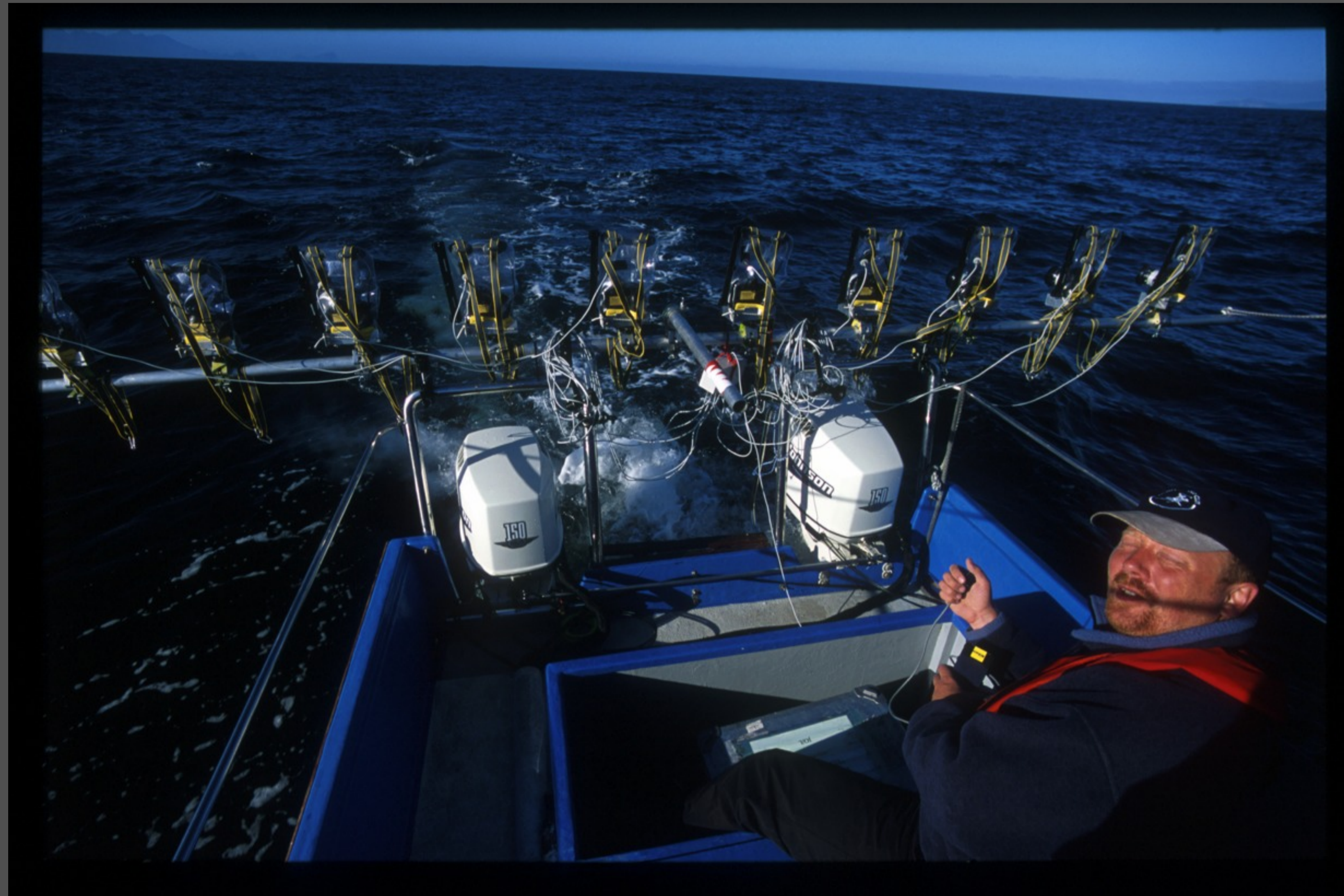
Improved SLR
Sync

But not without
issues...



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SLR Camera Array



Waiting for
Sharky...

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10x Nikon F5 SLR



Animal Planet
Great White Shark

Raw Frames

Large Disparity

Extreme
Occlusions

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10x Nikon F5 SLR



Animal Planet
Great White Shark

Interpolated

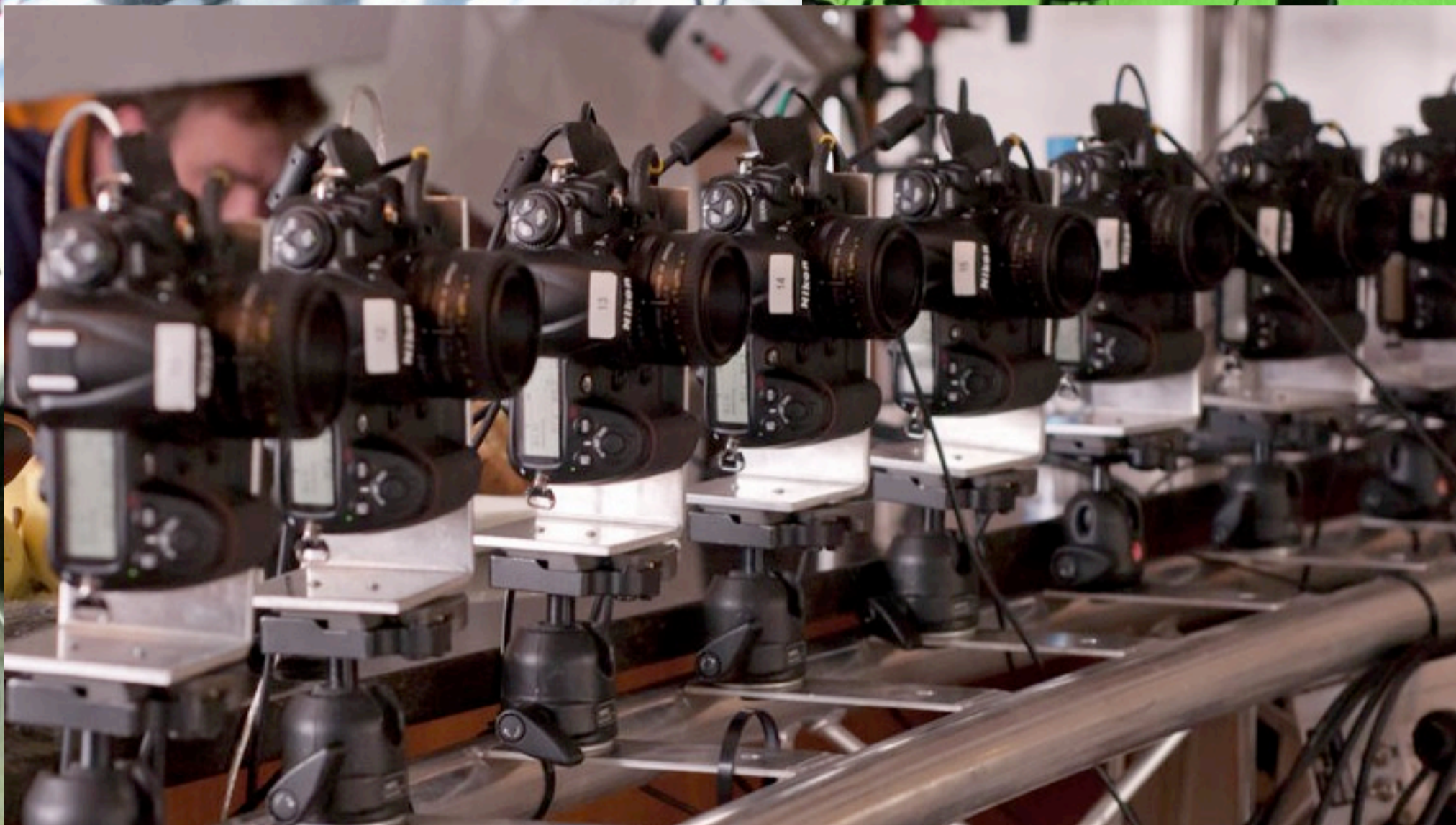
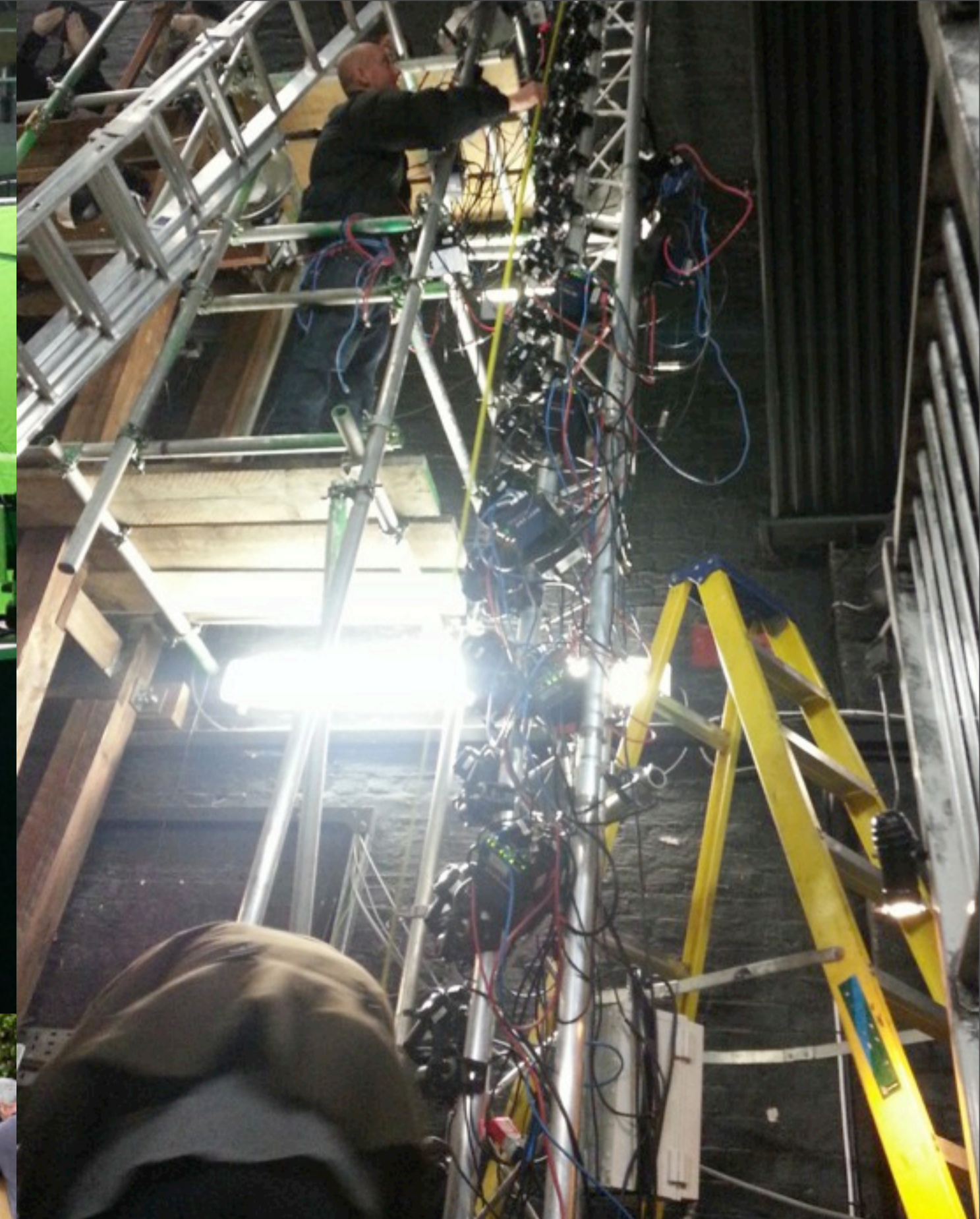
30x frames

Snell & Wilcox
'Flomo' Algorithm

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Camera Array and DSLR

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DSLR Camera Array



Max 6° Disparity

Flat Image Plane

On-Site Post-
Production

BBC TV
"miracles of Jesus" series

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DSLR Camera Array



BBC TV
"miracles of Jesus" series
"Legion"

RE:VisionFX
Twixtor

The Foundry
Kronos

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DSLR Camera Array



BBC TV
"miracles of Jesus" series
"Paralytic"

Depth-based
Segmentation

4-D Cloning

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Camera Array and Virtual Motion

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Camera Array and Virtual Motion

Adobe :
After Effects

The Foundry:
Nuke

3D Rendering

London Dungeon
TV Commercial

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Camera Array and Virtual Motion



London Dungeon
TV Commercial

Adobe :
After Effects

The Foundry:
Nuke

3D Rendering

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Camera Array and Virtual Motion



Rolls Royce
Commercial

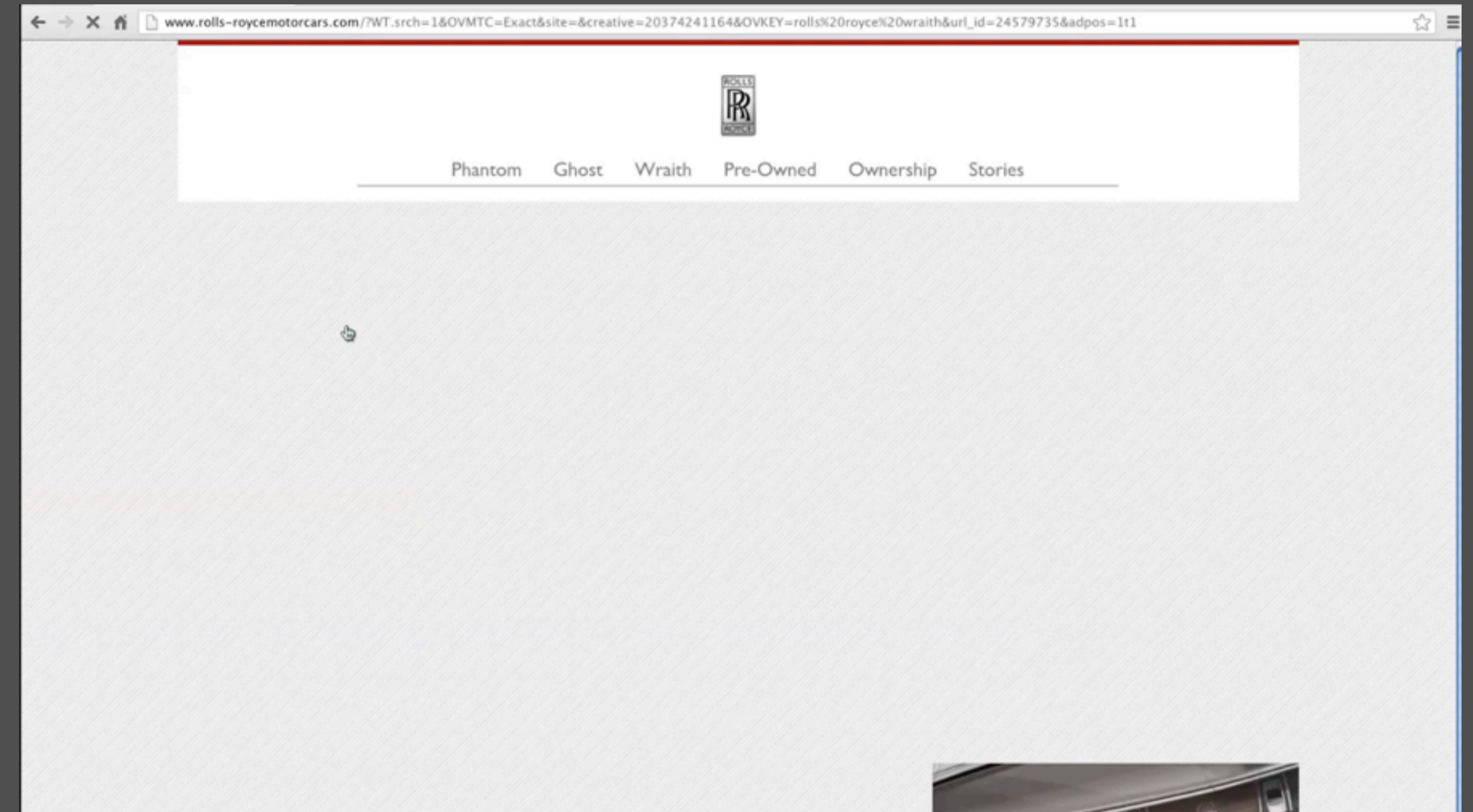
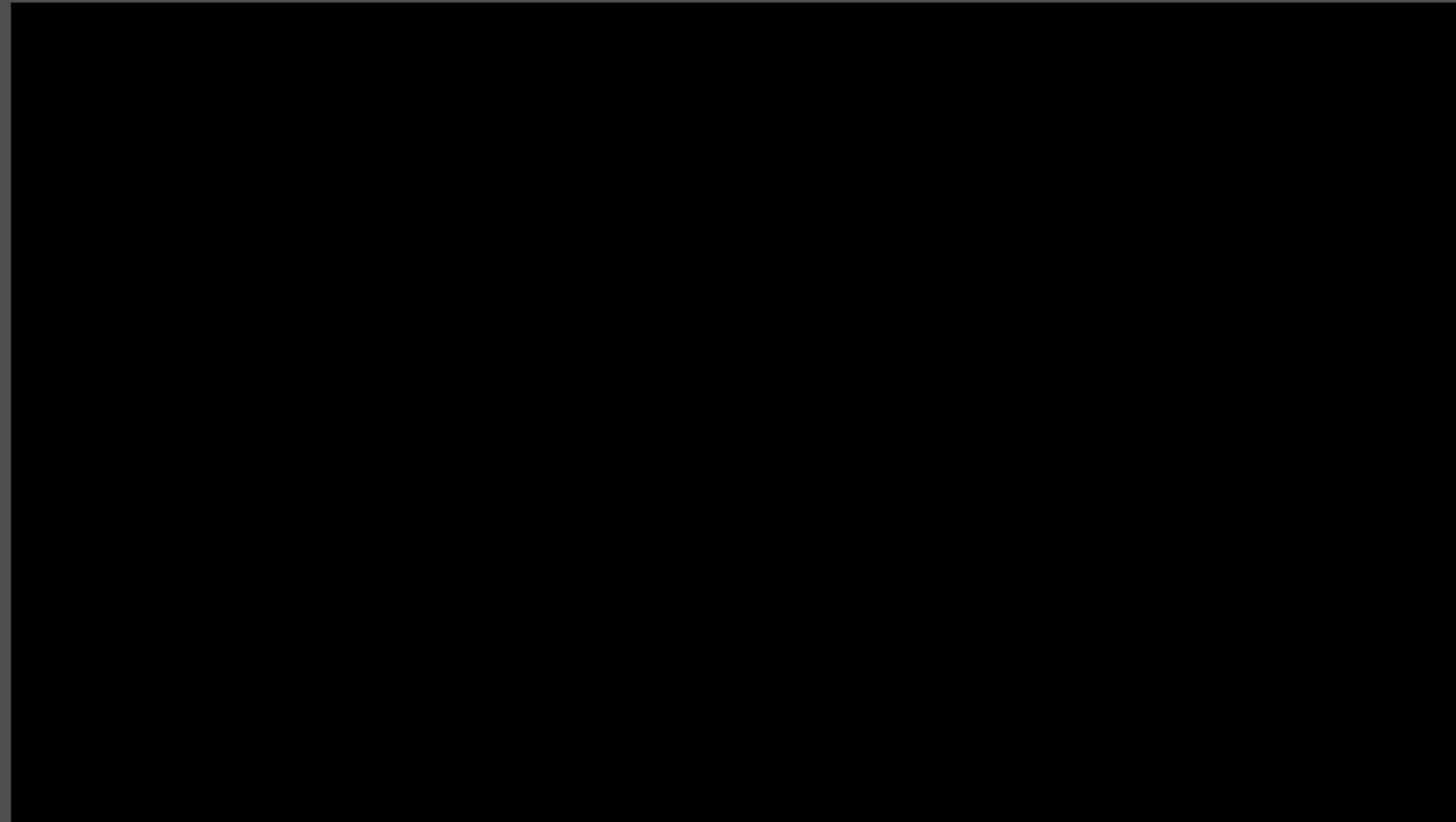
5.5 Gigapixel

High-Resolution
Motion-Estimation

3D CGI

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Camera Array and Virtual Motion



Rolls Royce
Commercial & Web

Cinema.....Web

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Camera Array and 3D Scanning

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Nadar - 1820-1910



Nadar
24-Camera 360° capture

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Photographic Sculpture

Nadar
24-Camera 360° capture



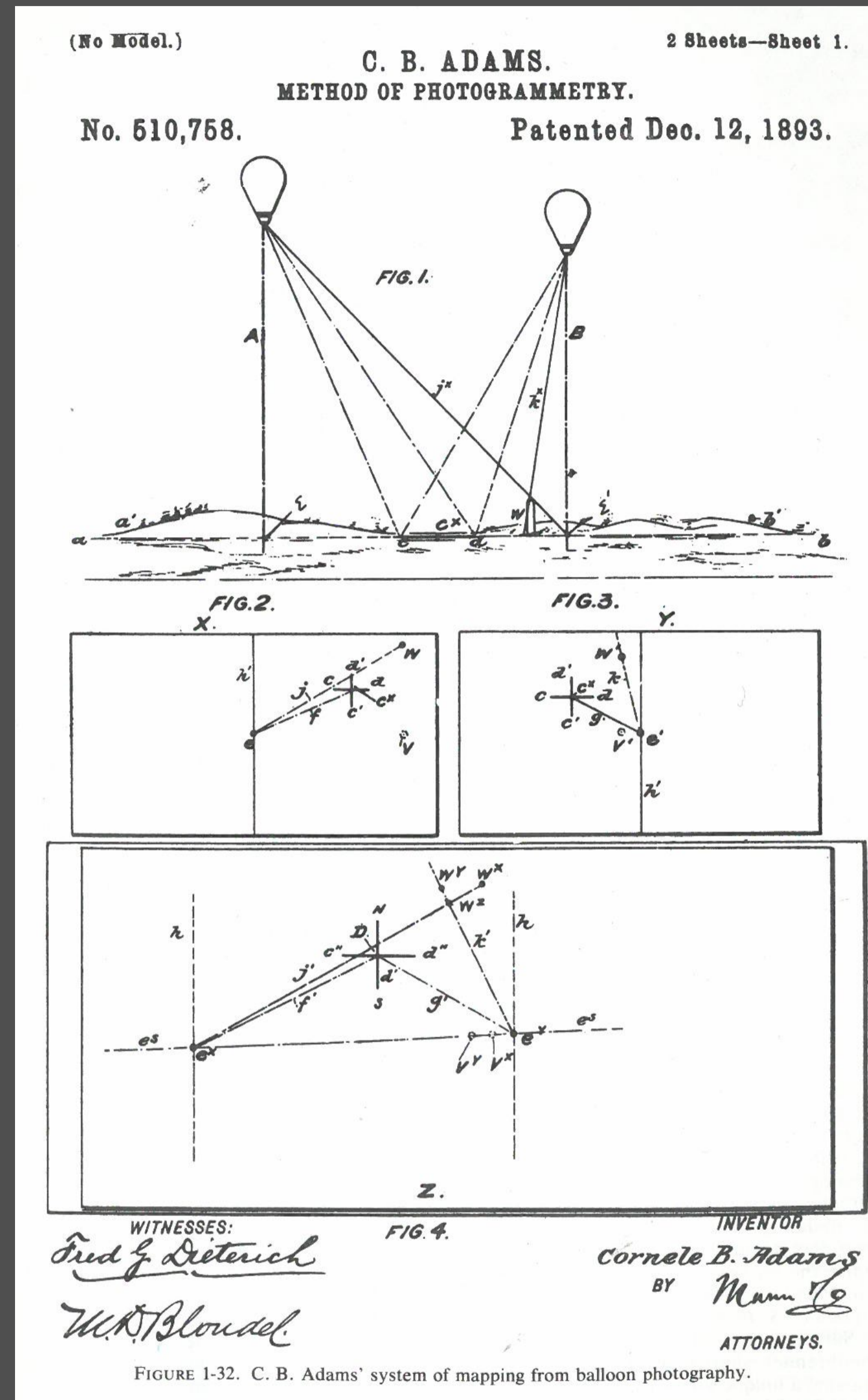
Admiral Farragut sits, late 1860s,
for photo-sculpture, in which
24 simultaneous photos were taken.

Shilouette

Segmentation

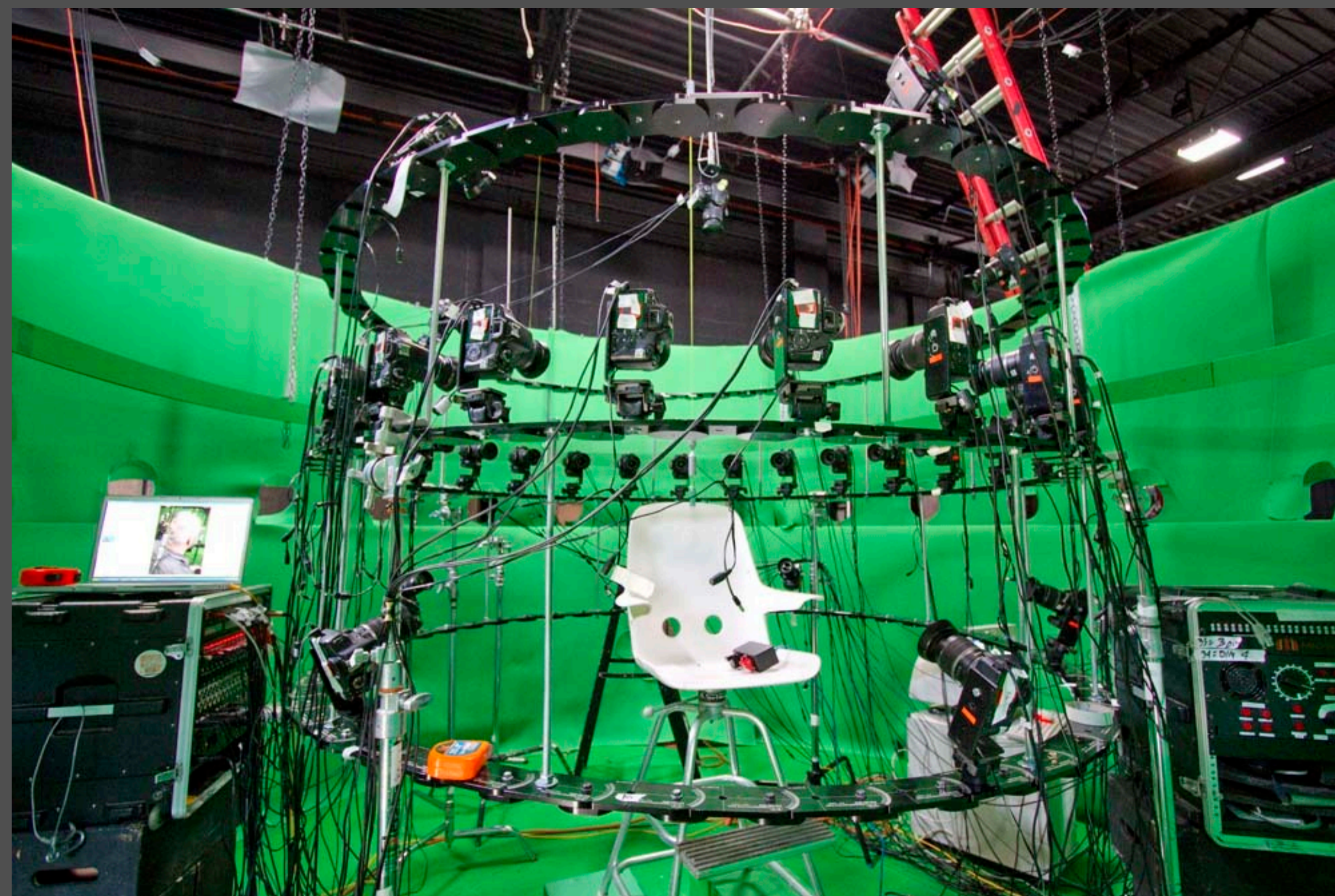
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Photogrammetry



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Photogrammetry Array



Time-Slice Films
Contemporary
Photogrammetry Rig

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Input : 2D-Capture



Time-Slice Films
Contemporary
Photogrammetry Rig
Capture Sequence

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Output : 3D Model

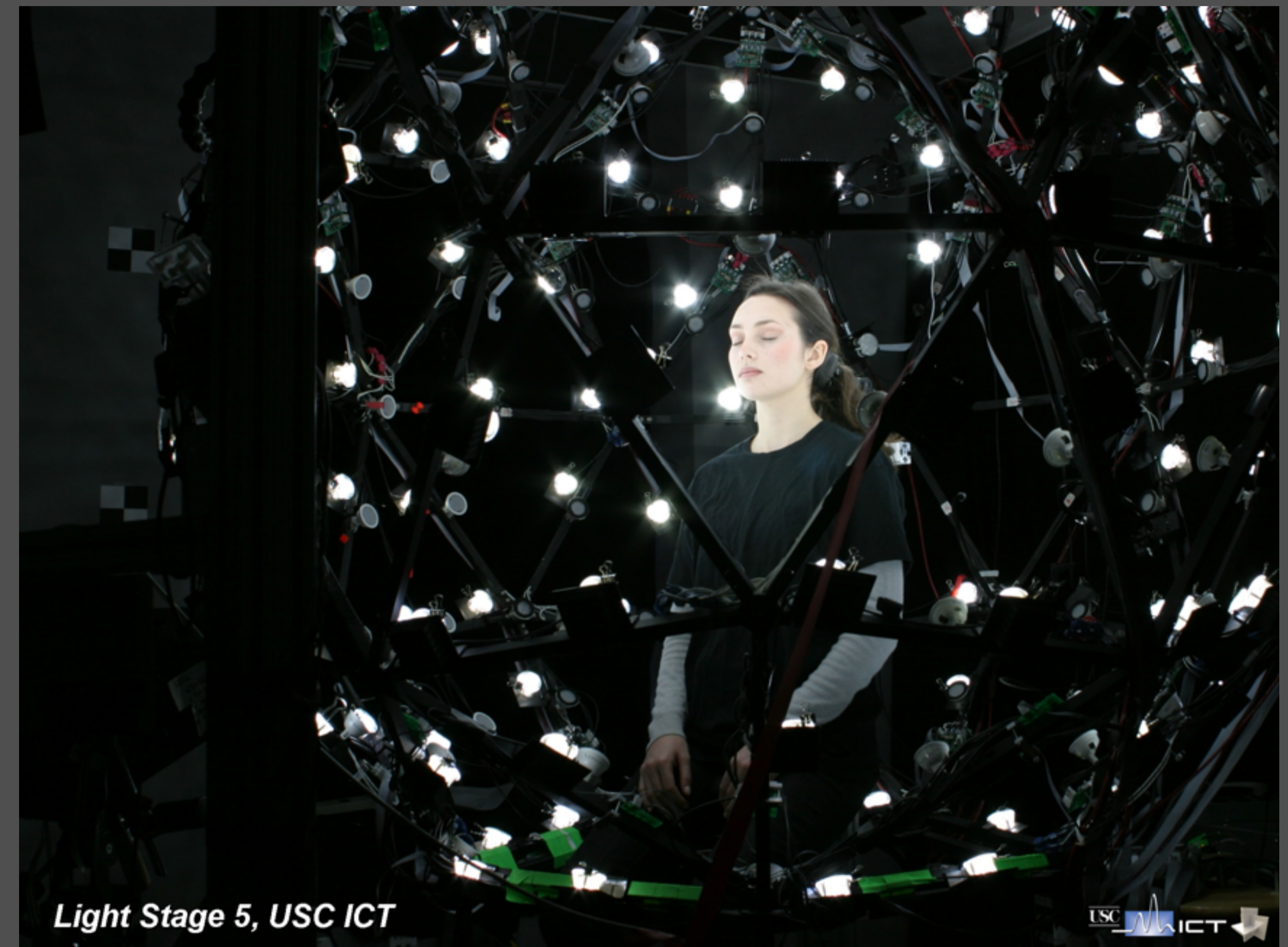


Time-Slice Films
Contemporary
Photogrammetry Rig
CG Model

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What is 3D Scanning? (3DS)

How does 3DS relate to multi-cam array?



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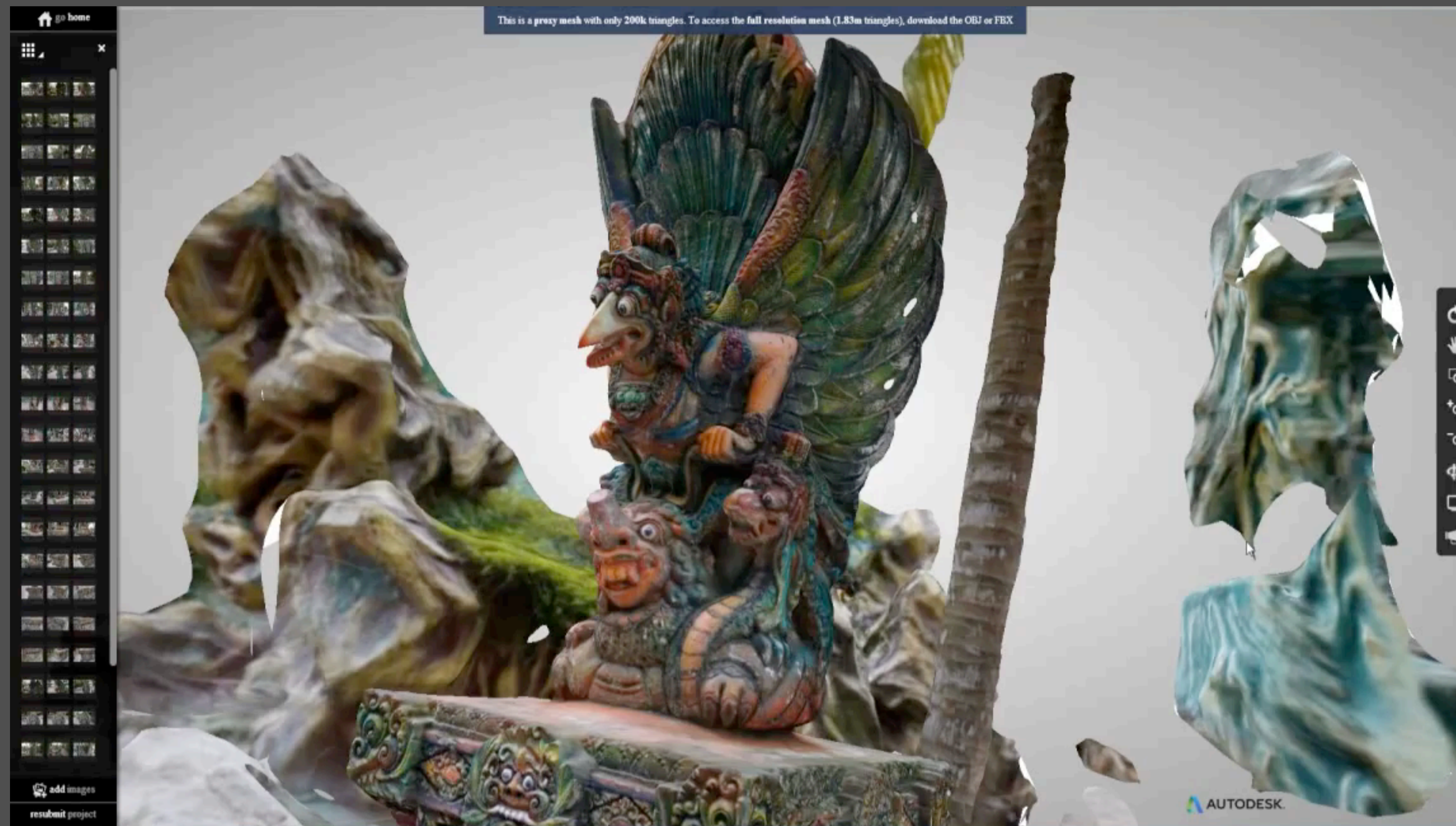
Photogrammetry for VisualFX



Time-Slice Films
Contemporary
Photogrammetry Rig
5 Gigapixel Capture

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Autodesk : ReCap Photo Cloud-based photogrammetry service

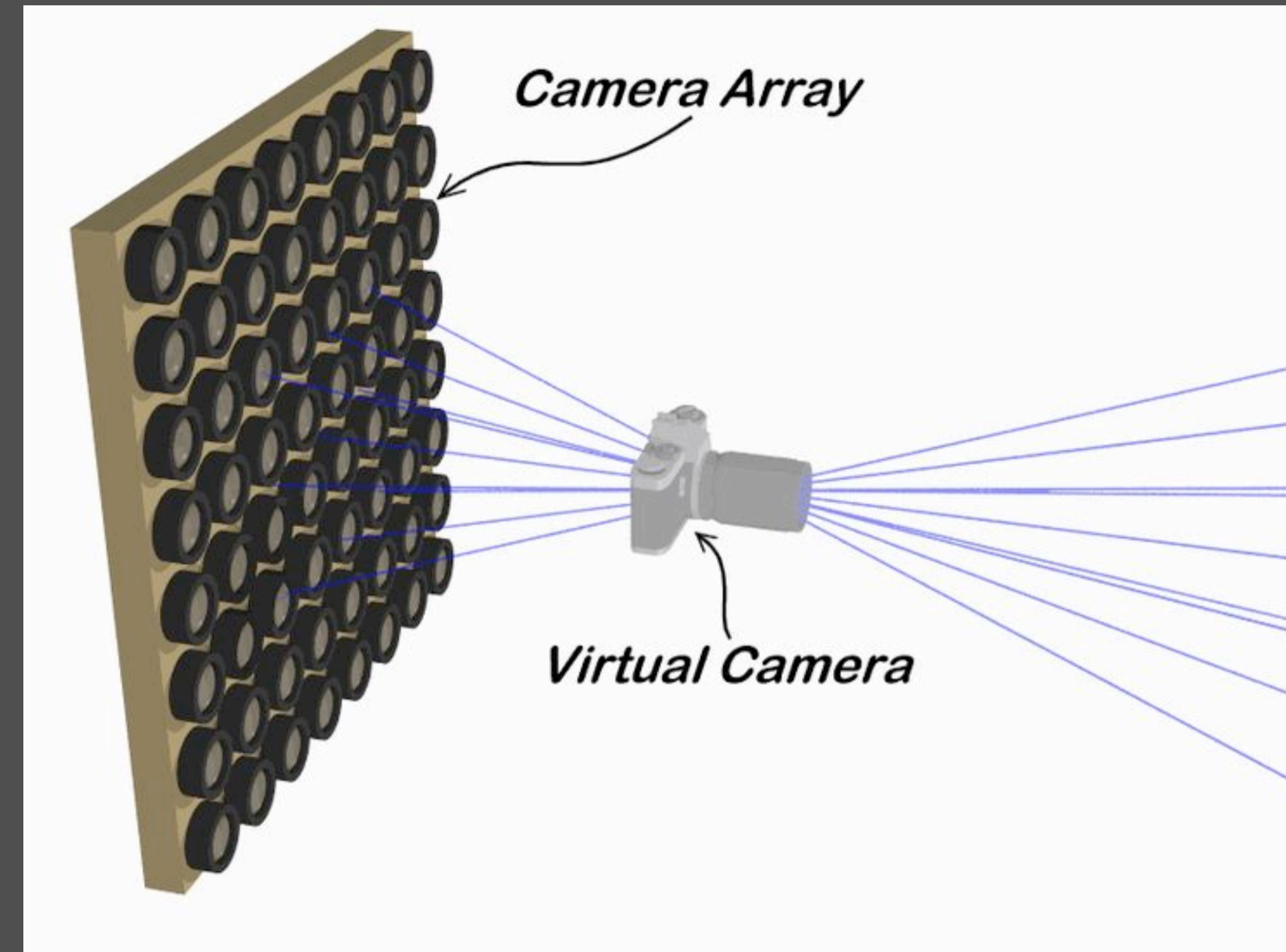
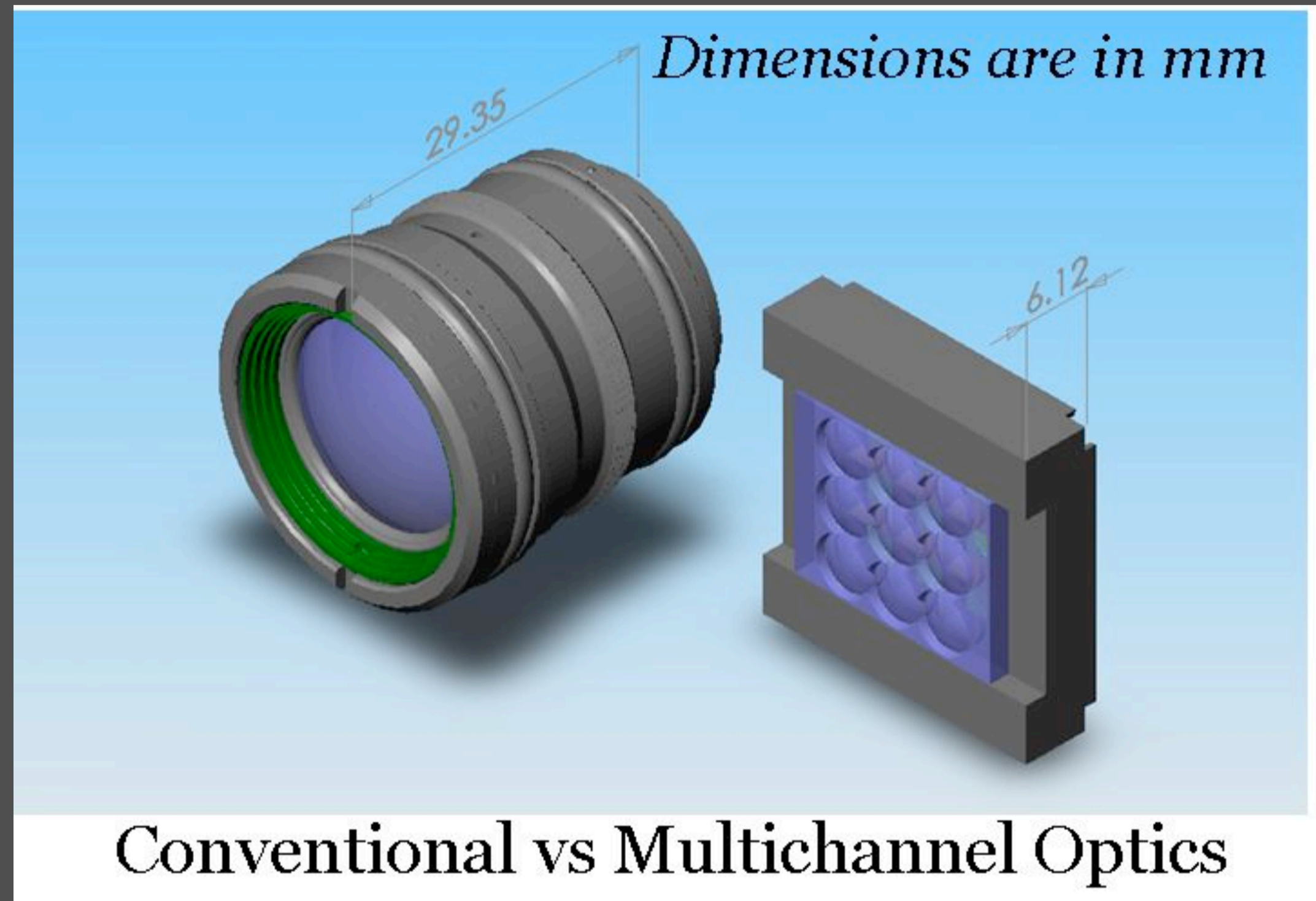


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Array and Computational Photography

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2D Array - a Dead End?



Micro and Macro

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2D Array - a Dead End?

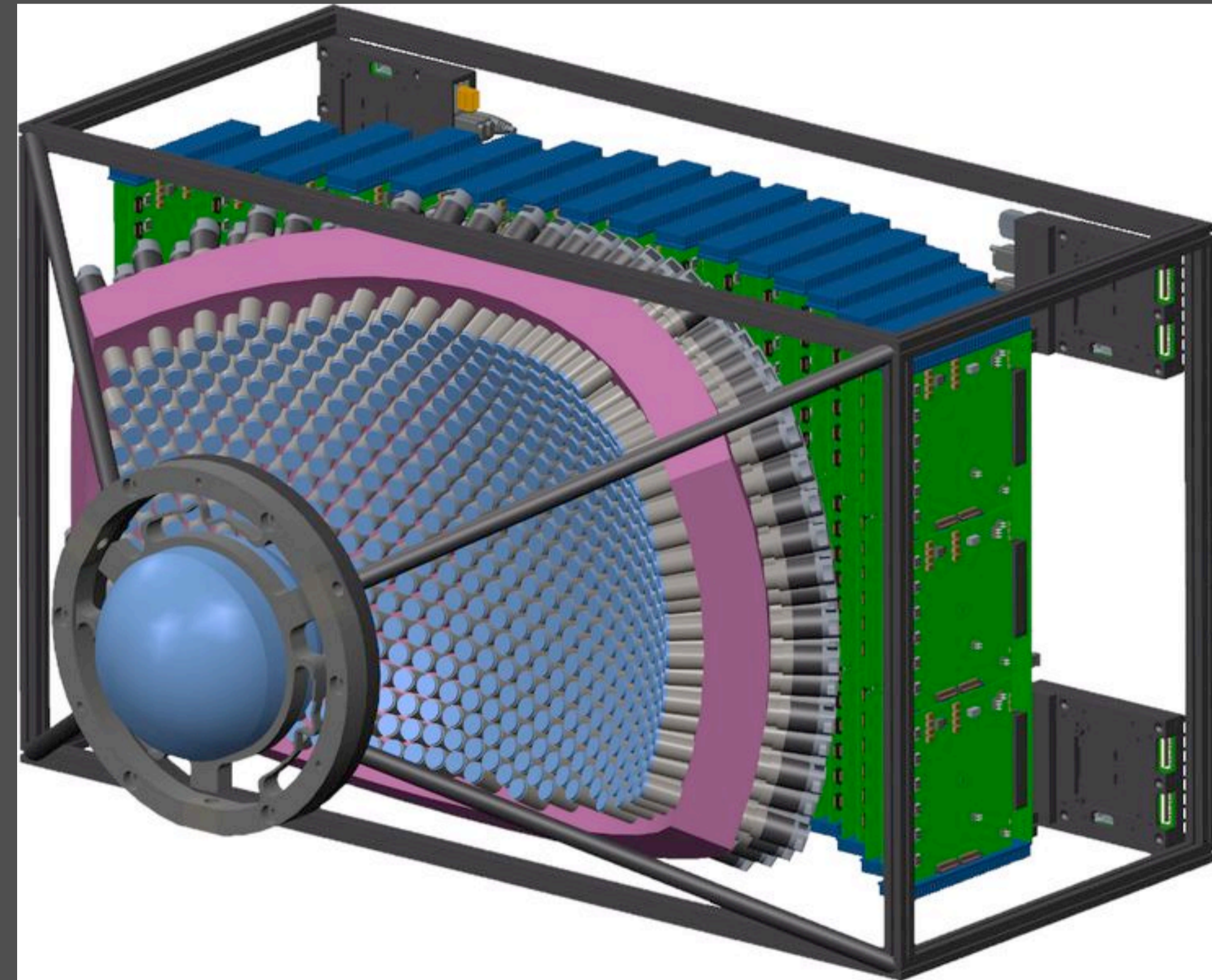


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2D Array - a Dead End?



Wide-Field Array



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Video Array (Continuous 4D Capture)



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Video Array (Continuous 4D Capture)



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Video Array (Continuous 4D Capture)



Time-Slice Films
4D Capture

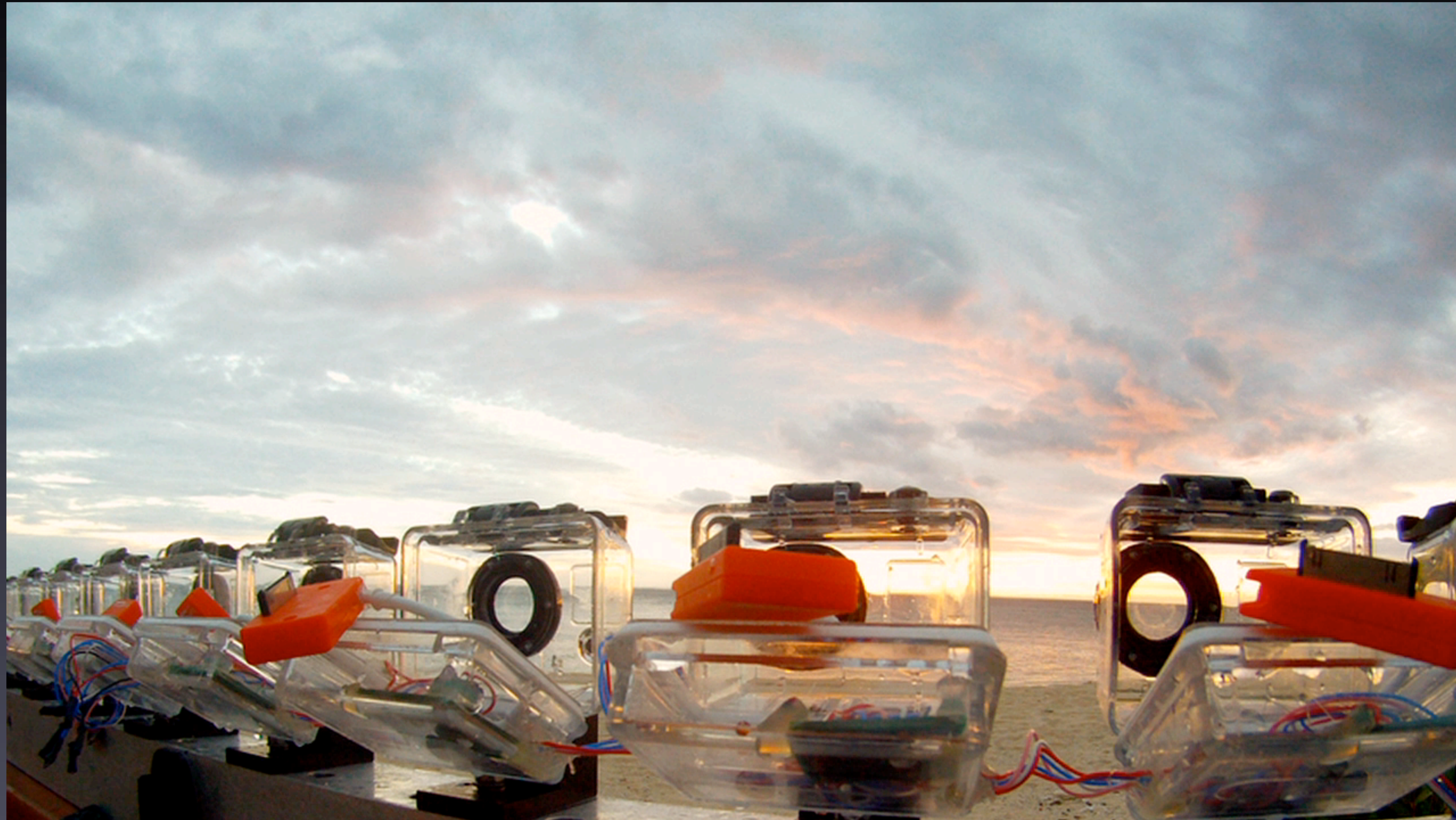
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Video Array (Continuous 4D Capture)

Experrimental GoPro
Array

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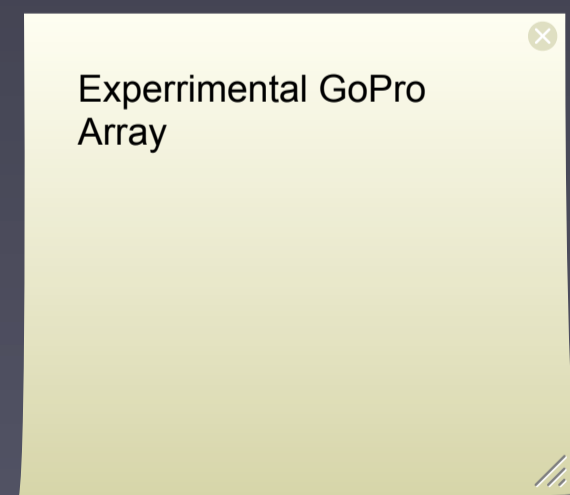
Video Array (Continuous 4D Capture)



Experrimental GoPro
Array

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Video Array (Continuous 4D Capture)



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Video Array (Continuous 4D Capture)



Experimental GoPro
Array

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The End

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