

DATAVIS 2019

CALTECH/NASA JPL/ART CENTER

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[PROGRAM ORGANIZERS] JPL | SCOTT DAVIDOFF | ART CENTER | MAGGIE HENDRIE | CALTECH | SANTIAGO LOMBEYDA | CALTECH | HILLARY MUSHKIN



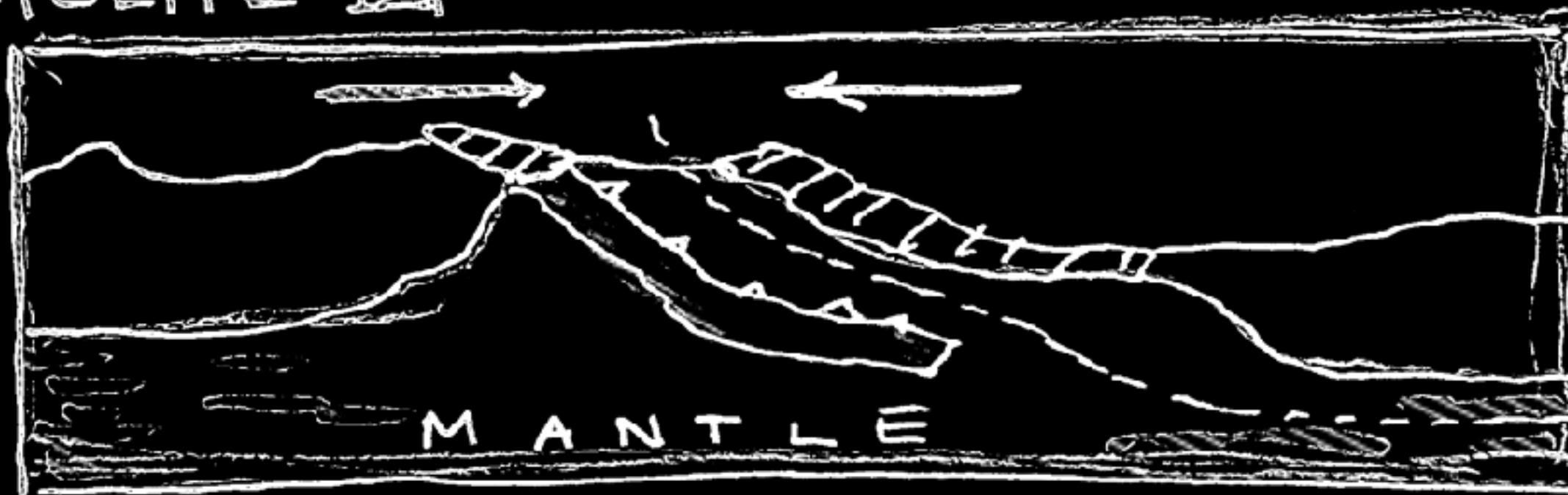
CORBIN INSPECTOR

DRILLING LOCATION:

SAMA IL OPHIOLITE

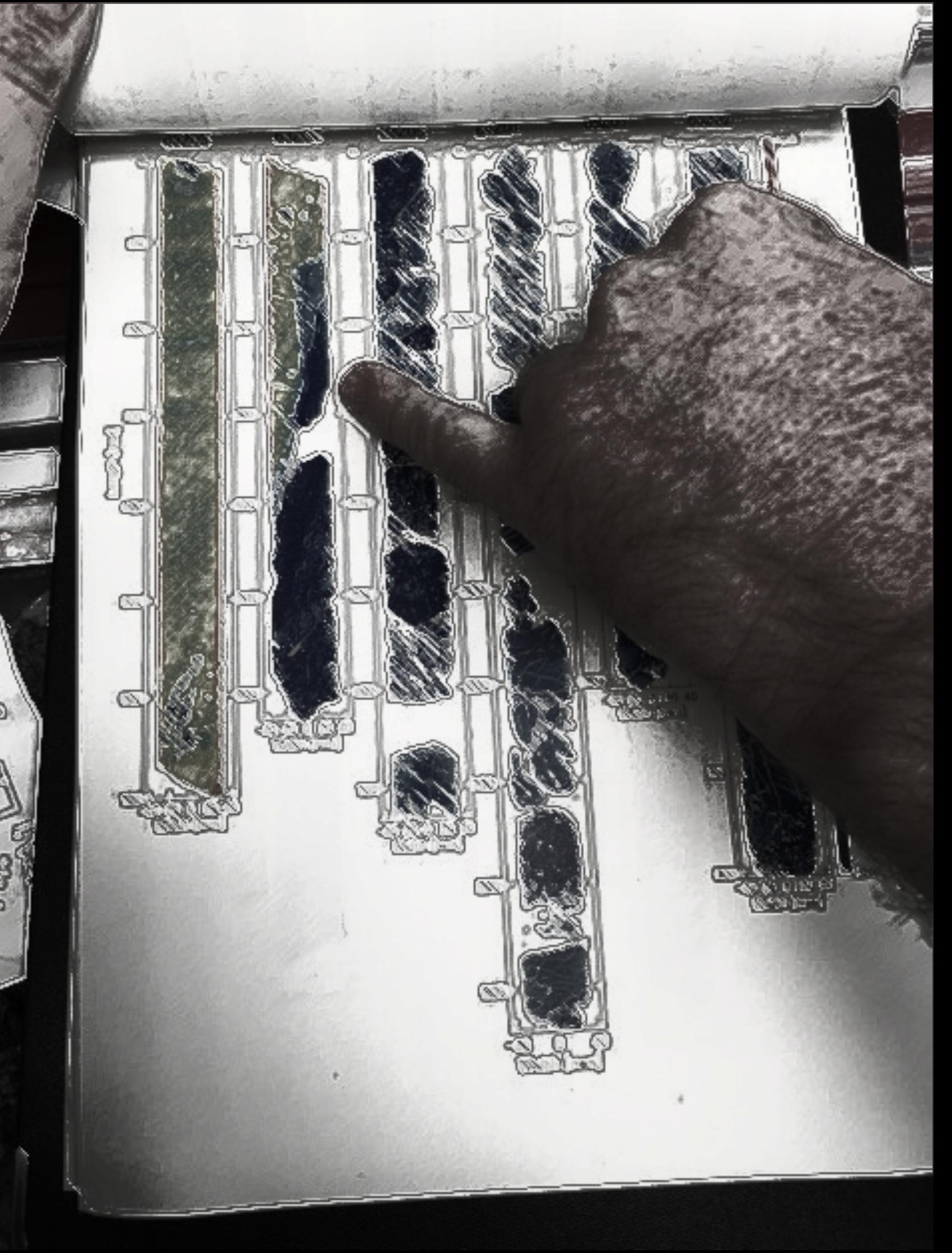


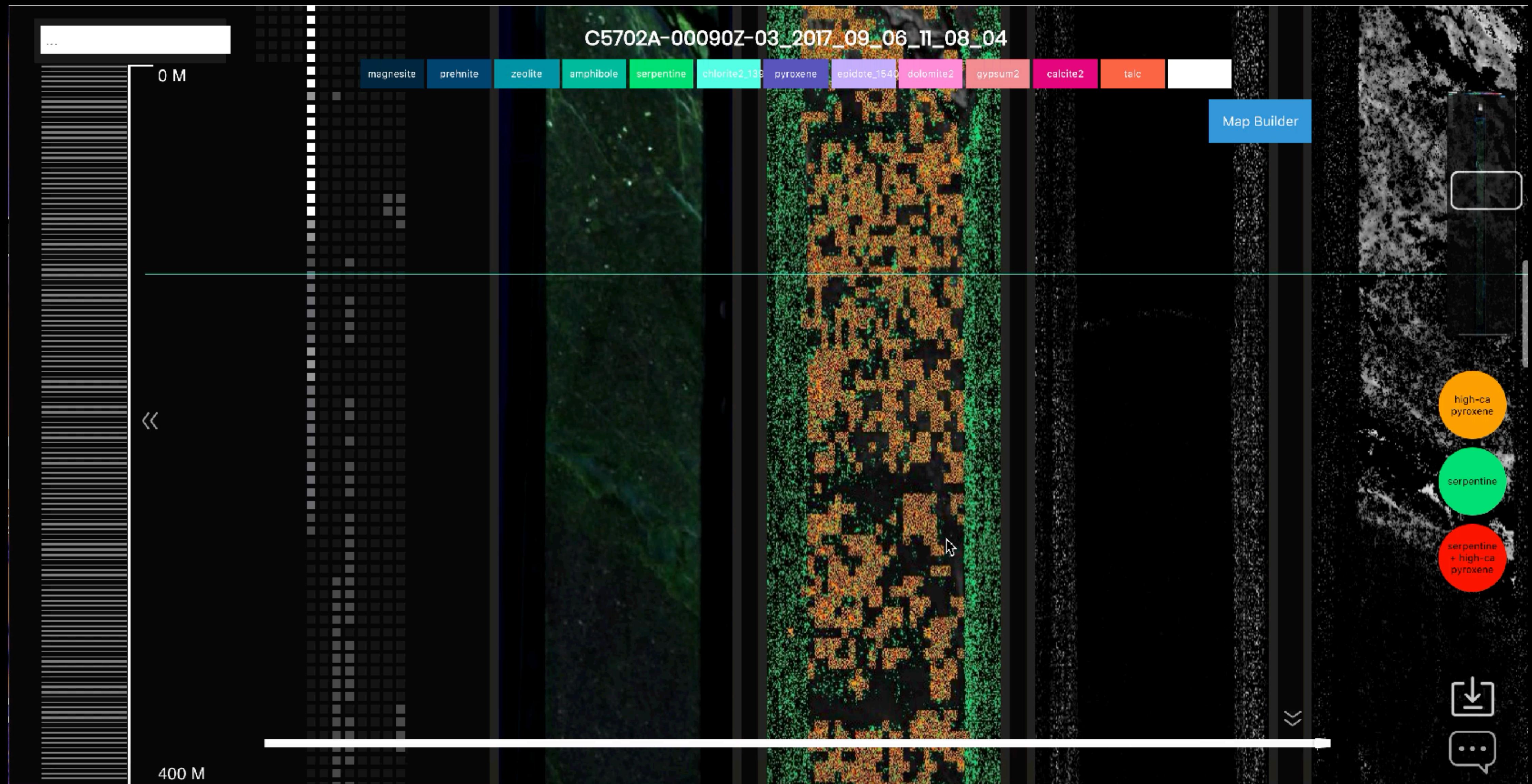
OPHIOLITE



MANTLE









HOW CAN RESEARCHERS USE KILOMETERS OF SHORT-WAVE, NEAR-INFRARED MICRO-SPECTROSCOPY IMAGES TO FACILITATE RESEARCH ON THE OCEANIC CRUST AND MANTLE?



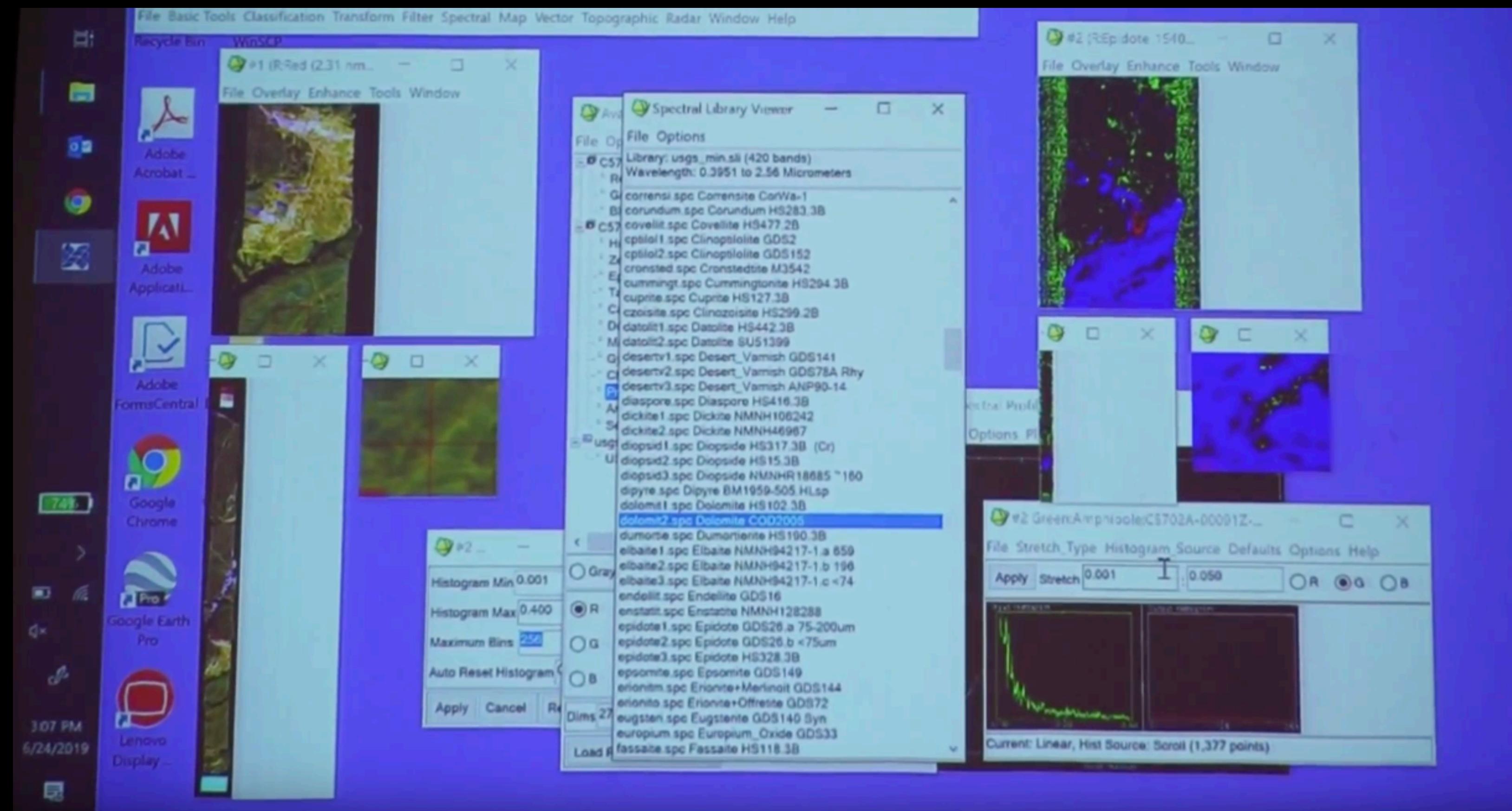
**HOW MIGHT RESEARCHERS EXPLORE
MINERAL PATTERNS ALONG THE
DEPTH OF A CORE TO BETTER
UNDERSTAND THE NATURE OF THE
EARTH'S
OCEANIC CRUST
AND MANTLE
FORMATION?**

INTERFACE PROBLEM

HOW CAN WE EXPRESS ~12 -30 MINERALS IN THE SAME SECTION SIMULTANEOUSLY, NAVIGATE THROUGH THE CORE AND INDIVIDUAL SECTIONS, AND MAINTAIN CONTEXT OF DEPTH IN ONE VIEW

OUR PROPOSED SOLUTION

COR-BINSPECTOR

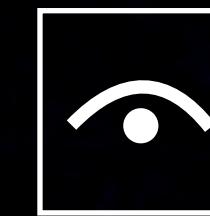




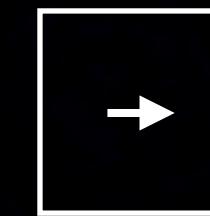
The background of the image is a dense, abstract network visualization. It consists of numerous small, glowing blue and white nodes connected by a complex web of thin, translucent blue lines, resembling a circuit board or a neural network. The nodes are scattered across the frame, with higher concentrations in the center and along the edges. In the middle-left area, the words "LIVE DEMO" are displayed in a bold, white, sans-serif font. The letters are slightly overlapping, creating a sense of depth. The overall aesthetic is futuristic and technological.

LIVE DEMO

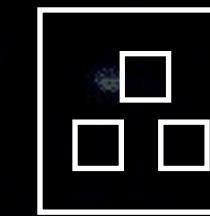
ACCOMPLISHMENTS



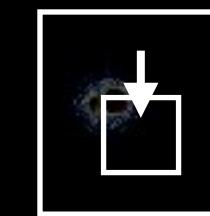
**AT A GLANCE VIEW OF THE CORE COMPOSITION THROUGH A
“PUNCHCARD VIEW”**



**ABILITY TO NAVIGATE THROUGH THE CORE AND ALL OF THE SECTIONS IT
COMPRISSES OF**

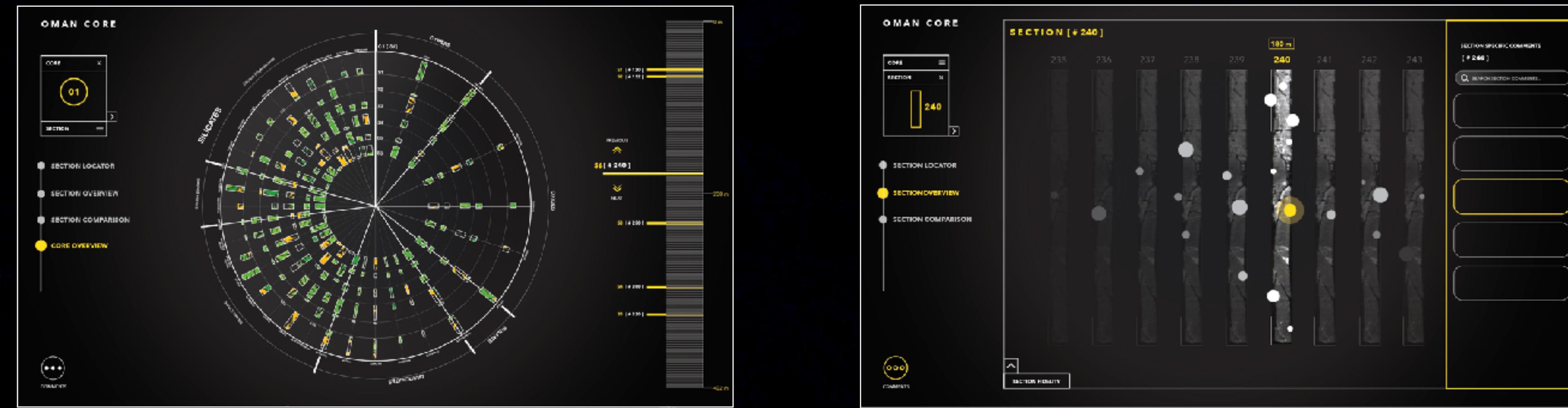


**CURATE AND BUILD A MINERAL MAPS WITH COMMENTS IN A MARKUP
MANNER**



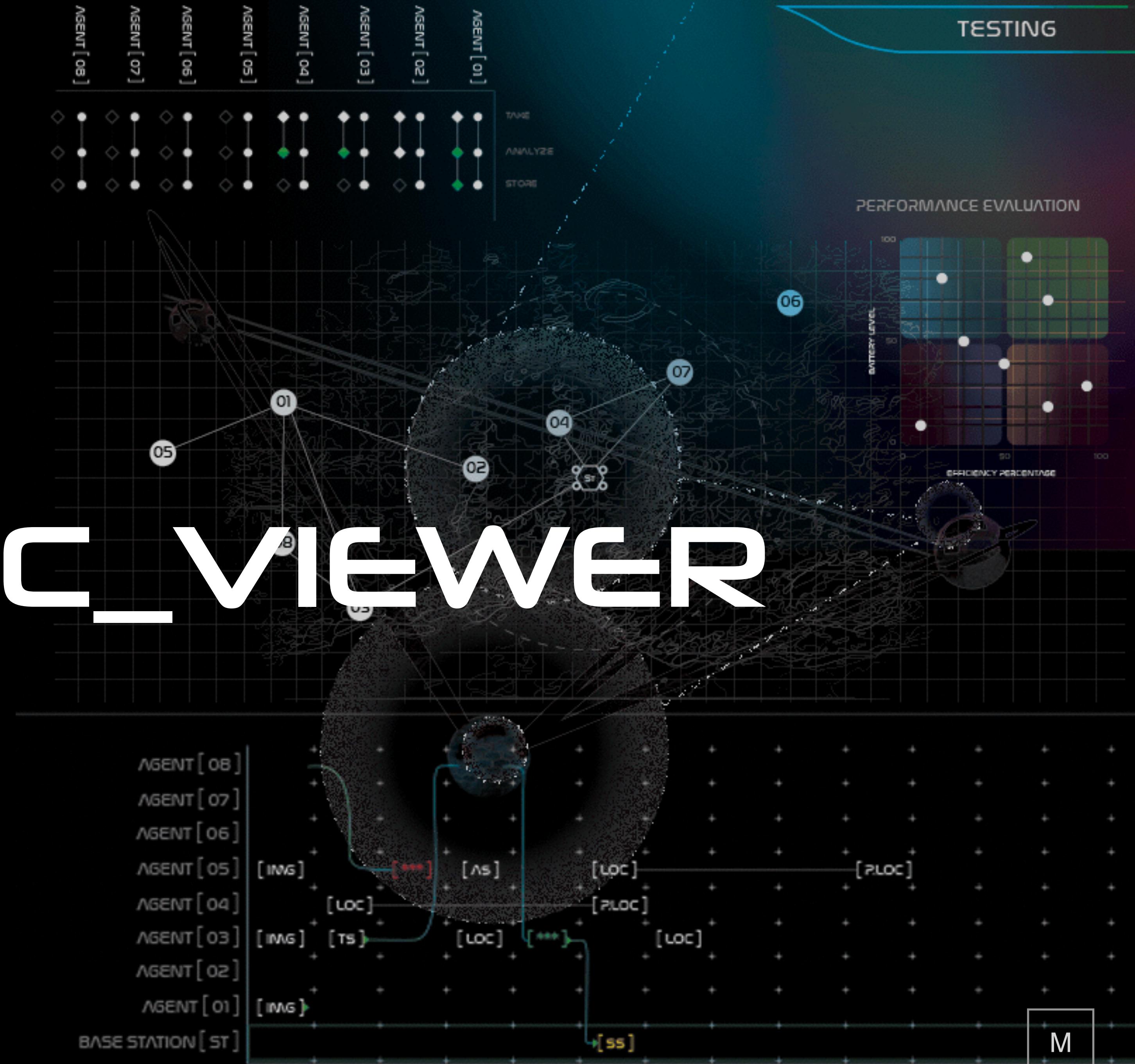
EXPORT THE MAP GENERATED AND SAVE FOR FUTURE REFERENCE

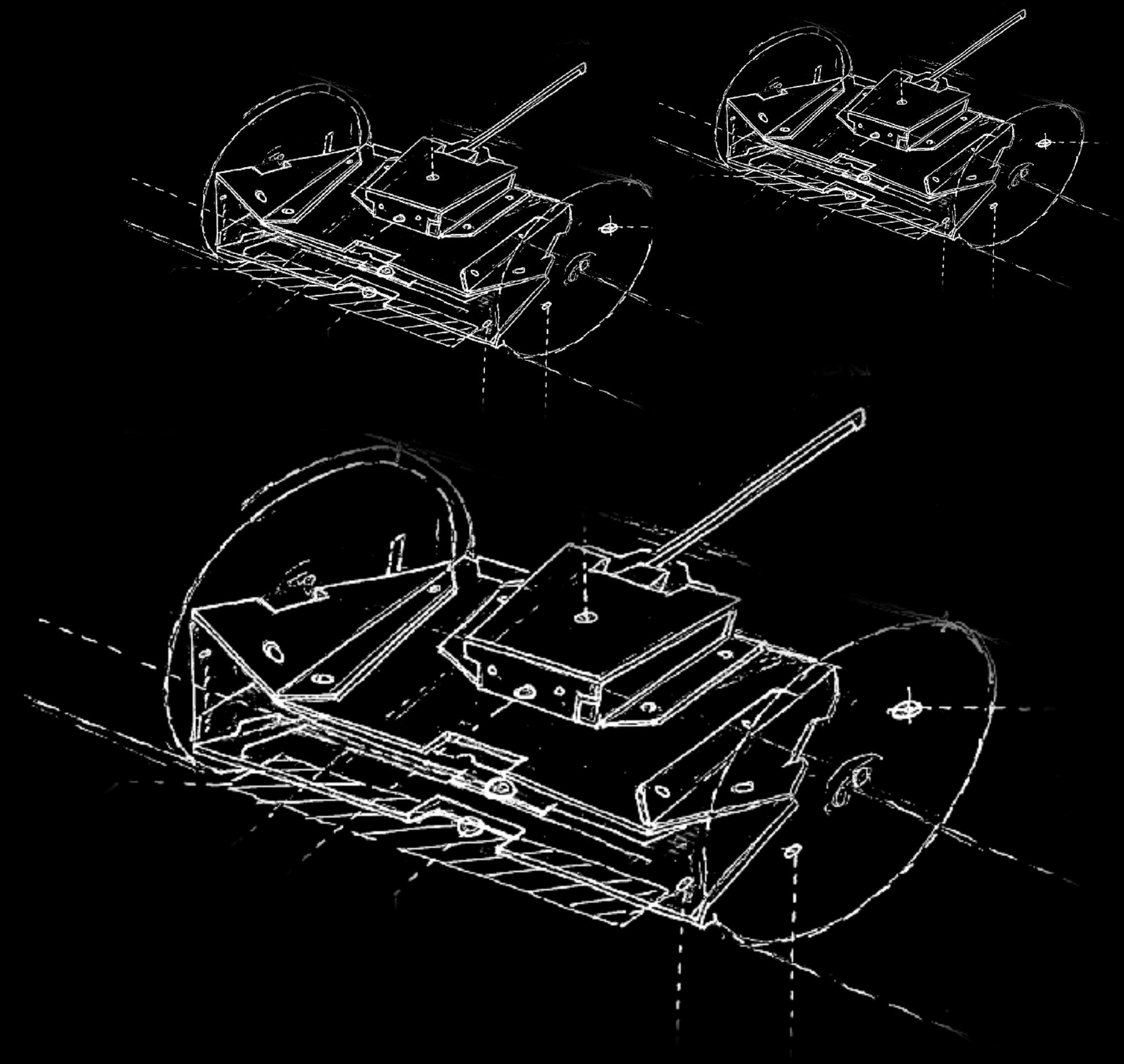
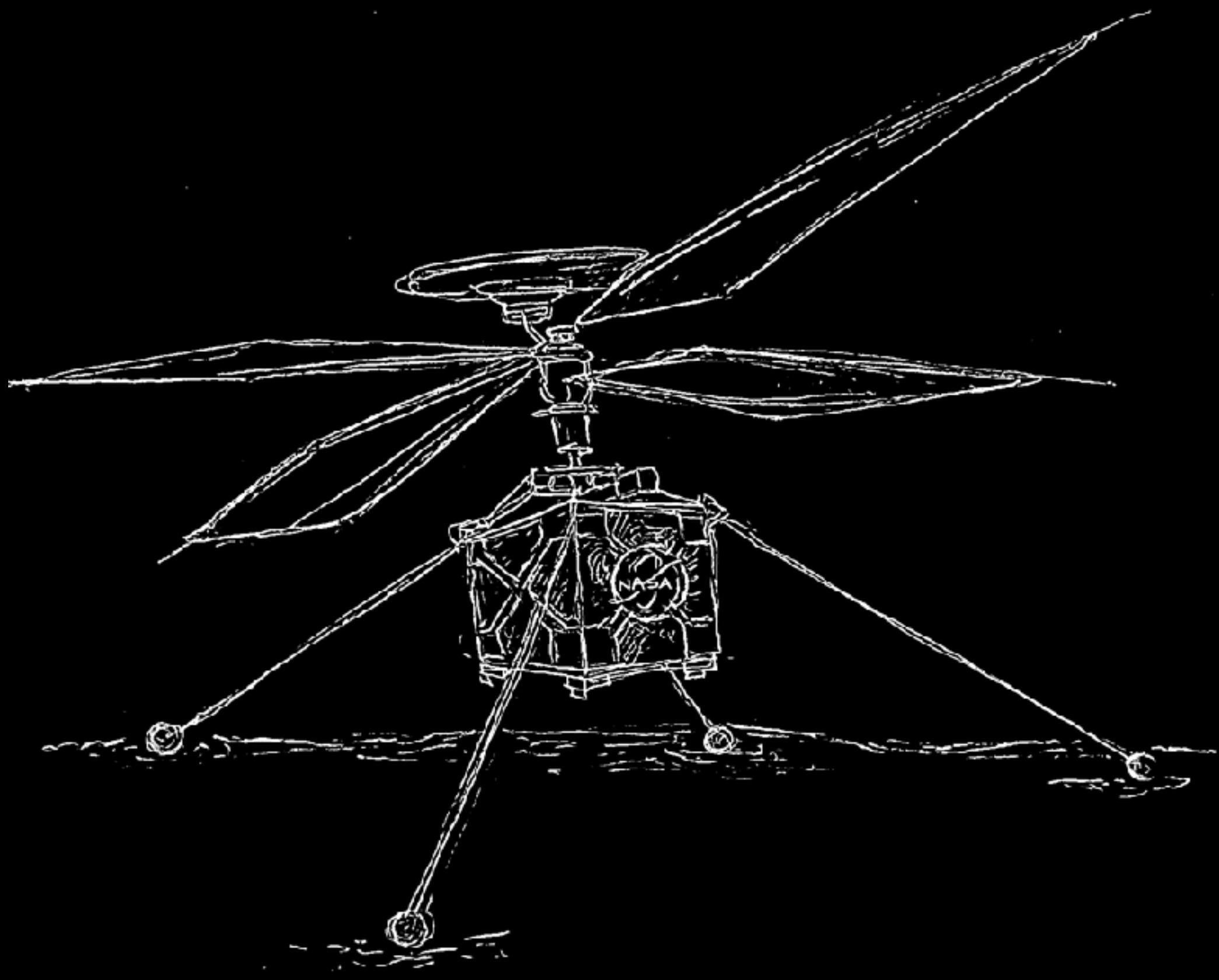
POTENTIAL FUTURE TRAJECTORIES



ACKNOWLEDGEMENTS

MOSAIC_VIEWER

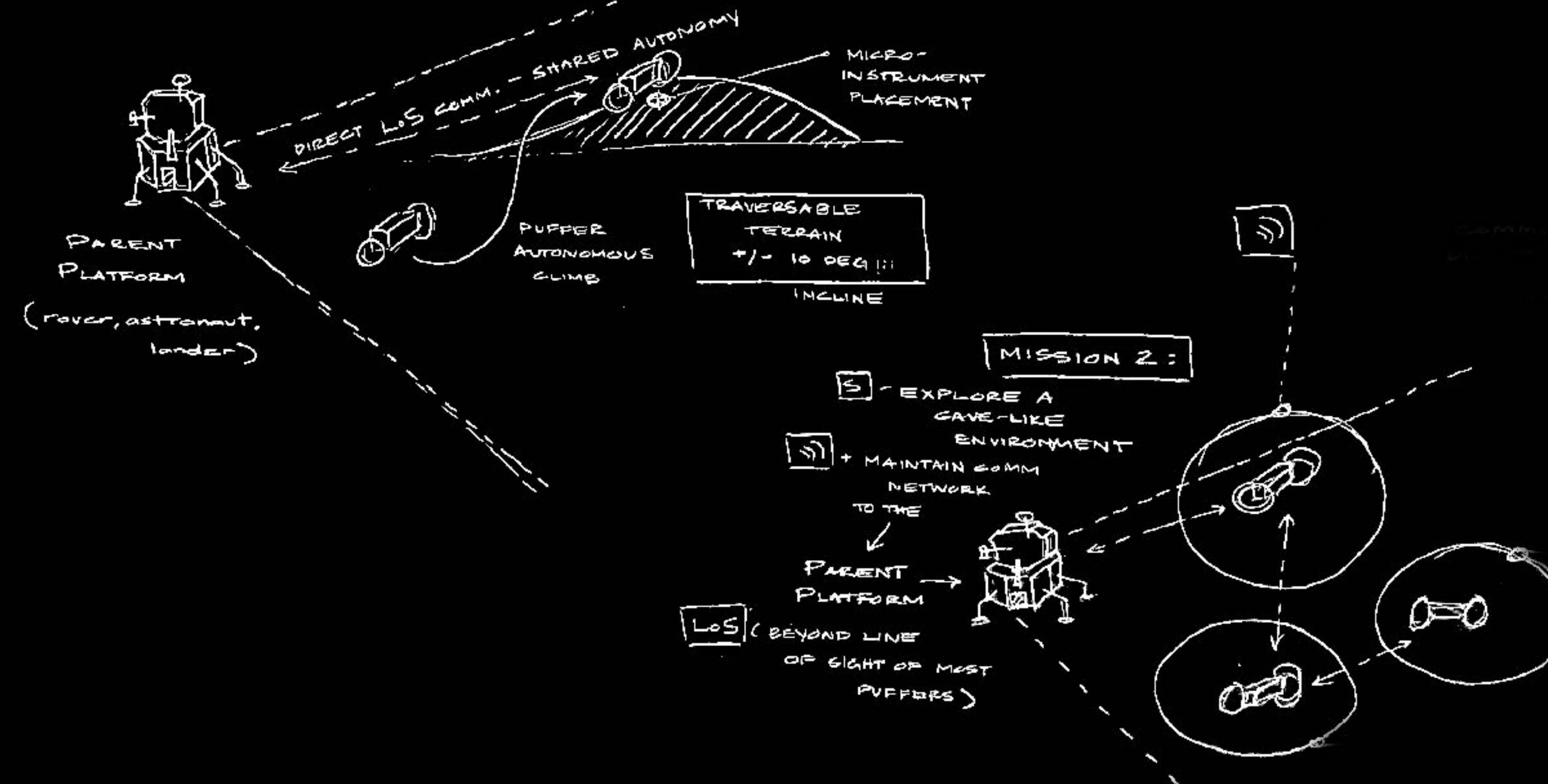


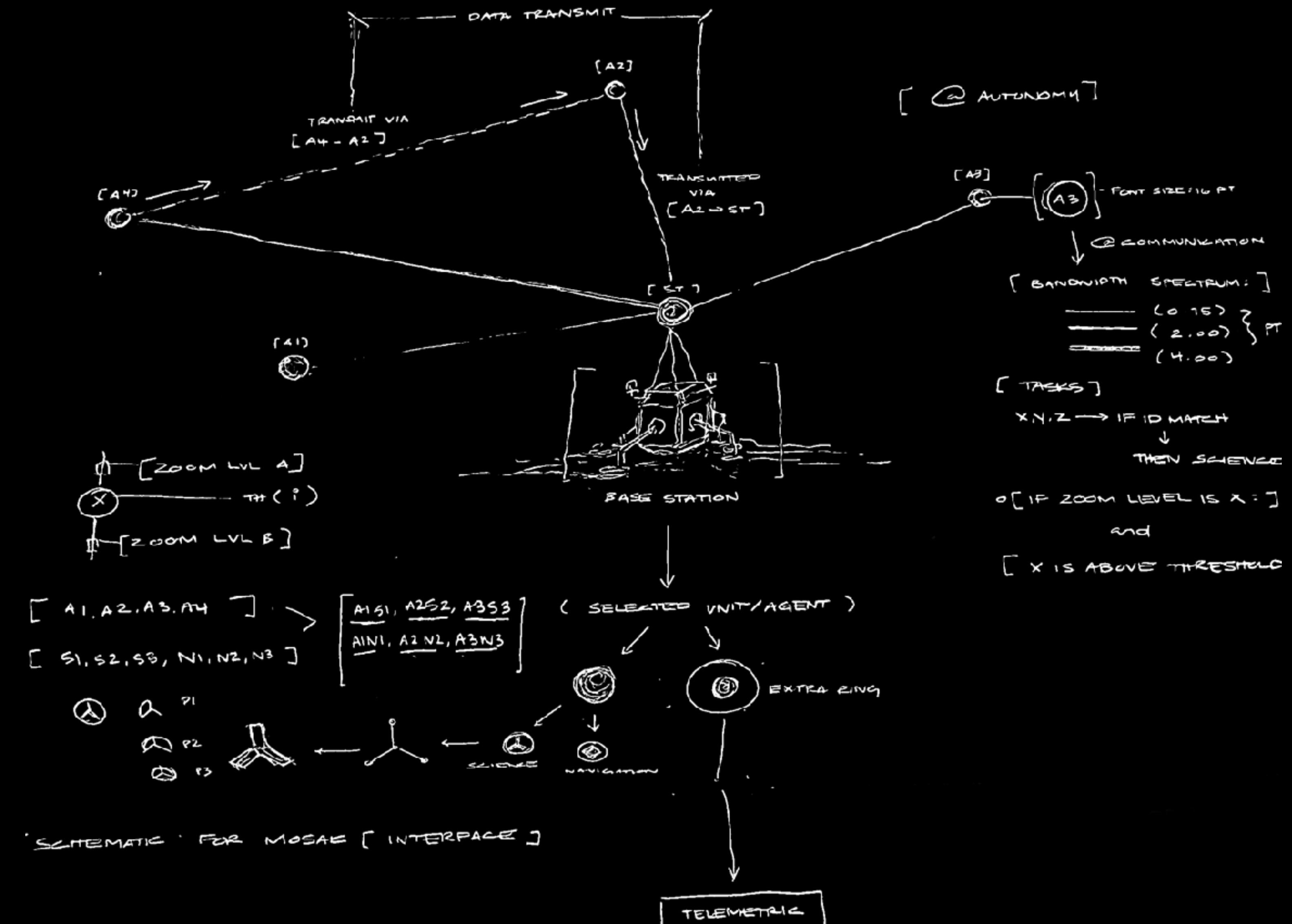


[MISSION 1]

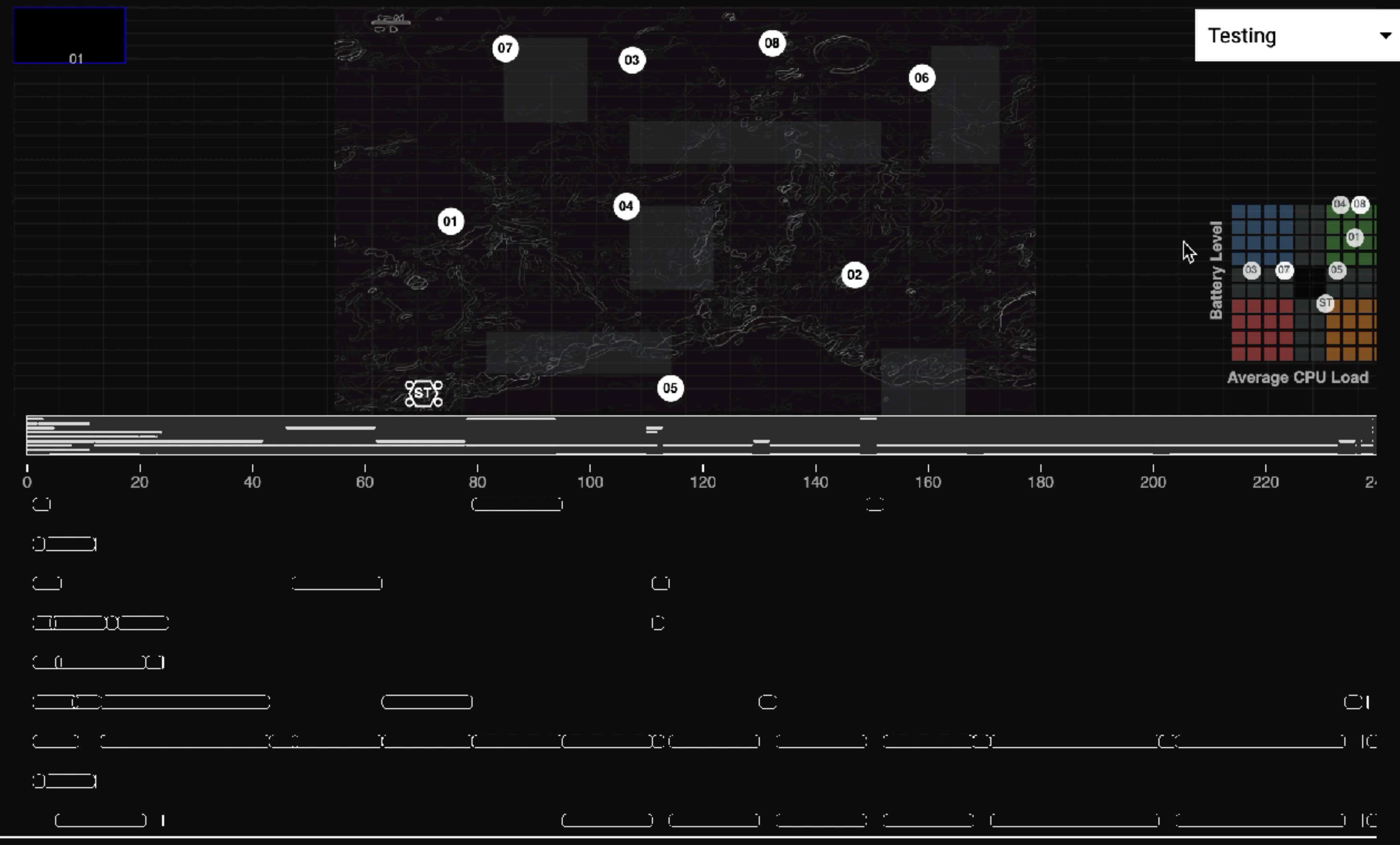
- PLACE A MICROIMAGER
FOR STRATIGRAPHY ON
A STEEP INCLINE

STEEP TERRAIN
30-45 DEG INCLINES



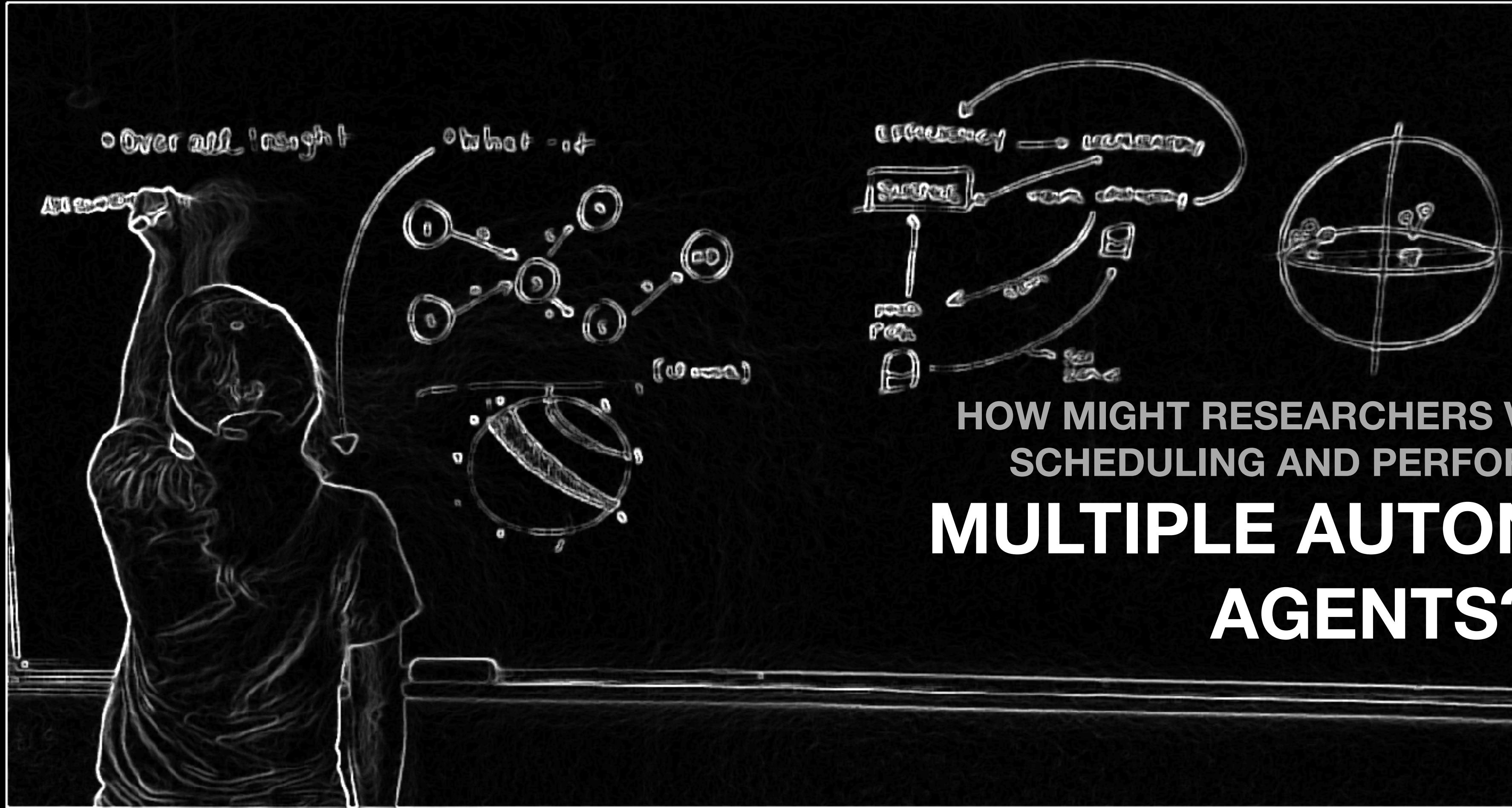


MOSAIC





HOW CAN RESEARCHERS MAINTAIN AWARENESS OF DIFFERING AGENT WORLD VIEWS?



INTERFACE PROBLEM

**UNDERSTANDING WHY DIFFERENT AUTONOMOUS AGENTS
CONDUCT THE ACTIONS THAT THEY DO ALONGSIDE TASK
DISTRIBUTION**

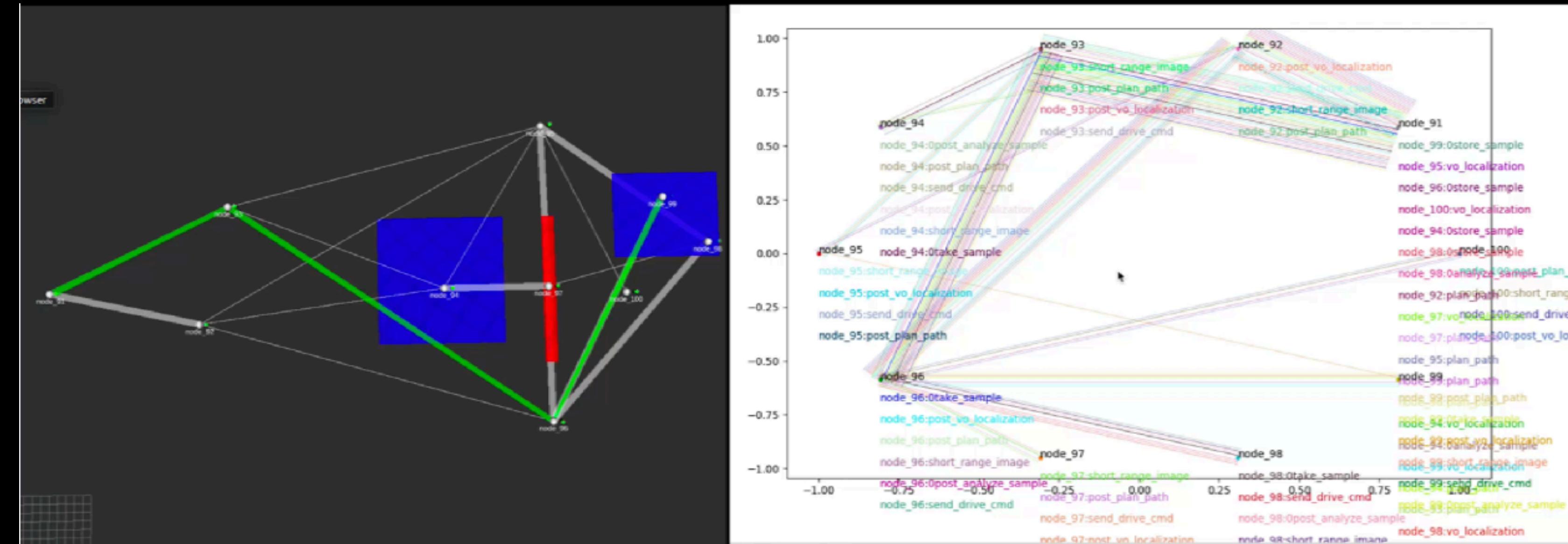
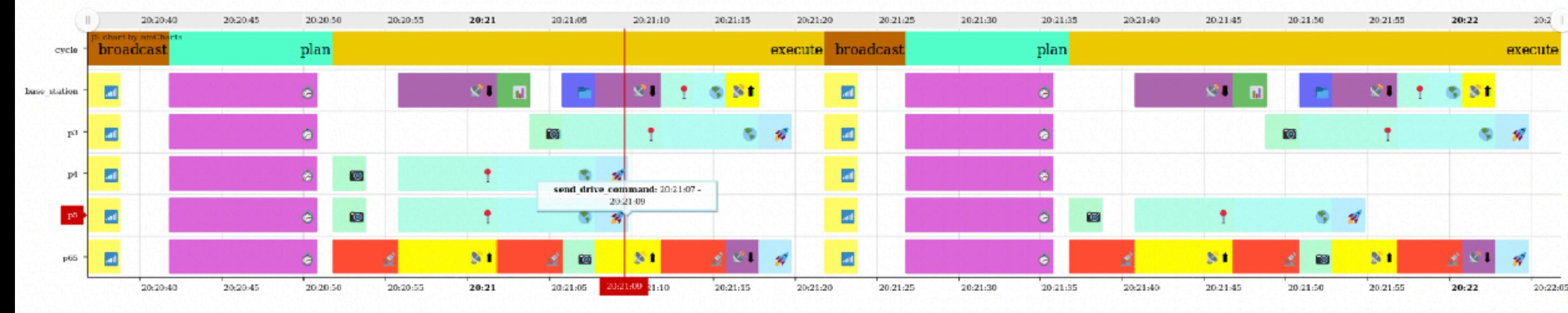
**BEING ABLE TO ANALYZE THE COMMUNICATION BETWEEN
MULTIPLE AUTONOMOUS AGENTS IN A DISCRETE TIME SCALE**



OUR PROPOSED SOLUTION

MOSAIC_VIEWER

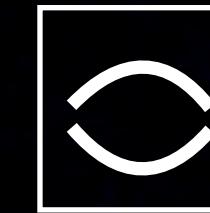
Timeline Visualization



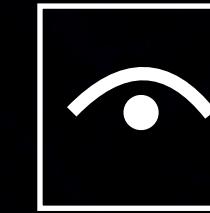


LIVE DEMO

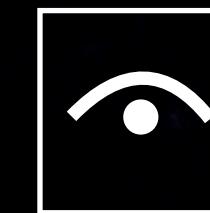
ACCOMPLISHMENTS



MARRIED, UNIFIED, VIEW WHERE ONE CAN GET AN AT A GLANCE VIEW FOR THE SUPERVISION OF MULTIPLE AUTONOMOUS AGENTS

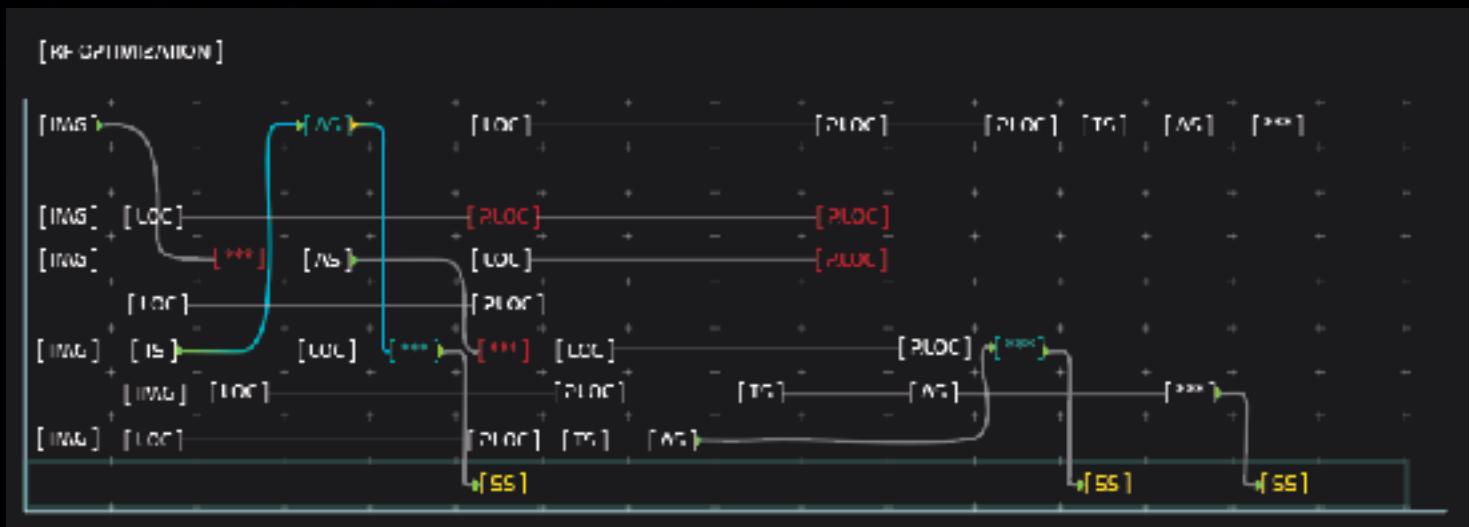
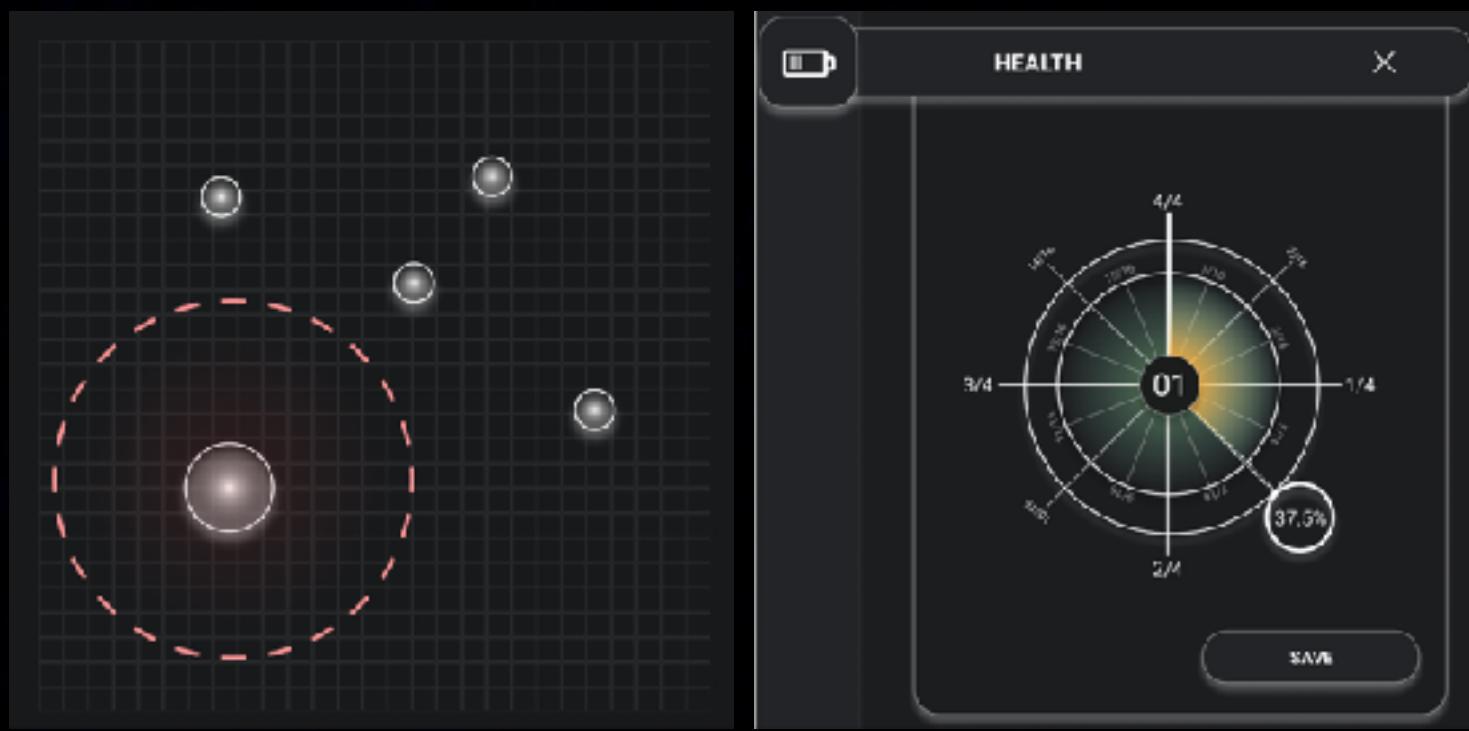


ABILITY TO VISUALIZE THE STATE OF THE SYSTEM TO BETTER UNDERSTAND WHAT IS CURRENTLY DOING AND WHAT IT WILL DO NEXT

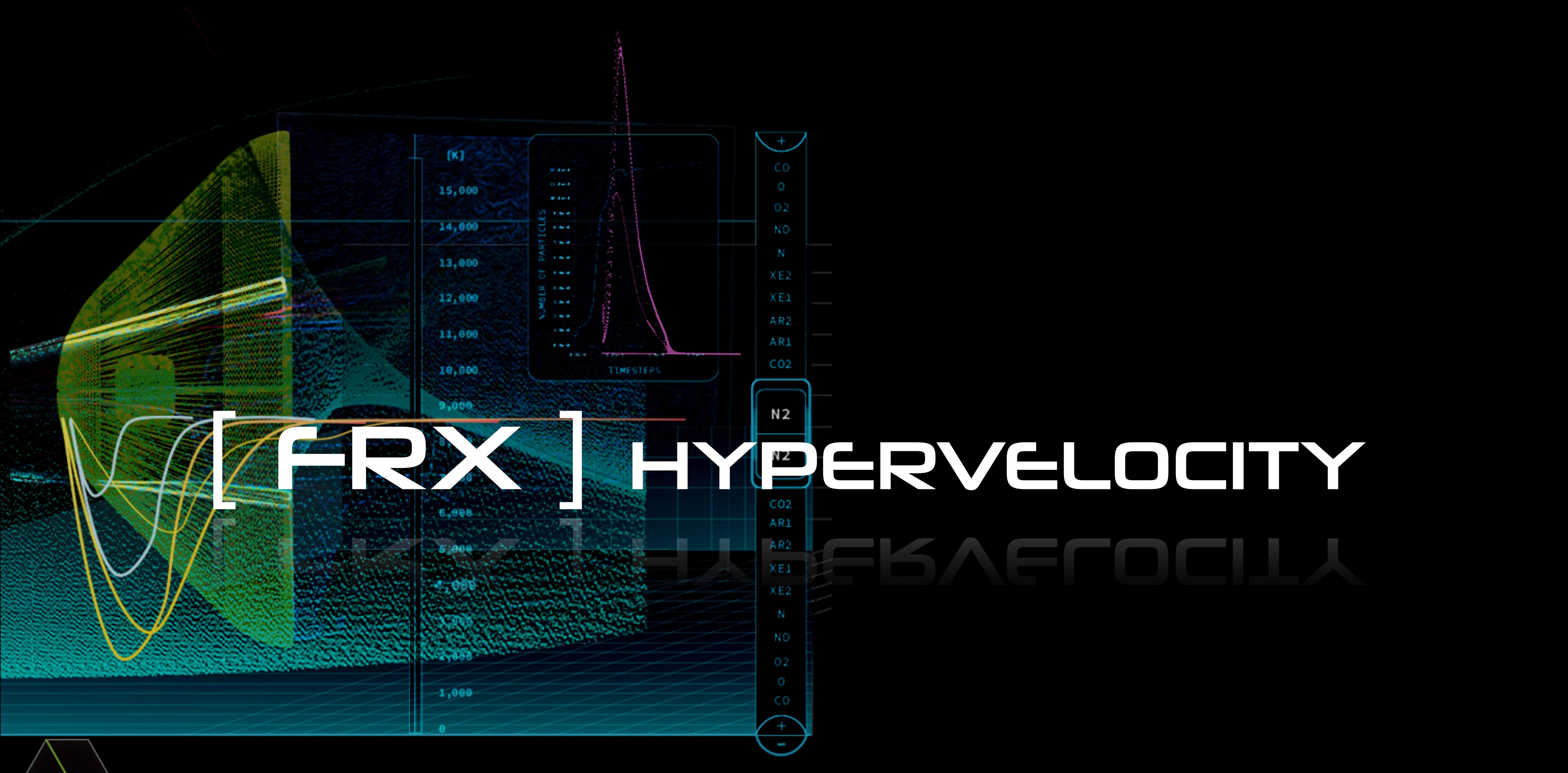


ABILITY TO VISUALIZE AN “AT A GLANCE” OF WHAT THE SYSTEM IS PLANNING

POTENTIAL FUTURE TRAJECTORIES



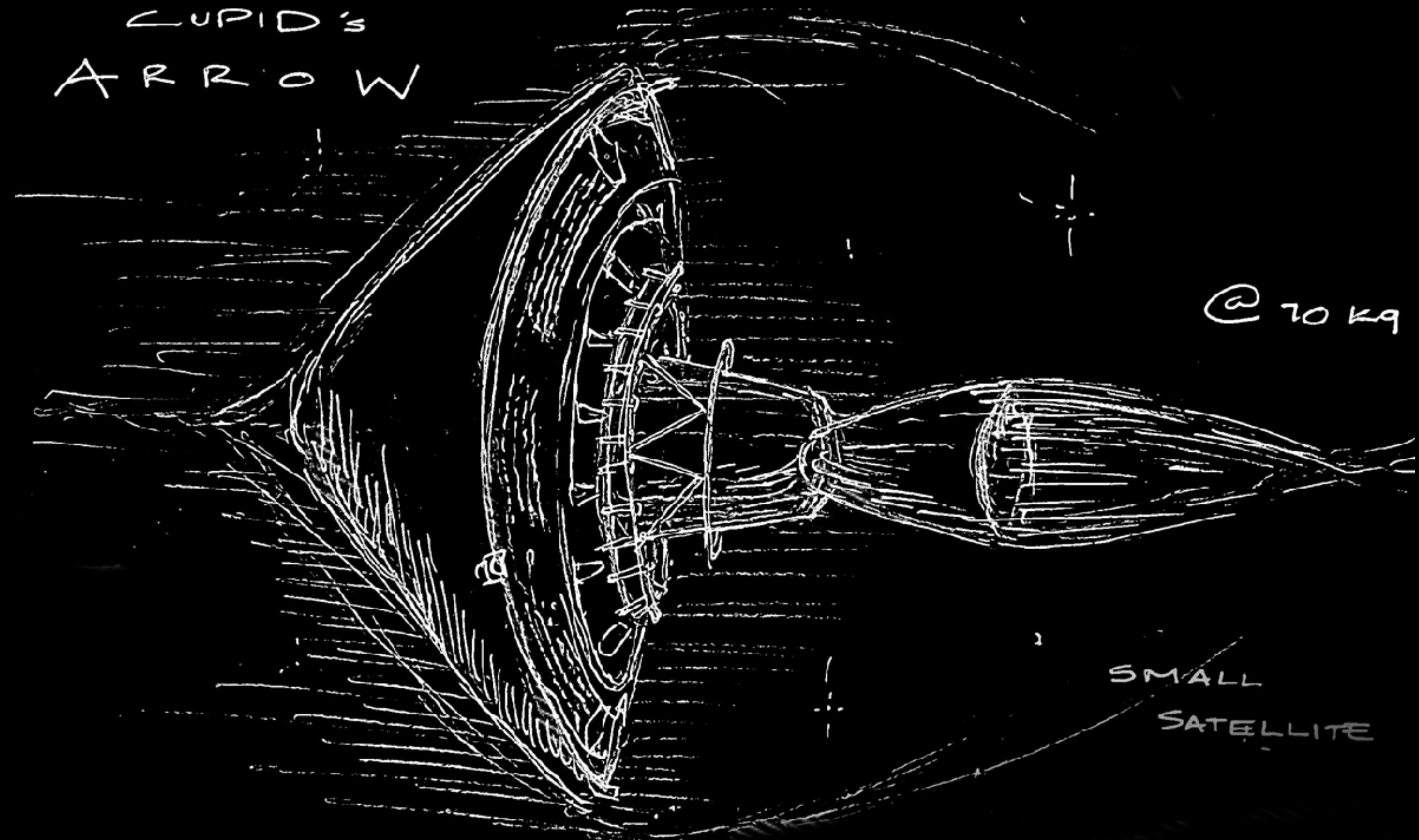
ACKNOWLEDGEMENTS



[FRX] HYPERVELOCITY



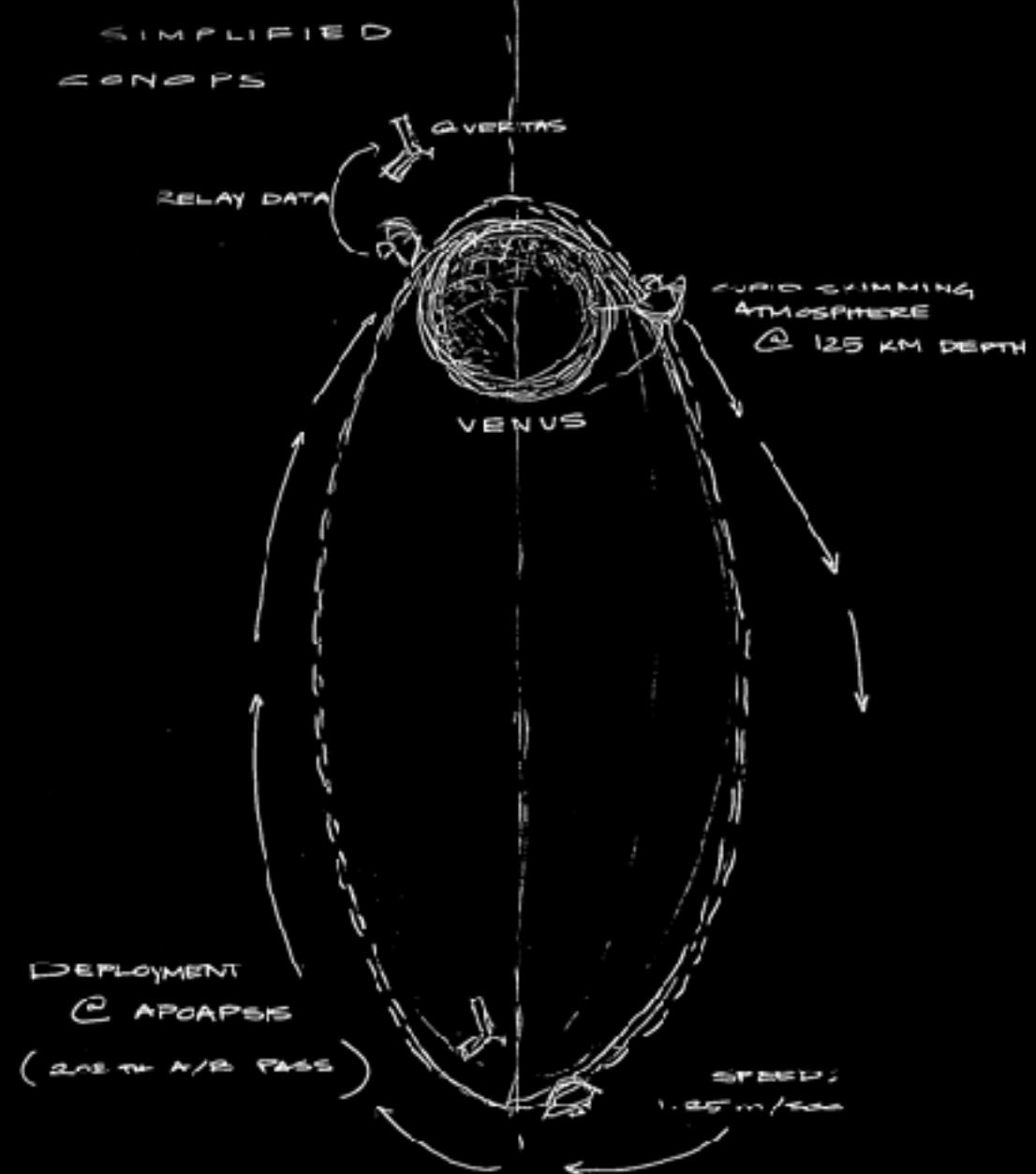
CUPID's
ARROW

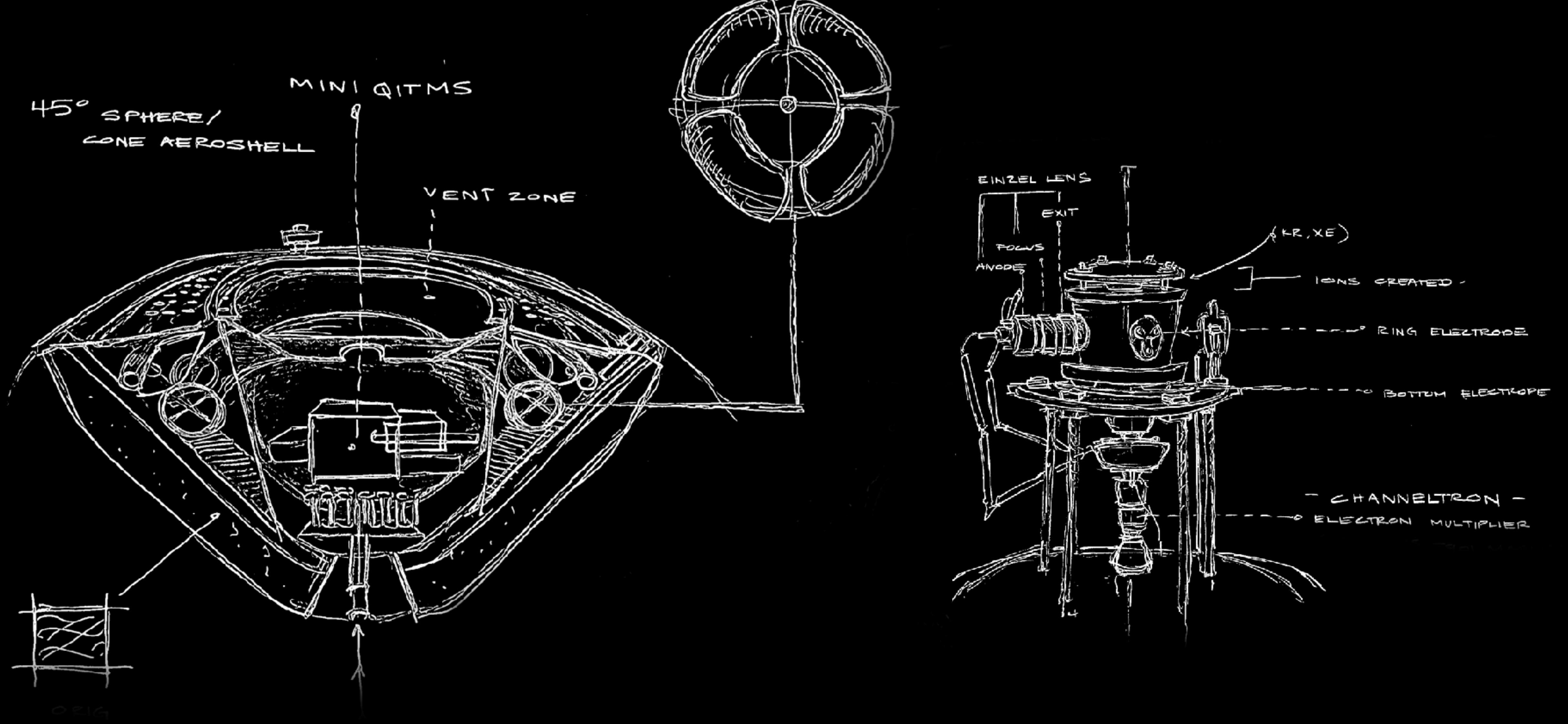


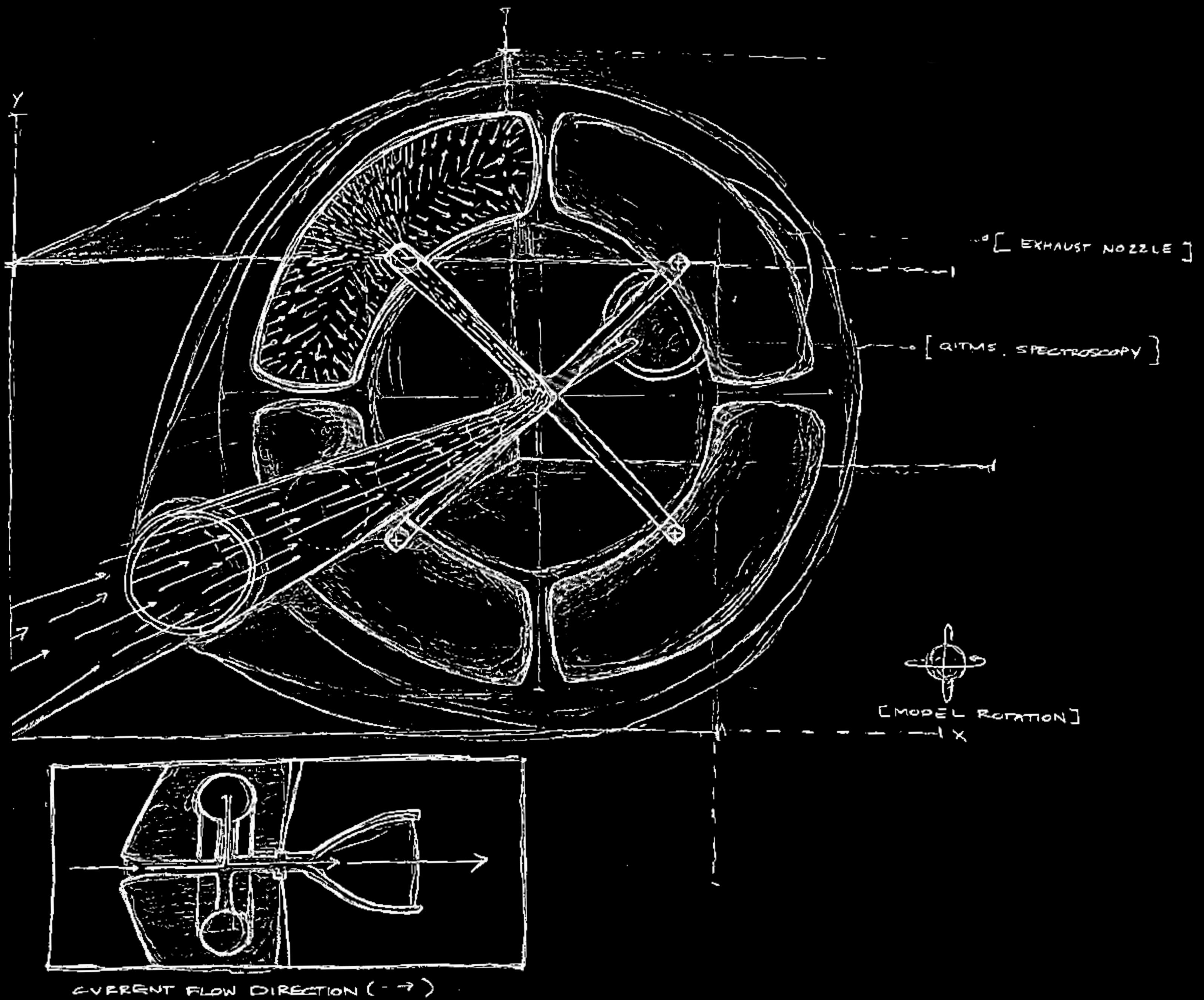
@ 70 kg

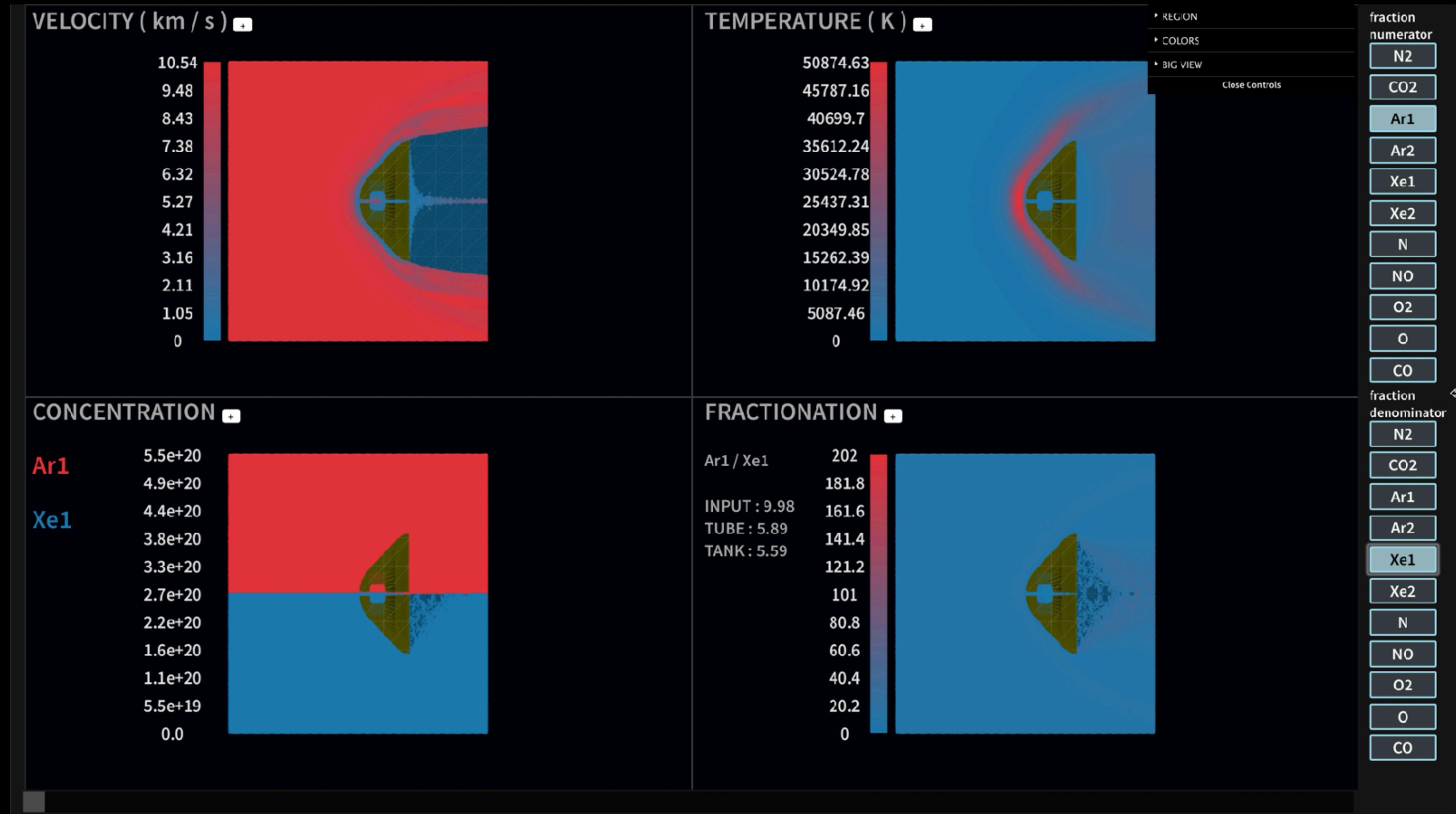
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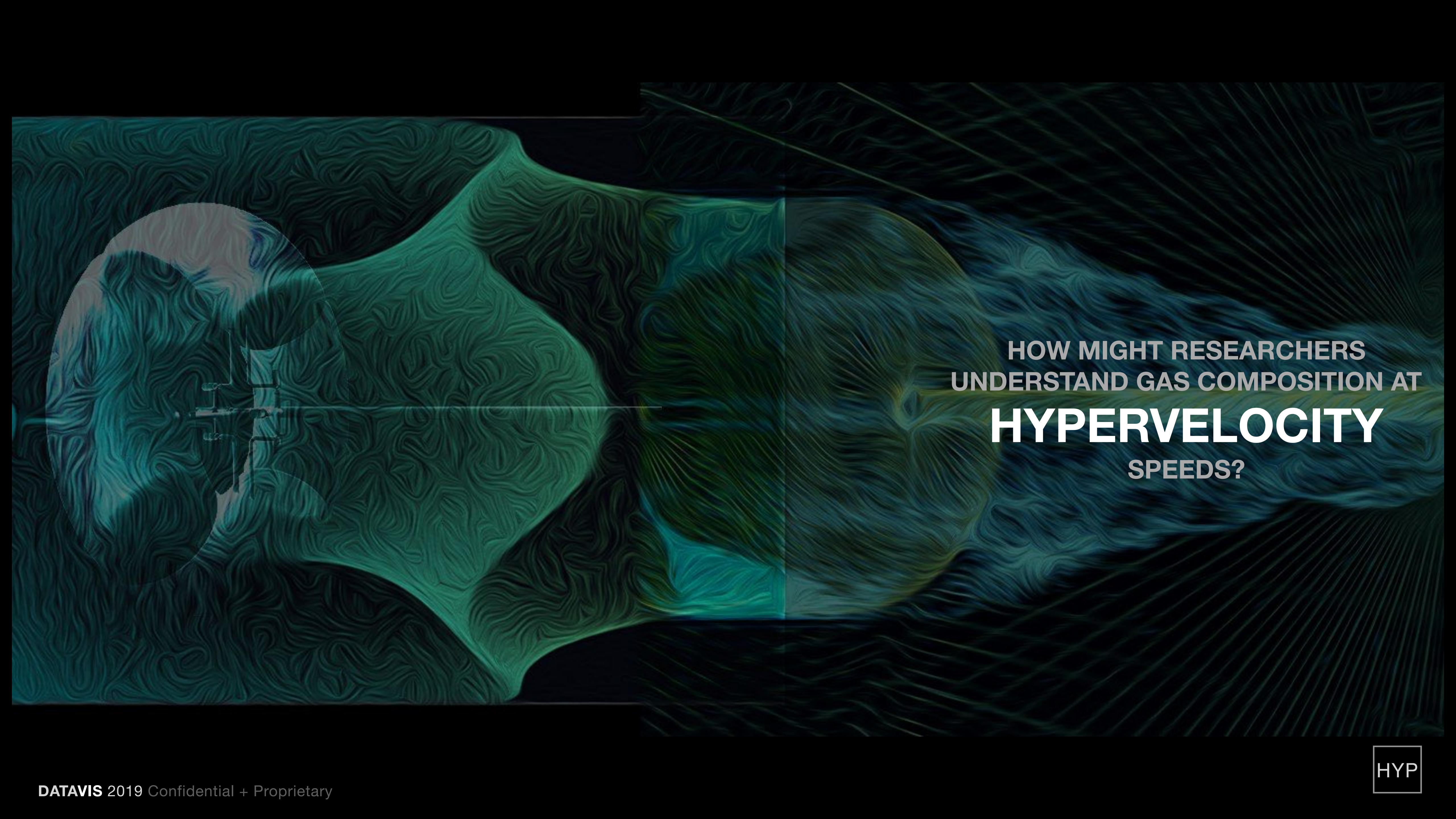
VENUS EMISSIVITY
RADIO SCIENCE
InSAR TOPOGRAPHY +
SPECTROSCOPY



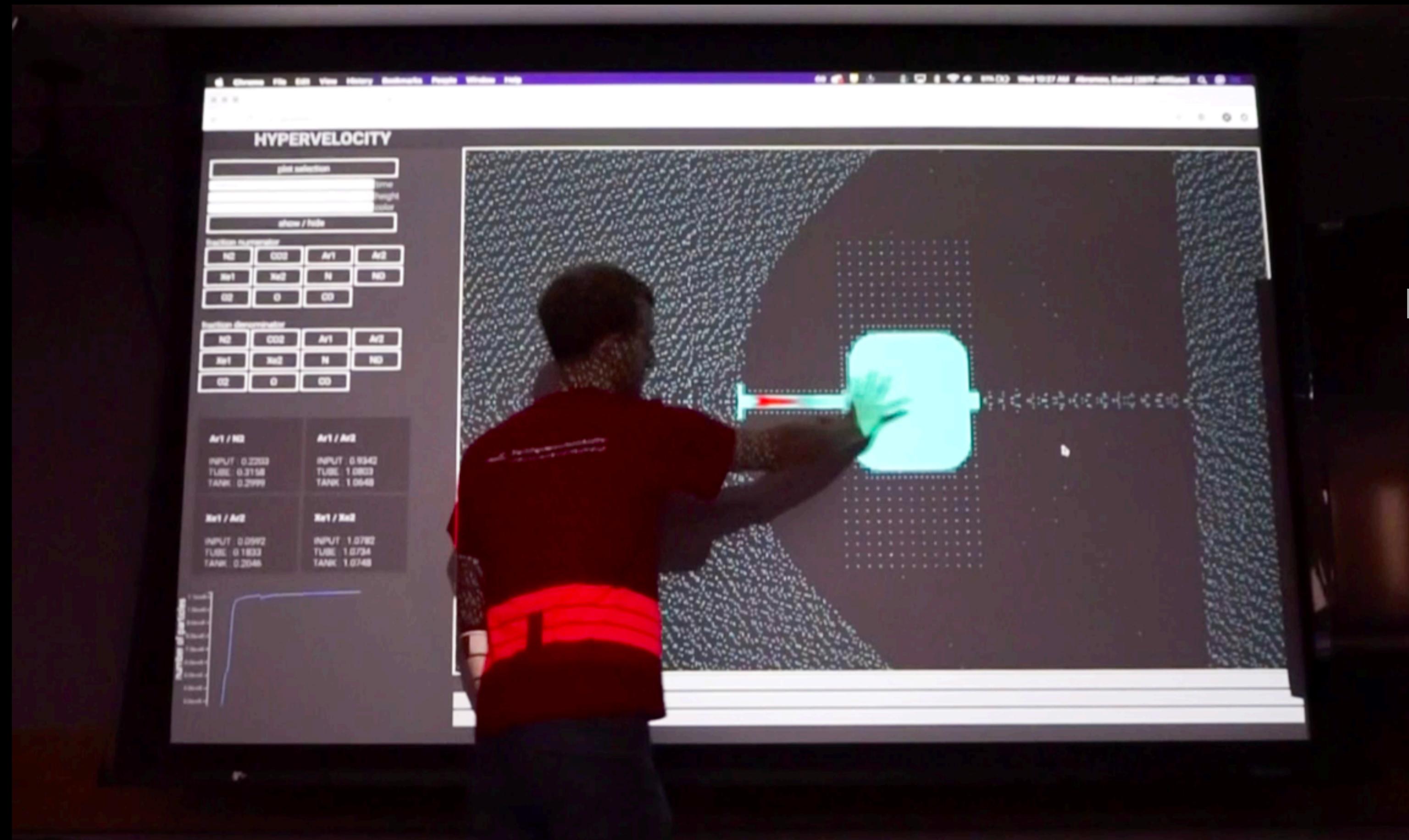






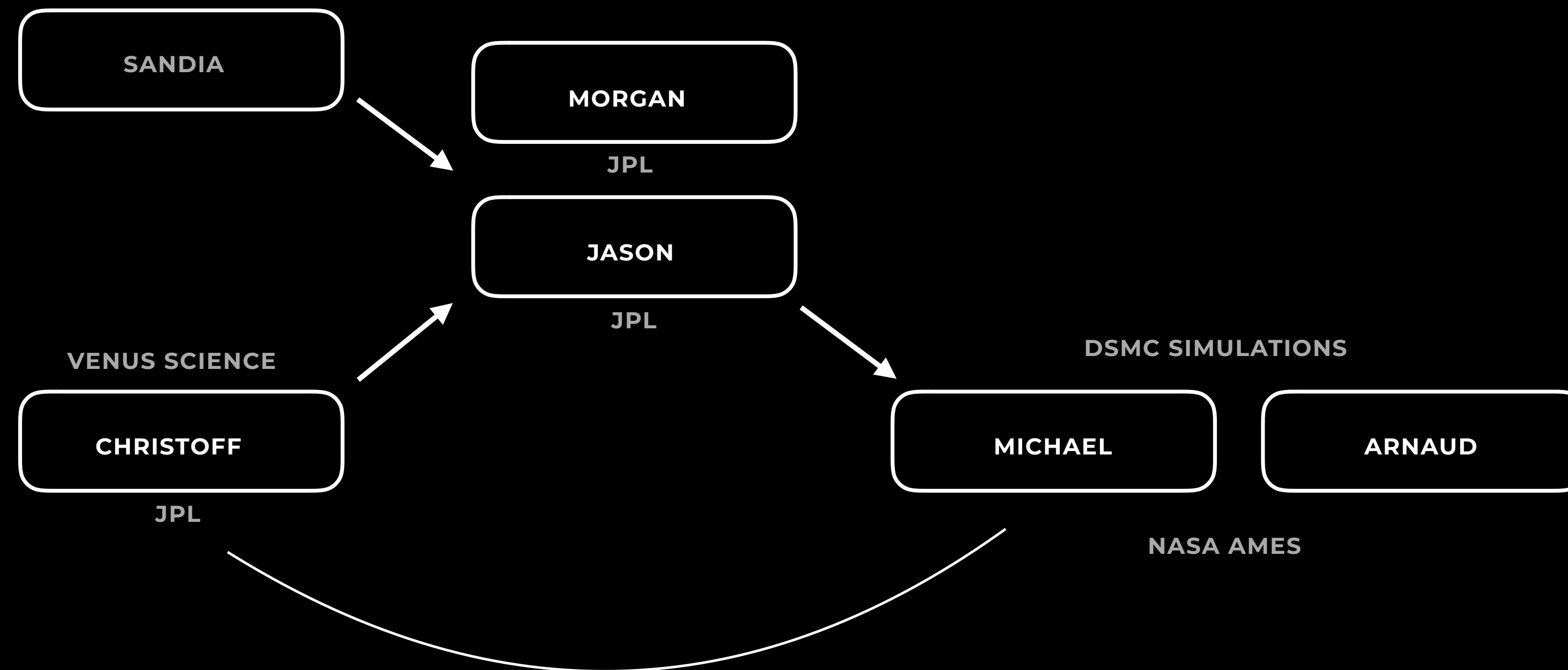


HOW MIGHT RESEARCHERS
UNDERSTAND GAS COMPOSITION AT
HYPERVELOCITY
SPEEDS?



HOW MIGHT RESEARCHERS IMPROVE
CURRENT INTERFACE USAGE
TO BETTER EXPLORE
THE NATURE OF
FRACTIONATION?

USER STRUCTURE



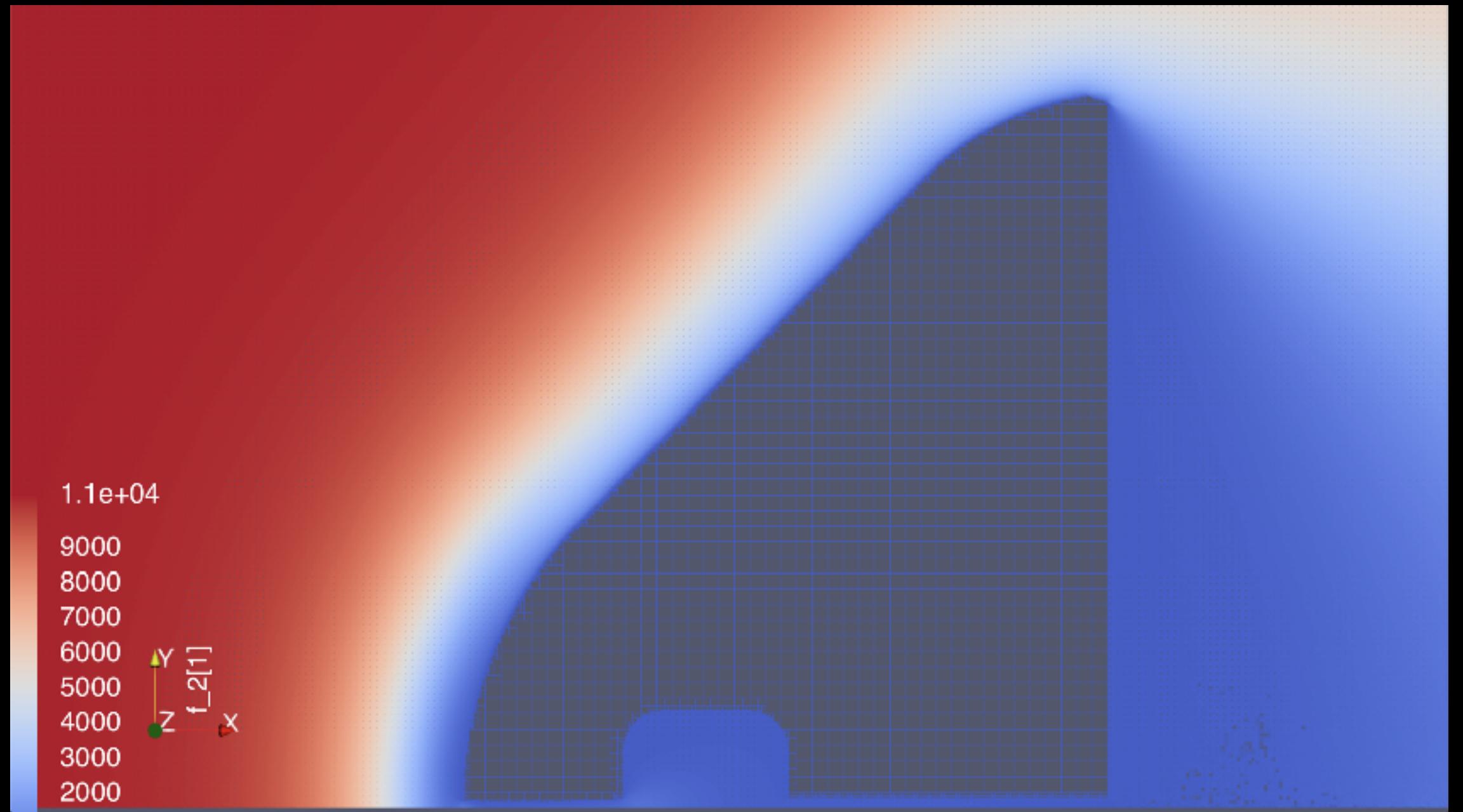
INTERFACE PROBLEM

**REPRESENTING AND VISUALIZING AN ACCURATE READING OF
ATMOSPHERIC GAS SAMPLING AT HYPERVELOCITY SPEED**

**THE NEED FOR AN INTERFACE THAT CAN PROVIDE A SPATIAL
REPRESENTATION OF GAS FLOW THROUGH THE SPACECRAFT
INTO THE TANKS**

OUR PROPOSED SOLUTION

FRX





LIVE DEMO

TECHNICAL OVERVIEW

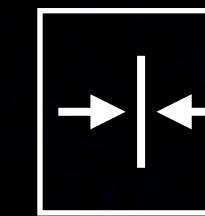
BUILT IN HTML / CSS / JAVASCRIPT

RELIES ON D3.js (DATA MANAGEMENT AND MANIPULATION)

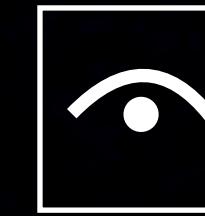
THREE.js FOR RENDERING THE 3D VISUALIZATION

TWEEN.js FOR SMOOTHING THE CAMERA MOVEMENTS

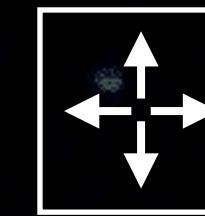
ACCOMPLISHMENTS



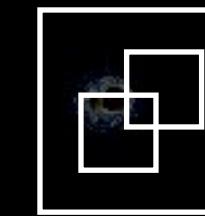
COMPRESSING A APPROX 5.5 GB SIMULATION DOWN TO 170 MB (LOSSY)



VISUALIZE 1/2 MILLION DATA POINTS SIMULTANEOUSLY ACROSS FOUR LINKED VIEWS IN REAL TIME



INTERACTIVELY PAN, FILTER AND ZOOM IN A HYBRID 2D/3D ENVIRONMENT



EXPLORE HIGH DIMENSIONAL SIMULATION DATA SPATIALLY AND TEMPORALLY

ACKNOWLEDGEMENTS

