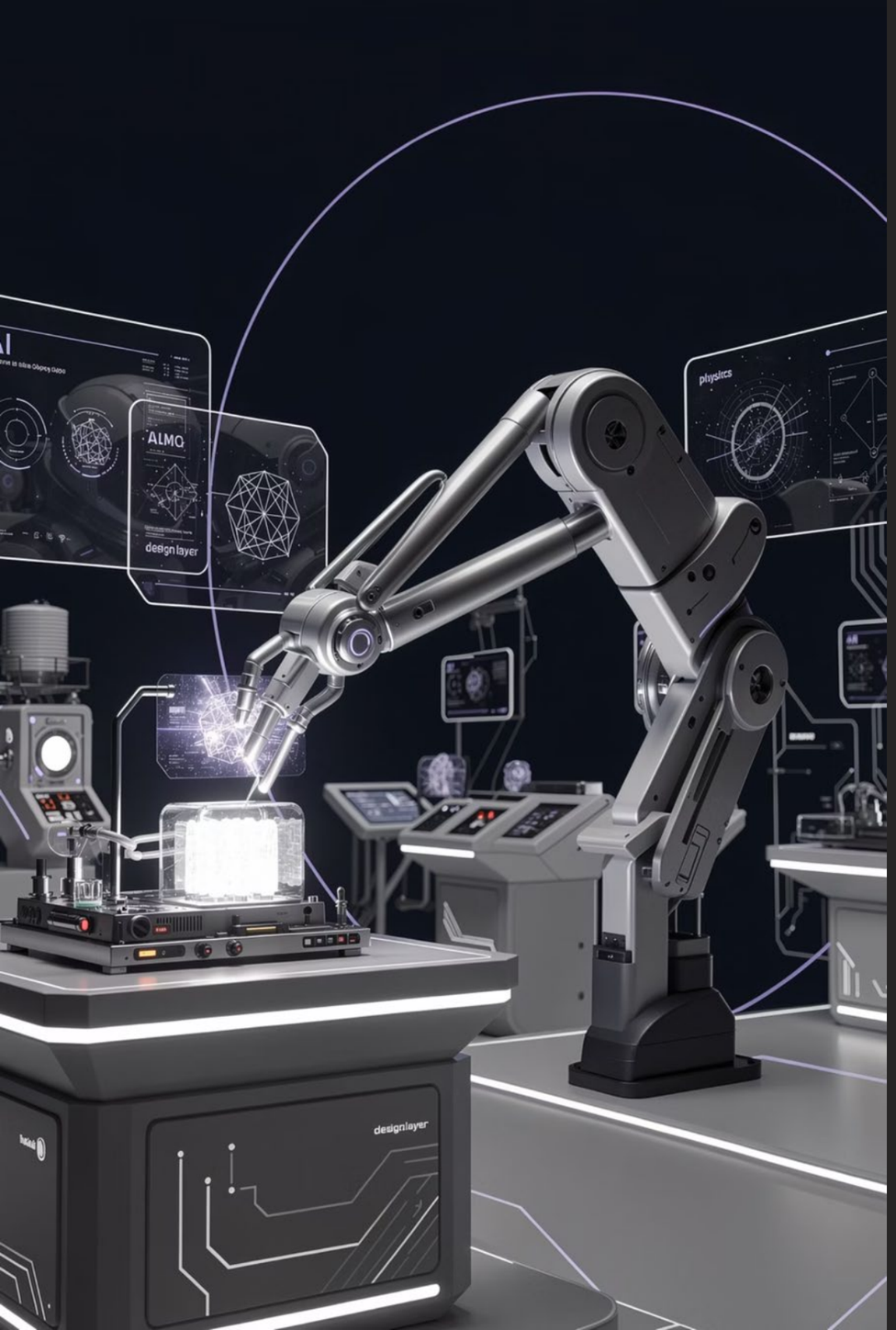


Optimizing Space Manufacturing

Microgravity Science as a design variable enabled by AI/ML, Physics, and Automation

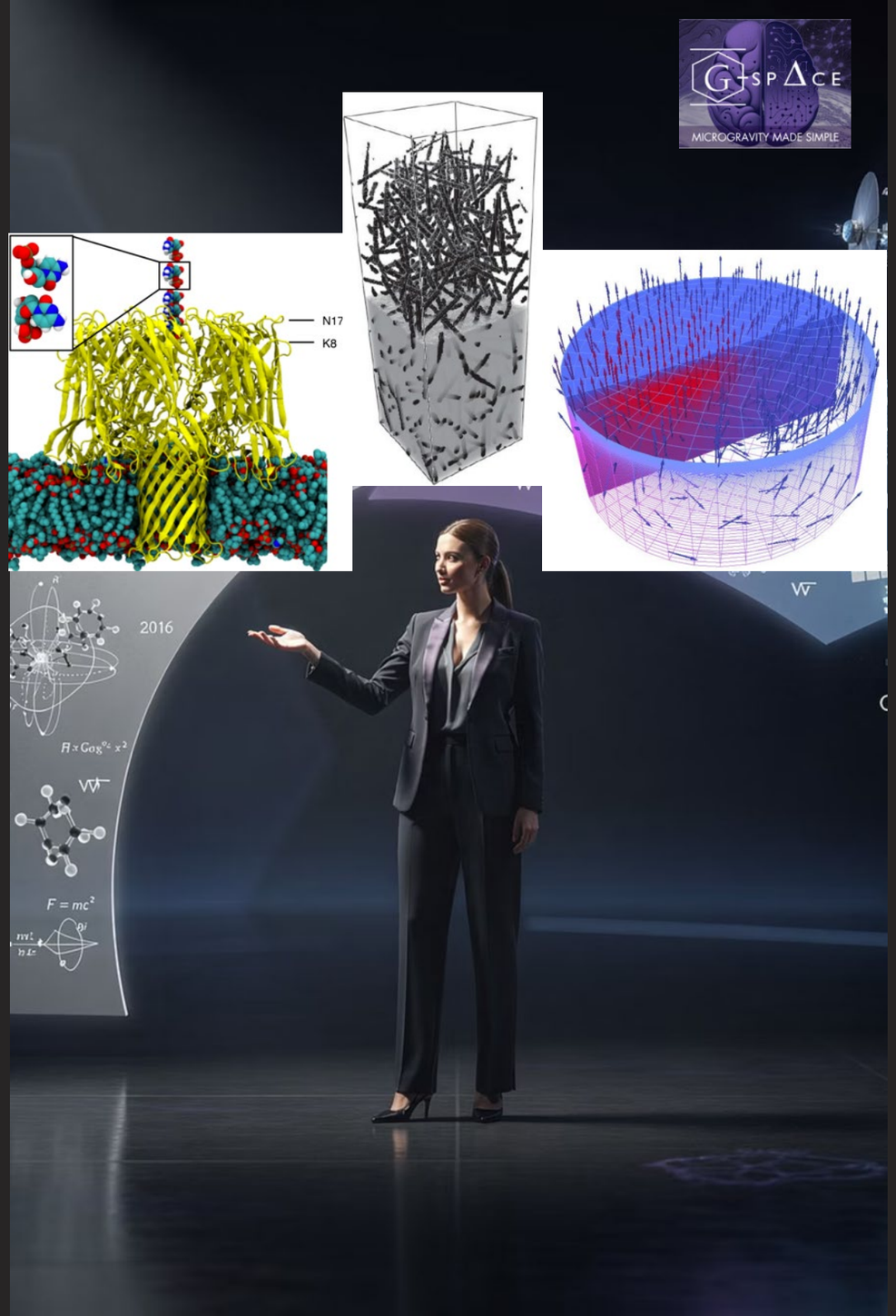
Dr. Ioana Cozmuta
Founder and CEO, G-SPACE Inc

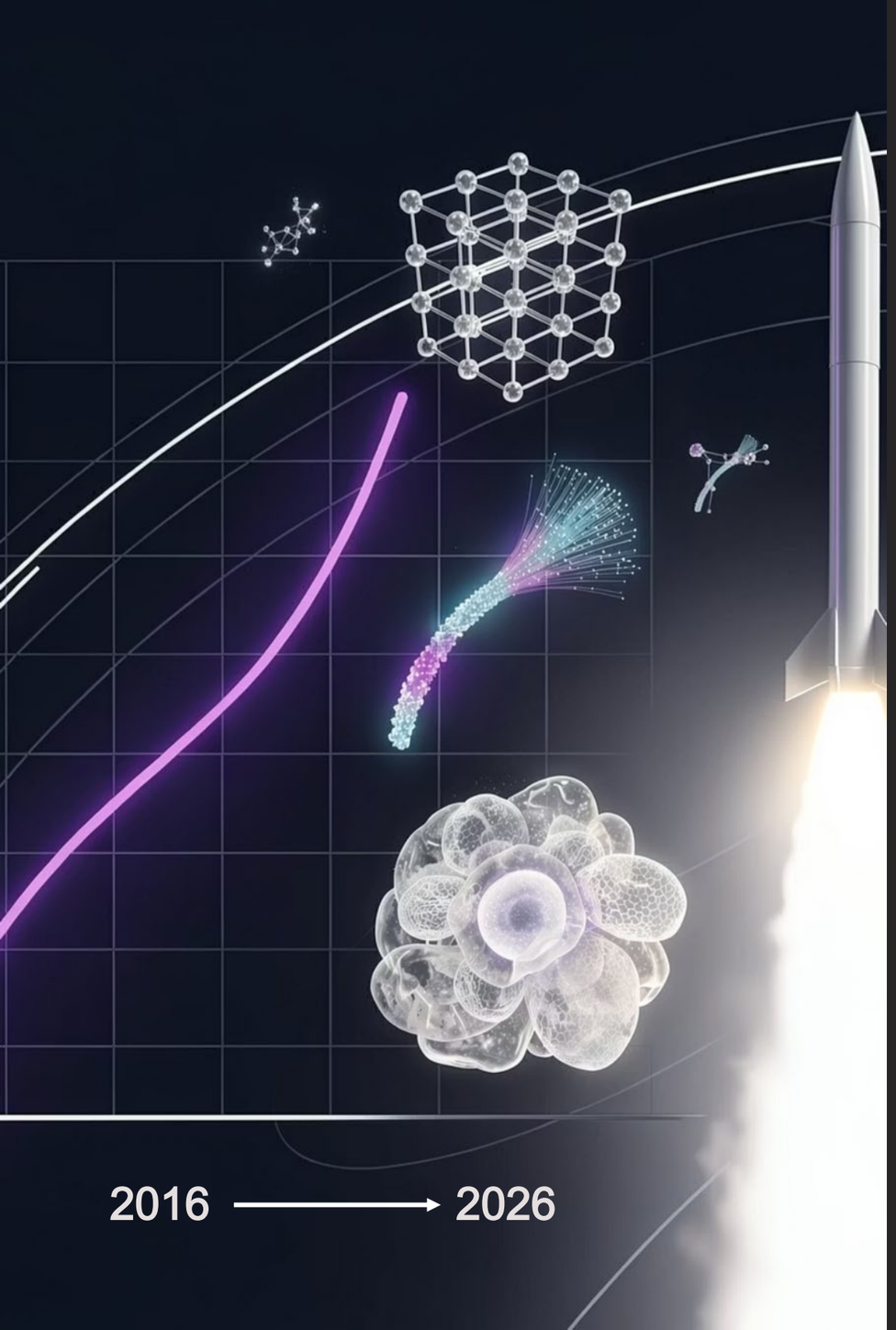
National Academies of Sciences - Space Science Week 2026

Vantage Point

1. Physicist; modeling & simulation across materials, life sciences, and space systems
2. 15 years at NASA — bridging science, engineering, and commercialization
3. Direct exposure to microgravity's promise and its translation gap
4. Founder of G-SPACE, building the intelligence layer for microgravity R&D

> The question is no longer *whether* microgravity matters. It's how we make it work **reliably at scale**.





Growing Interest, Persistent Gap

Momentum Is Real

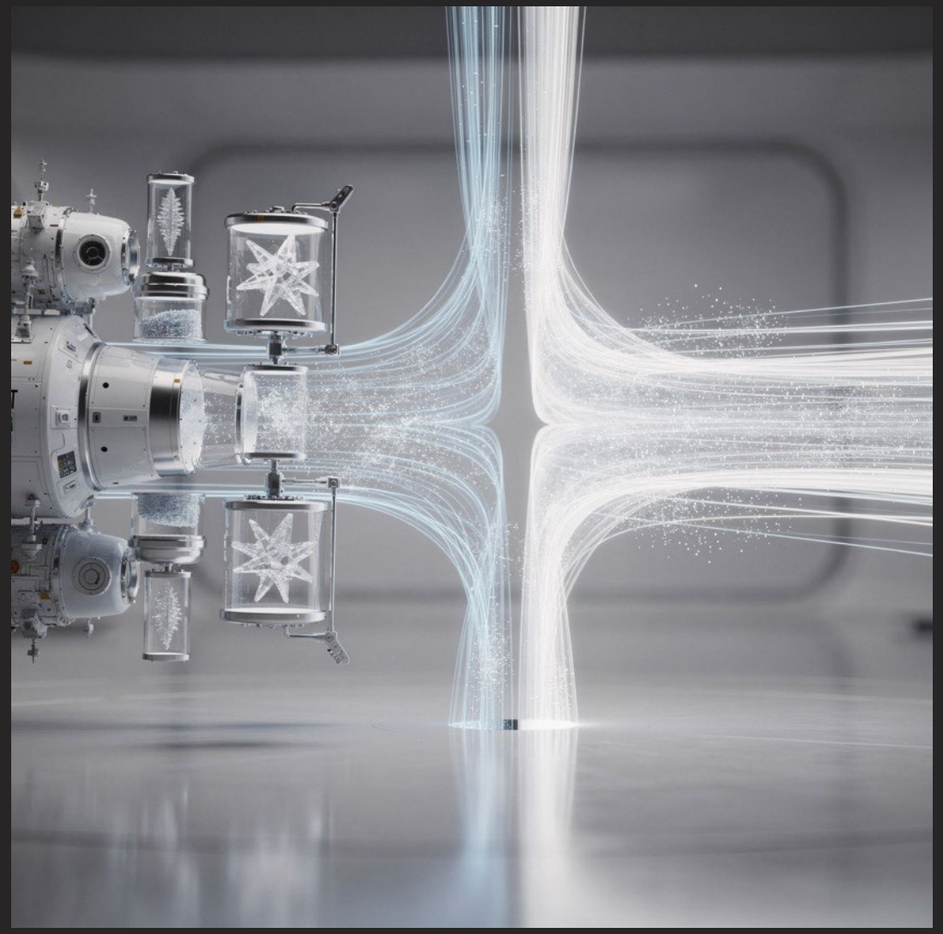
Awareness of microgravity entered terrestrial private sector. In - space manufacturing is a genuine ecosystem and market.

Translation Is Lagging

Growth has not yet produced reliable, repeatable, scalable results.

The question is no longer *whether* microgravity matters. It's how we make it work credibly and **reliably at scale** .

The Bottleneck



Sparse & Expensive

Heterogeneous data
Hard to compare across payloads and missions
Expensive trial and error

Manual & Fragmented

Analysis is post-flight and non-standardized
Slow to interpret
Difficult to replicate

No Decision Power

Collecting data but not extracting
actionable insight

We have an **interpretation, prediction, and translation** problem.

Why AI Alone Is Insufficient

Overfitting Risk

Pure AI on sparse data can hallucinate patterns or miss underlying mechanisms

Physics-Rich Environment

Microgravity is not just a pattern-recognition problem

Grounded Intelligence

AI must be anchored in physical reality, experimental context, and domain constraints

> Data without physics is noisy correlation. Physics without scalable analytics is too slow. **We need both.**

The Missing Layer

What Goes In

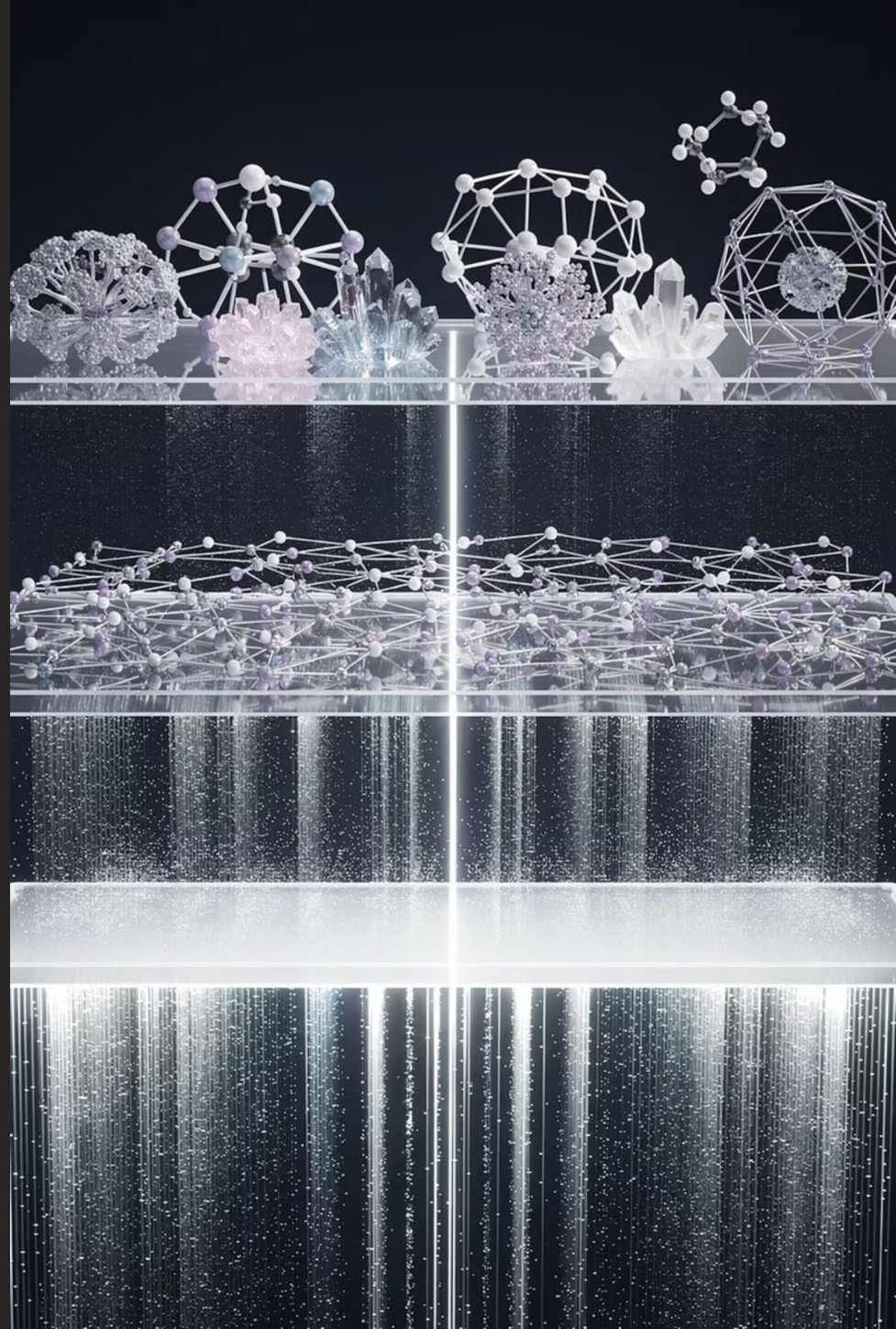
- Multimodal data
- Image/video -derived features
- Experimental metadata
- Physics -based understanding
- AI/ML pattern extraction

What Comes Out

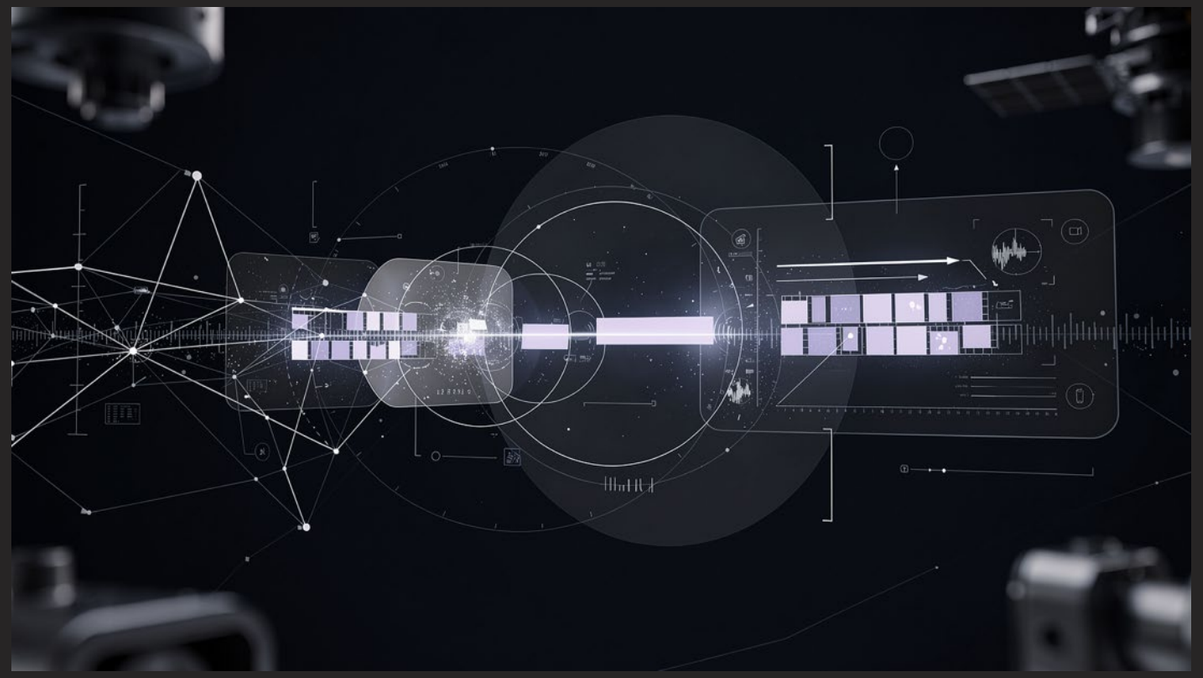
- Better experiment interpretation
- Cross -platform comparison
- Delta -to -gravity understanding
- Process optimization
- Predictive design for products and processes

Design Layer: Data + AI/ML + Physics

Usable. Repeatable. Scalable Microgravity



Why G-SPACE



NASA & NSF Origins

Built through NASA, NSF grants & private capital

NASA PSI Ecosystem

Integrated in NASA PSI
ISS National Lab Partner

Data + AI + Physics

Built for microgravity analytics and design

Predictive by Design

Not just what happened — but what should happen next

The design platform for the microgravity economy


G+SPACE

What This Enables

USABLE

Raw data → interpretable, decision -ready outputs

Accelerate insight from every experiment.

REPEATABLE

Standardized analysis across experiments, platforms, conditions

Increase microgravity credibility and # of publications

SCALABLE

Reduces manual bottlenecks, enables learning across datasets

Design with confidence, optimize experiments cost.

COMMERCIALLY ACTIONABLE

Connects outputs to product design, process control, go/no-go decisions

Translate orbital experimentation into economic impact

Microgravity shifts from a one-off experiment paradigm into a **learnable, comparable, designable environment** .

The next phase of space science belongs to those who turn data into **design intelligence** . This is the layer G -SPACE is building.

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