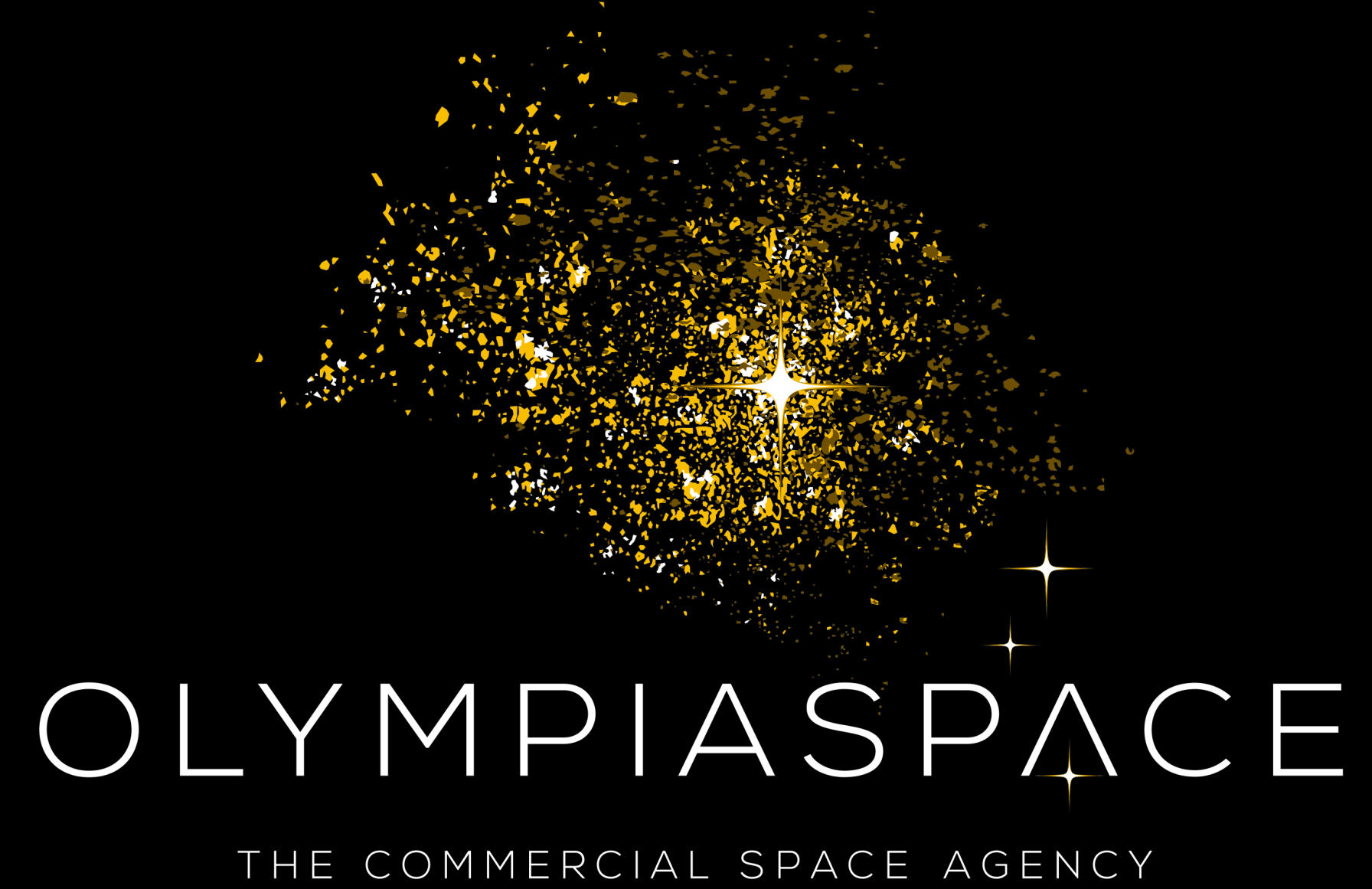




NEW SHEPARD

PAYLOADS

DR. OLYMPIA KYRIOPOULOS



OFFICIAL CHANNEL PARTNER

NEW SHEPARD PAYLOADS

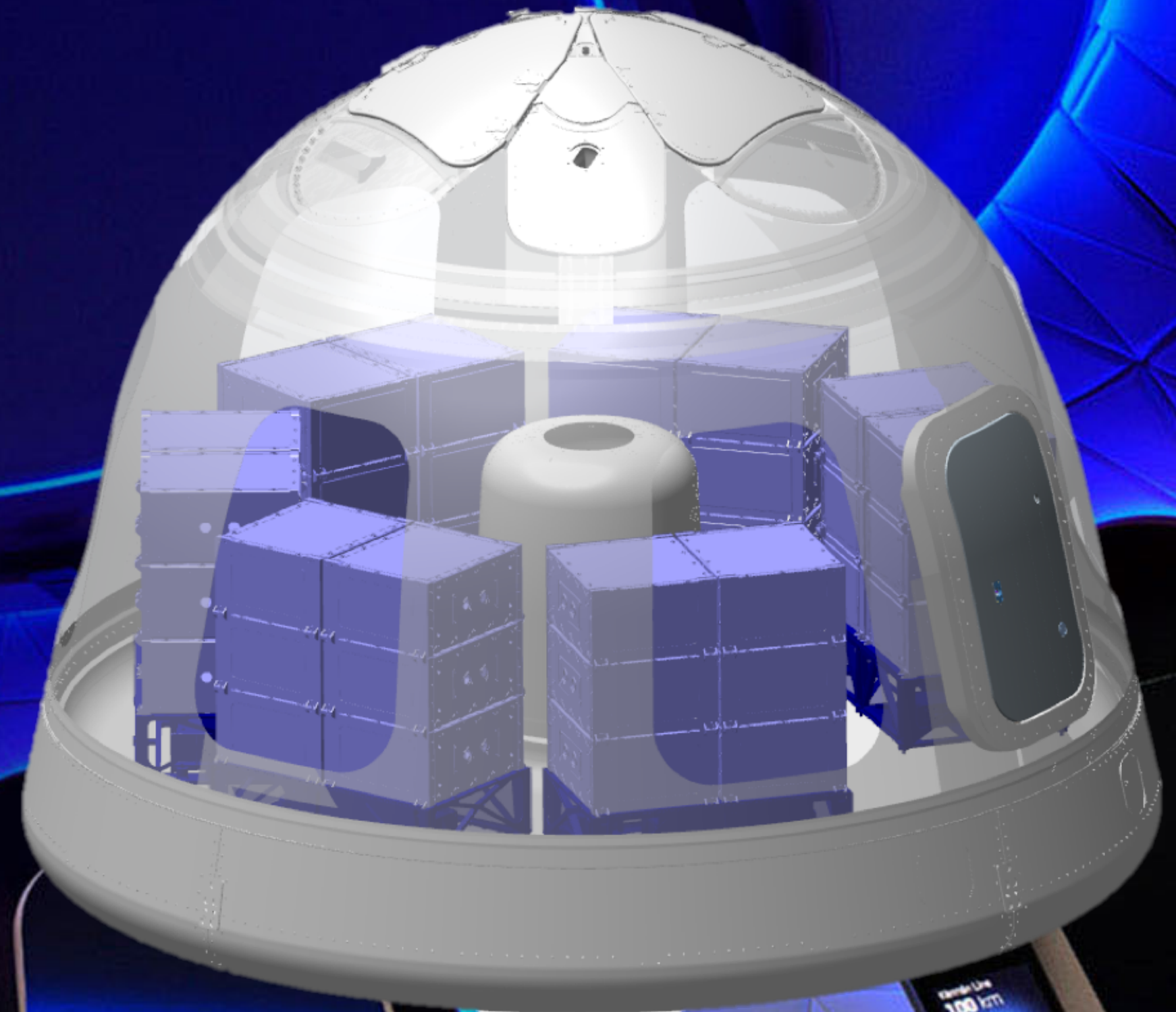
SUBORBITAL RESEARCH

INITIAL CAPABILITIES

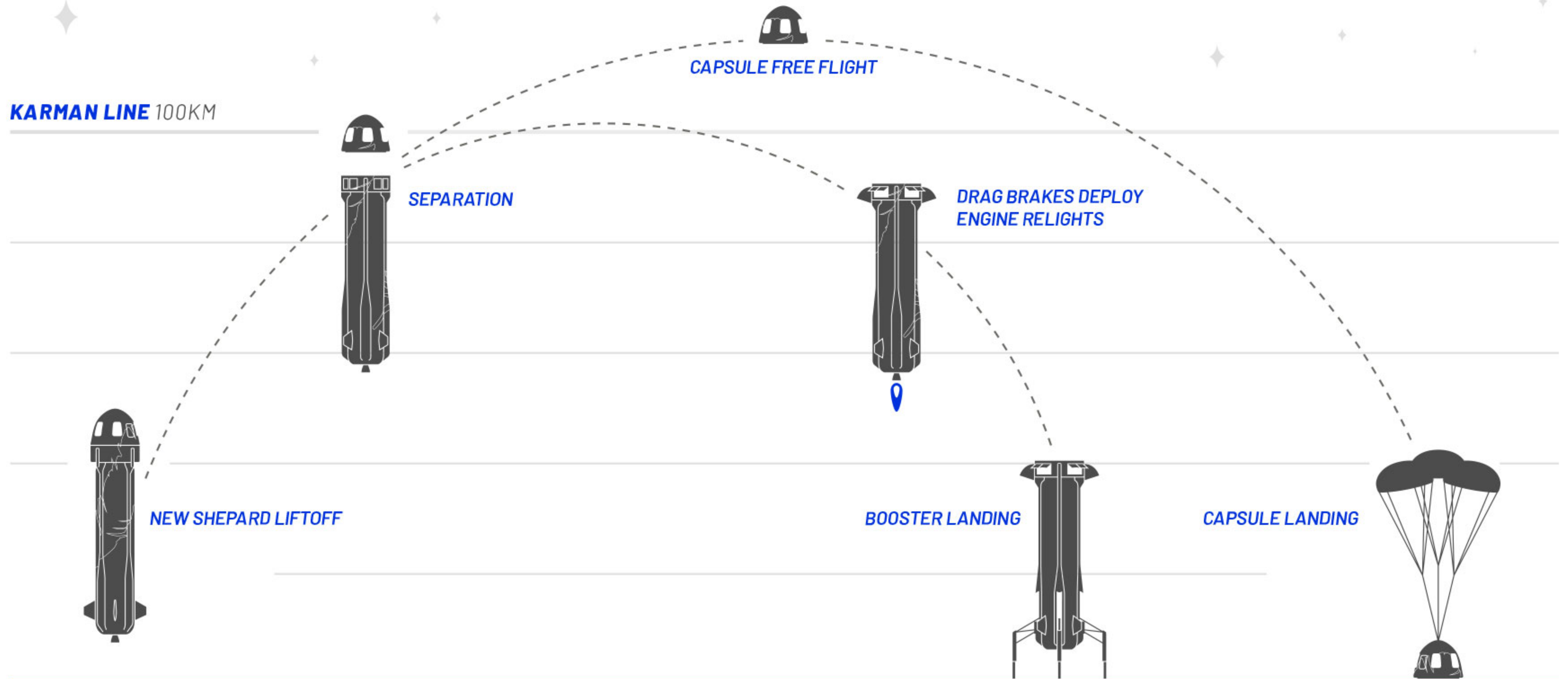
- 100 km apogee
- ~3 mins of milli-g accelerations
- Largest windows in spaceflight history
- Blue Origin Payload System or custom interface
- Payload access L-8 hrs and R+1 or 6 hrs

FUTURE CAPABILITIES

- Late pad load at L-1 hour
- Partial-G missions in rotating capsule
- Custom window for imaging, sampling, deployment
- Human-tended experiments



FLIGHT PROFILE



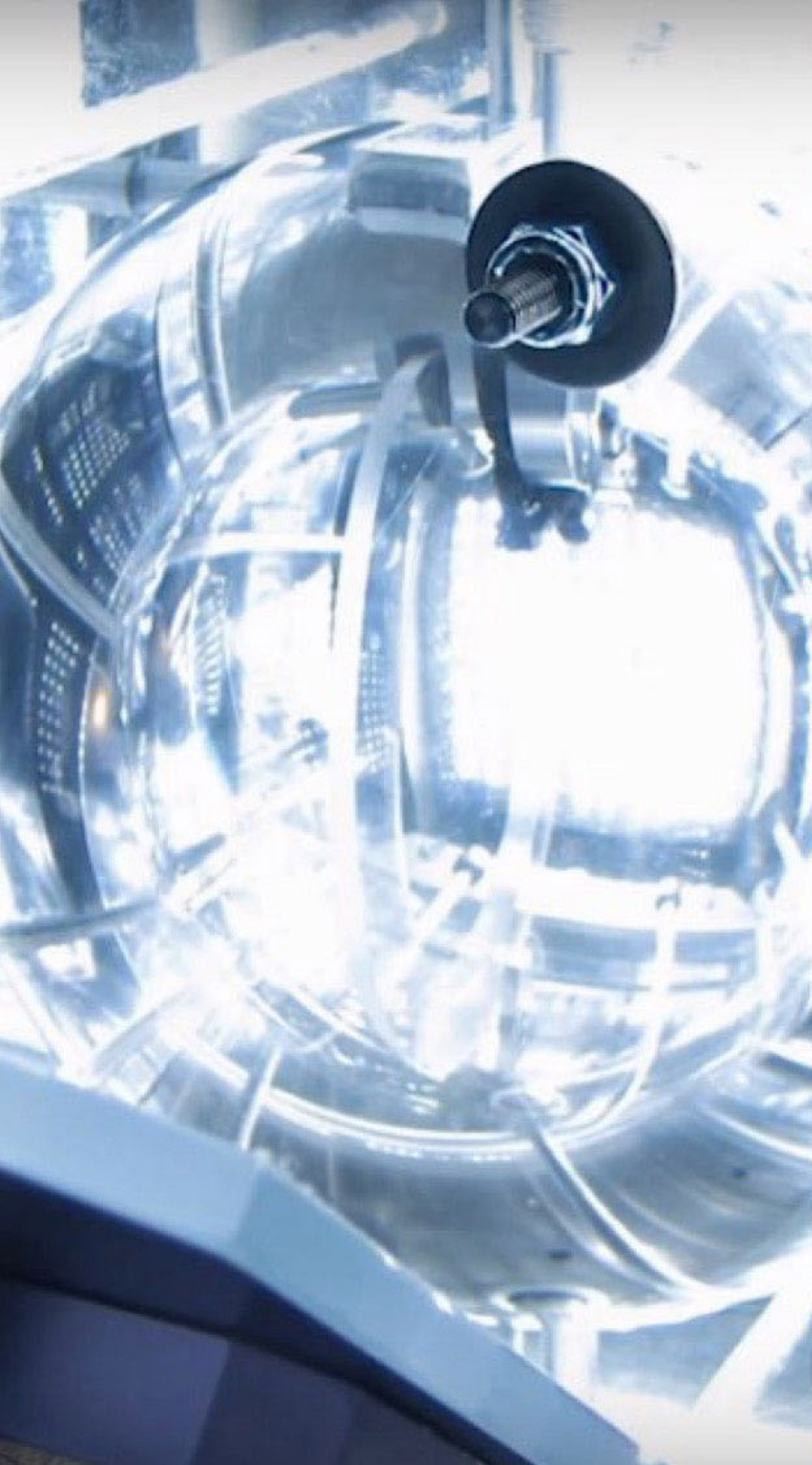


IMAGINE A LAB TOOL THAT...

- Prevents materials of different densities from separating into layers
- Reduces convection and buoyancy by a factor of 1000 or more
- Allows diffusion and surface tension behaviors to dominate
- Removes boundary effects of container interactions
- Provides quiescent environment to stretch the observation of transients

ENABLING...

- Unique multi-phase flow regimes
- 3D colloidal assemblies
- New alloys
- Purer glasses
- Cool flames
- Improved physiochemical models for combustion and fluid studies



NEW SHEPARD PAYLOADS



PHYSICAL SCIENCES

FLUIDS

- Multi-phase flows
- Cryogenic fluid management
- Isothermal systems

COMBUSTION

- Liquid and solid combustion
- Fire safety demos
- Hazardous propellants and byproducts okay

MATERIALS

- Small molecule crystallization and crystal initiation
- Soldering and other fast transition processes

TECHNOLOGY DEVELOPMENT

- TRL raising to 6/7 for subsystems or prototypes
- Partial gravity exploration demos



OTHER APPLICATIONS

LIFE SCIENCES

- Acute responses to microgravity
- Short time constant systems (vestibular, pulmonary)
- Large N physiology with diverse subjects
- Demos for plant growth, cell biology, other tech

EARTH & SPACE SCIENCES

- “Ignorosphere” sampling and sensing from 60-100km
- Experimental space science, e.g., low G collisions
- Remote sensing at zenith, nadir, and limb
- TRL raising for sensors, deployable structures

HEAVY LIFT

- 8,000 lbm capsule replacement for hypersonics, EDL

EDUCATION & OUTREACH

- Student NanoLabs starting as low as \$8,000

STANDARD INTERFACES



SINGLE PAYLOAD LOCKER

20.6 x 16.3 x 9.5 inches

25 lbm payload

26 +/- 4 VDC

200 W peak power

Flight data via Ethernet



DOUBLE PAYLOAD LOCKER

20.6 x 16.3 x 18 inches

50 lbm payload

26 +/- 4 VDC

200 W peak power

Flight data via Ethernet



NANOLAB

4 x 4 x 8 inches

1.1 lbm payload

5 VDC

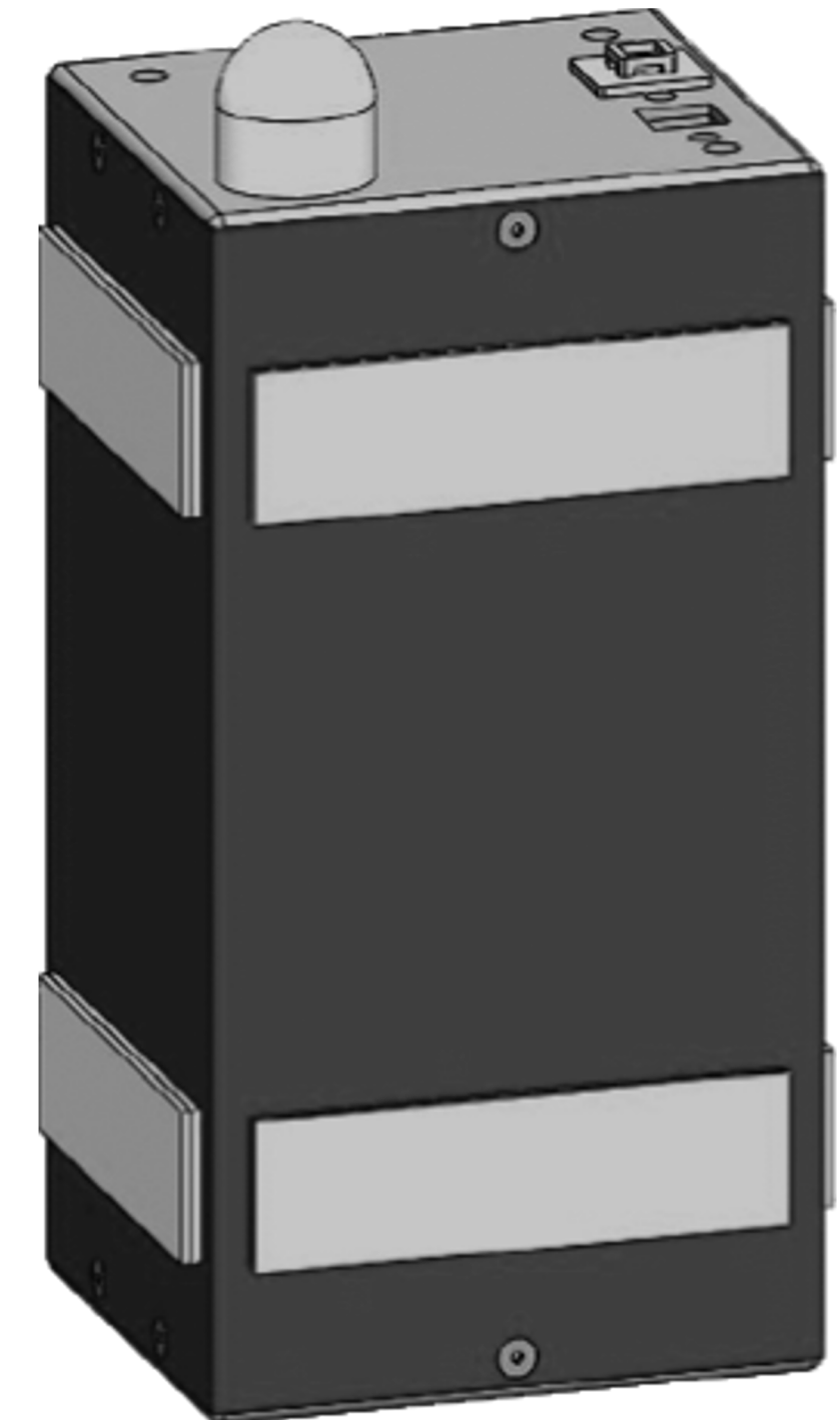
4.5 W peak power

Flight data via USB



EDUCATIONAL PAYLOADS

- One non-profit student project per box
- Up to 4 x 4 x 8 inches, 1.1 pounds (10 x 10 x 20 cm, 0.5 kg)
- 5V of power and mission data via USB from L-5m to R+5m
- Up to 50 mL approved liquids **-or-** Approved small batteries
- No significant hazards, biology, or flammable materials
- Shipped launch ready at L-2 weeks



Special add-ons available for extra mass, volume, biology, Pad Load

SCIENCE IN THREE MINUTES

- “One really giant, super-clean parabola”
- Pick a short time constant system with easily measured variables
 - Keep your data collection simple
- Build or order a box with a USB connector on the top
 - E.g., 3D printed, [Purdue Launchbox](#), Arete STEM box (right)
- Automate your lab using sensors or rocket state as triggers
 - Raspberry Pi or Arduino are typical
- Test as you fly, and fly as you test
 - Think about your ground controls

