🌙 Dahlia Space Array™ – 100-Acre Crescent Configuration

Developer: NU'OIR Labs
Founder & Inventor: Loren D. James
Mission: Clean, continuous, large-scale solar energy capture and conversion in orbit.

⚡ Executive Overview

The Dahlia Space Array™ is a 100-acre crescent-shaped orbital solar collector designed to deliver 150–200 MW of continuous electric power using multi-spectrum photon entrapment and high-efficiency conversion.

In vacuum and microgravity, Dahlia's performance scales exponentially—no atmospheric absorption, no convective loss, and natural radiative cooling via deep space. The result: up to 3.5× more power per square meter than Earth-based solar systems.

🛰️ System Overview

Geometry & Design

Shape: Crescent (curved truss spine with deployable roll-out wings)

Total Area: 100 acres (≈404,685 m²)

Orientation: Sun-pointing, slowly rotating for thermal balance

Material: Graphene-reinforced polymer film (reflective or PV layer)

Structure: Composite lattice truss backbone + radial deployment booms

Function: Continuous power collection, transmission, and redirection for orbital or surface use

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🌞 Energy Generation

Parameter	Specification
Solar constant (space)	~1,361 W/m²
Capture efficiency (visible + IR)	95–99% photon entrapment
Electrical conversion	25–40% (depending on PV/TPV configuration)
Average power yield	120–200 MW(e)
Waste heat (to reject)	~350 MW(th)
Radiator requirement	80,000–200,000 m² (0.2–0.5× array area)

🧩 Power System Architecture

1. Photon Collection Layer: Blackbody-inspired cavity surfaces and spiral light traps.

2. Conversion Core: Multi-junction PV or TPV with tuned spectral filters.

3. Thermal Transfer Network: Conductive mesh routing waste heat to rear-side radiators.

4. Energy Management: High-voltage DC (300–600 V) with superconducting bus lines.

5. Power Output Options:

Beamed microwave or laser transmission.

HVDC tether or modular orbital storage node.

🚀 Launch & Deployment Model

Launcher	Payload (to LEO)	Launch Count (100-acre array)	Launch Cost Range	Cadence
Starship	100–150 t	1–2	$10–$170M	1–3 months
Falcon Heavy	~63 t	2–4	$150–$1,100M	6–9 months
Falcon 9	~16 t	7–11	$400–$1,200M	12–18 months

Deployment

Segmented into 10–20 roll-out “petals.”

Each petal stows at 10:1 compression ratio.

Robotic or semi-autonomous deployment.

On-orbit assembly via modular latching truss spines.

⚙️ Mass & Cost Breakdown

Build Type	Areal Mass (kg/m²)	Total Mass (t)	Launches (Starship)	Approx. Cost (USD)
Ultra-light PV	0.2–0.35	100–170	1–2	$160–$550M total
Reinforced PV	0.5–0.8	240–390	3–4	$400M–$1.2B
Concentrator Variant	1.0	480–500	4–5	$600M–$1.3B

> Includes array, structure, wiring, radiators, and launch.

❄️ Thermal Management

Space offers a natural vacuum, eliminating convective heat loss.

Dahlia’s rear panels act as integrated radiators using blackbody coatings.

Radiators sized at 20–50% of collection area.

Radiative equilibrium at 300–320 K (approx. 26–47°C).

🧠 Operational Benefits

No moving parts → zero wear and near-infinite lifespan.

Autonomous sun-tracking via reaction wheel control.

Continuous power in GEO or with overlapping constellations.

Modular scalability for gigawatt-class orbital farms.

Eliminates atmospheric losses → maximum photon yield.

📦 Integration & Applications

Orbital power stations for lunar or Mars bases.

Microwave beaming arrays for planetary surface supply.

HVDC orbital transmission for in-space industry or tugs.

Cryogenic charging for superconducting propulsion systems.

Power backbone for NU’OIR’s future “Omnidirectional Systems.”

🧮 Key Metrics Summary

Metric Value

Collection area	404,685 m²
Energy conversion efficiency	25–40%
Total electrical power	120–200 MW
Waste heat	~350 MW(th)
Array dry mass	100–500 metric tons (variant-dependent)
Radiator area	80,000–200,000 m²
Launches (Starship)	1–4
Estimated total cost	$160M–$1.3B
Deployment duration	1–12 months

🛰️ Dahlia Space Array Advantages

✅ 2.5–3.5× energy yield vs. Earth solar farms
✅ No atmosphere → full-spectrum photon capture
✅ Zero land usage, full environmental neutrality
✅ Scalable and modular for orbital assembly
✅ Direct link to NU'OIR Labs' clean-energy portfolio

💡 Vision Statement

The Dahlia Space Array™ extends NU'OIR Labs' mission beyond Earth—turning sunlight into a limitless, exportable energy source for the next phase of civilization.
By merging blackbody thermodynamics, multi-junction conversion, and scalable membrane engineering, Dahlia transforms orbit into a power plant without borders.