Rosette
ENERGY

PRIVATE & CONFIDENTIAL · COMMERCIALIZATION OVERVIEW

# A capital-efficient path to compact fusion power

We harness the physics of solar flares — magnetic eruptions larger than Earth — to bring fusion within reach at a fraction of the size and cost of today's mega-facilities, on hardware that sells valuable products long before the power-plant endgame.

**James B. Worth** Founder, Rosette Energy (in formation) · brenworth@gmail.com · June 2026

THE OPPORTUNITY

# Strong academic interest — and a credible path to a platform company

A simulation study (submitted to Physics of Plasmas) shows an eight-spot, reconnection-driven laser fusion that pushes ions to fusion energies on a fraction of the power any approach uses today — tabletop scale, not mega-facility scale. The same hardware runs different fuels, and a US provisional patent with 300+ claims protects the core.

## 5 J

**coupled laser energy**

vs ~2 MJ at NIF's record shot

## G ≈ 3.6

**simulated gain — ~1,000× the**

best p–$^{11}$B experiments*

## 300+

**claims in the US provisional**

patent, now filed

## ~7-figure

**projected hardware capex**

vs $billions for megaprojects

**Simulated, conservative gain (fusion energy / coupled laser energy), not wall-plug net gain. The best p–$^{11}$B experiments to date sit near 0.001 — orders of magnitude below breakeven.*

THE GAP

# Today's fusion is big by necessity — which leaves compact off the table

WHERE THE FIELD IS

## Scaling up, high-capex

Capital and physics are concentrated on large, high-capex facilities — mega-lasers and billion-dollar tokamaks racing toward net gain at scale. Years between shots; not mass-manufacturable.

WHY COMPACT IS EXCLUDED

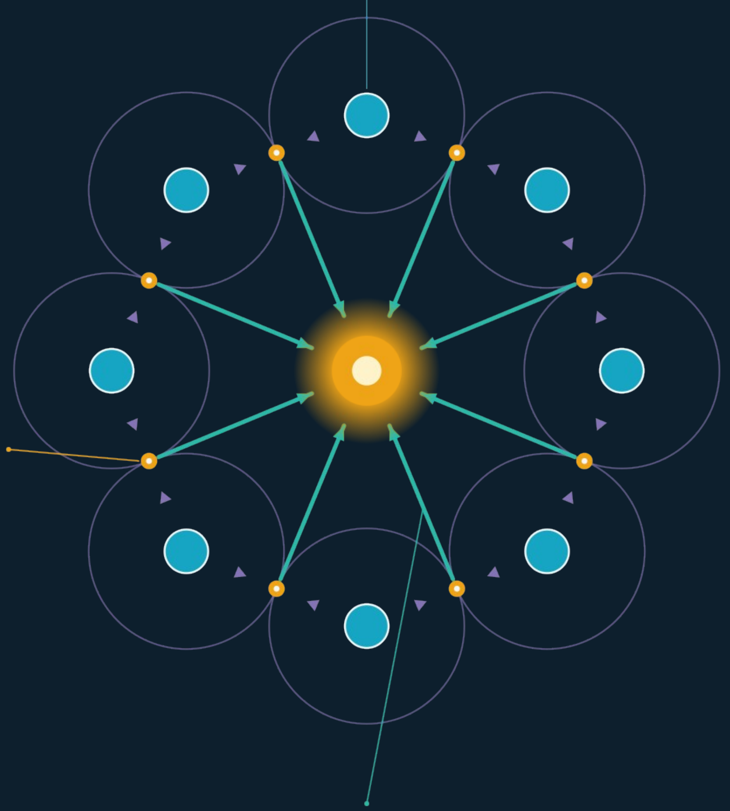
## Physics shuts the door

At small input energies, conventional approaches simply cannot reach fusion conditions. So compact, low-energy fusion has been written off — yet that is exactly the regime where deployment value is highest.

## Our contribution

Our approach finishes the fusion in a fast burst — before the energy-draining losses that defeat conventional p–$^{11}$B have time to engage. Winning that race is what makes fusion reachable in a small, low-cost machine instead of a billion-dollar one — and it's already drawing interest from leading p–$^{11}$B physicists, with a manuscript under review at Physics of Plasmas.

# How it works — no physics degree required




## 1 Eight laser spots, one ring

Eight ultrafast laser pulses fire together in a ring. In one shot, each creates the fuel plume and energizes the magnetic fields that drive the acceleration — nothing wasted.

## 2 The fields collide

Neighboring fields slam together and reconnect — creating the very conditions behind solar flares strong enough to knock out satellites orbiting Earth.

## 3 Ions are flung to the center

Reconnection concentrates the high-energy protons into a dense fuel region at the core — the energy and density together give the best chance to fuse.

**The key idea:** one geometry optimizes every fusion lever at once — high-energy protons, a dense fuel core, and the reaction finished before the losses bite — a combination physics forces other approaches to trade off. We win by being fast, not big and hot.

# A comparable gain — at a fraction of the input energy

| Approach | Fusion gain | Input energy | Hardware |
|---|---|---|---|
| **This approach — simulated, p–$^{11}$B** | **~3.6** | ~5 J | **Tabletop Yb:YAG, energy-efficient, up to ~kHz** |
| NIF record — experimental, D–T | **~4.1** | ~2 MJ on target | Stadium-scale; ~300 MJ wall-plug; ~1 shot / day |
| p–$^{11}$B to date — experimental | **~0.001** | facility-scale | Far below breakeven — orders of magnitude lower |

**≈ 400,000×**

less input energy than NIF's record for a comparable simulated gain, on aneutronic fuel. Grid-converged and robust to realistic beam imperfections (<2%).

**~1,000×**

more fusion product per joule than today's best p–$^{11}$B experiments — also laser-driven, but their broad TNSA proton spectrum is poorly matched to the p–$^{11}$B resonance; reconnection puts protons right at it.

**The structural edge:** one geometry holds energy, density, and timing at once — where others must sacrifice one for another — and it scales by replicating identical compact units.

*Gains are fusion energy / laser energy on target; ours is simulated (2-D hybrid-PIC). 3-D and experimental validation are the active next steps; net wall-plug gain is not yet claimed. NIF uses neutron-producing D–T. The leading p–$^{11}$B experiments are laser-driven (TNSA pitcher–catcher); their broad proton spectrum places little flux at the ~0.6 MeV p–$^{11}$B resonance.*

# What the physics is worth, made concrete

| Source | Power density (avg) | Footprint for 870 kW | Scale |
|---|---|---|---|
| **Solar — utility PV** | ~9 W/m² | ~10 hectares | ~14 soccer fields |
| **Wind — onshore** | ~2.5 W/m² | ~35 hectares | ~50 soccer fields |
| **Natural gas plant** | $10^{3}$–$10^{4}$ W/m² | ~20–100 m² | shipping container |
| **Nuclear plant — full site** | ~250–500 W/m² | ~2,000–3,500 m² | ~half an acre |
| **Reconnection reaction core** | **~$10^{11}$ W/m²** | **~1 mm²** | **grain of sand** |

### A different universe

The reaction-zone power density runs ~$10^{11}$ W/m² — roughly ten orders of magnitude above solar and wind, seven to eight above a gas plant.

### Near-peer: nuclear

Only a fission core competes on density — and even that sits two to three orders of magnitude below the reconnection-driven p–$^{11}$B core.

### Modular, not vast

870 kW gross, simulated, from a core the size of a grain of sand — delivered in room-scale units, not square-kilometre sites.

# Revenue before breakeven

BEACHHEAD

### Beam-shaping heads

**~200 labs**

for research labs · first revenue

EXPANSION

### Particle & neutron sources

**$7–11 B**

+ industrial neutron $0.5–0.7 B · with partners

ENDGAME

### Compact fusion power

**Multi-trillion $**

long-horizon clean-power market

*Sequenced, not simultaneous: beam-shaping heads first, then particle and neutron sources with partners as validation lands, with compact fusion power as the long-horizon endgame — each rung's revenue funding the next. TAM figures are comparable annual sizes; industry reports 2025–26, order-of-magnitude.*

# Sell the geometry into the labs that already own the lasers

## ~200 labs

already own the laser — we sell the missing geometry

## < $1.4M

per head, built in months — an optic, not a facility

## Patent pending

broad topology claims could support licensing across entrants

### Why they buy

Validation makes reproducing and extending the result a career-making, product-defining race — academic groups and corporate R&D will want to run it on the lasers they already own. We give them two things they lack: the 8-spot ring as a head, and reconnection-physics simulation consulting on our proven pipeline — modelling their exact target and density so they reach results faster. Picks-and-shovels to the whole field first; licensing kept open for companies that productize it.

**Explore platform** → **Scan geometries** → **Converge on one** → **Tuned head** → **License geometry**

*Simulation consulting on our pipeline accelerates them at every step; the platform funnels them to a dedicated head; and patent-pending topology could let the entrant wave license through us.*

# What the head business earns — before breakeven

Illustrative · conditional on validation

PER-HEAD PRICE

**$0.3–1.4M**

research platform to fast-rep tuned head — ~63% gross margin, sold as an optic, not a facility.

5-YEAR HEAD REVENUE

| | |
|---|---|
| No validation | consulting / nominal |
| Validated base | **~$59M** |
| **Validated race** | **~$104M** |

**Why buy, not build:** labs can fabricate optics; they cannot easily buy validated geometry, alignment, diagnostics, and freedom-to-operate in one package.

### Where the revenue comes from

**Platforms & cartridges** the recurring base
**Tuned application heads** factory-locked geometry
**Geometry licensing** the dominant upside
**Simulation consulting** early bridge revenue

### How it compounds


*Non-fusion particle-source verticals (neutron and ion sources, isotopes) lift the five-year total toward ~$148M and margins toward ~72% as licensing compounds. Internal estimates, conditional on validation; top-line opportunity, not net of operating cost. Energy and transmutation excluded as >5-year horizon.*

WHERE IT STANDS TODAY

# Real traction — and an honest TRL

### Peer review in progress

Manuscript submitted to Physics of Plasmas.

### IP filed

US provisional (300+ claims) filed via Cooley LLP — a multi-year relationship; ready to execute.

### Open, citable artifacts

Code, data & container archived with Zenodo DOIs.

### Specialist venues

ISPBFSA 2026, IWPROBONO (COST), ECLIM, APS-DPP.

### Scientific engagement

THEORY **Dr. Aldo Bonasera** (Texas A&M / INFN-LNS) — co-built the p–$^{11}$B yield framework used here

EXPERIMENT **Prof. Dimitri Batani** (Bordeaux / CELIA) — runs the p–$^{11}$B laser campaigns in the field

RISING TALENT **Dr. Zhu Zhe** (UCAS / CAS) — active in p–$^{11}$B fusion; trained under Bonasera

*Engaged on the work — not formal advisors. Dr. Bonasera invited a joint fusion-simulation study (SGII-Up).*

### Honest stage

**TRL 2–3** / 9

Concept formulated, with computational proof-of-concept from 2-D hybrid-PIC simulation. 3-D, full-physics and experimental validation are the gating next steps. Net wall-plug gain is not yet claimed.

THE TEAM

# One founder — full-stack technical depth and a proven operator

## James B. Worth

FOUNDER · ROSETTE ENERGY (IN FORMATION)

A multidisciplinary engineer, repeat company-builder and prolific inventor — pairing 20+ years across aerospace, mechanical and software engineering with a track record of raising non-dilutive capital and building valuable IP.

### Scientific engagement

**Dr. Aldo Bonasera** Texas A&M / INFN-LNS

p–$^{11}$B fusion authority — co-developed the yield framework

**Prof. Dimitri Batani** Univ. Bordeaux

senior laser-fusion physicist; editor at HPLSE journal

**Dr. Zhu Zhe** UCAS / CAS

laser-fusion researcher, national lab

*p–$^{11}$B researchers engaged with the work.*

### Full-stack engineer

Aerospace, mechanical & software — 20+ years across all three.

### Repeat builder

Co-founder & CTO of one of Spain's largest AI companies.

### Prolific inventor

Named inventor on a $100M+ AI patent portfolio.

### Plasma roots

Undergrad research on a reversed-field plasma confinement device (Boulder, CO).

### Grant track record

Millions secured in Spanish public R&D grants — de-risks the plan.

### International operator

Corporate strategy & lean teams across the US, LATAM & Europe.

**On validation — next hires:** computational plasma lead · laser-optics integrator · experimental facility PI

THE PATH & THE ASK

# Milestone-gated — each step funds the next

Phase 1

### Validate the gain

3-D + experimental validation of reconnection-driven yield — the gate everything else depends on.

→

Phase 2

### Revenue before breakeven

Sell the reconnection platform and particle sources, then license the neutron fuel-swap — isotopes, transmutation, materials testing — with partners.

→

Phase 3

### Scale & power endgame

Pod arrays driving sub-critical blankets; fleet build-out, and the path to grid-scale power.

THE ASK

## $100k

validation bridge · SAFE

converts into the seed round

| | |
|---|---|
| PCT patent conversion — Cooley | $60k |
| 3-D validation compute | $25k |
| Entity formation + IP assignment | $5k |
| Contingency / lean runway | $10k |

*EuroHPC compute applied for as upside — extends what we can model at no added cost.*

**James B. Worth** Founder, Rosette Energy (in formation) · brenworth@gmail.com

# A modular neutron driver that destroys long-lived waste

**~448,000 t**

legacy spent fuel, no permanent home

**+10,000 t/yr**

added by the current reactor fleet

**~300,000 yr**

how long the actinides stay hazardous

## Our approach

A tabletop laser pod drives a sub-critical (accelerator-driven) blanket loaded with spent-fuel actinides. Neutrons fission them; k<1 means beam-off = instant shutdown. Capacity scales by adding identical pods, not by building one larger machine — and the residual collapses from a ~300,000-year hazard to a ~300-year one.

**Spent fuel** → **Partition** → **Sub-critical blanket** → **Fission** → **300-yr residual**

*Partitioning and the blanket are shared with every actinide-burning route; the only thing we change is the driver in the middle.*

# What one pod costs — and earns

COST TO BUILD

## ~$10–20M

per pod — built in months on a production line, ~23× cheaper than a comparable accelerator.

ANNUAL REVENUE

## ~$60–130M

per pod, per year — once validated and deployed.

**The shape of it:** a ~$10–20M unit that can bring in ~$60–130M a year — and you grow by adding identical pods, not by building something bigger.

### Where the revenue comes from

- **Electricity** ~$45–100M, the anchor
- **Waste-management service** ~$10–30M
- **Medical / industrial isotopes** co-production upside

### Under the hood

Each pod drives a sub-critical blanket that burns ~95–160 kg of actinides a year — the waste output of about 5 reactors — at ~250–410 MWth.

*Blanket runs k≈0.95–0.97 on ~$1.2\times10^{18}$ n/s (D–T, 50 kHz), ~90–160 MWe. Figures projected from simulation, gated on gain validation (3-D + experimental) and fission-limited by the shared blanket; order-of-magnitude.*

# Who competes as the neutron driver

| Approach | Scaling / failure | Driver capital | Build time |
|---|---|---|---|
| **Spallation ADS — Transmutex, MYRRHA** | One giant linac — a single fault stops the plant | ≈€1.6B facility | ~5–10 yr |
| **Fusion neutron source — SHINE** | Semi-modular; beam-target losses cap efficiency | >$1B raised | Late 2020s |
| **Critical fast reactors — Newcleo, Oklo** | Large bespoke reactor; the core is the source | ~$4B first plant | ~2030–31 |
| **Laser / IFE — Marvel, Focused Energy** | A few very large laser halls; energy-focused | ~$100–250M raised | 2030s+ |
| **This approach — reconnection ring-pod** | **Many identical pods — one can fail without stopping the plant** | **~$10–20M / pod** | **Months** |

### More output per joule

It accelerates ions directly, so more of each joule becomes useful particles — without the energy losses rivals' drivers carry.

### Fails gracefully

Many small pods, not one giant machine — if a pod fails, the plant keeps running. A single big driver can't.

### Cheaper, faster to build

~$10–20M per pod, built in months on a production line — versus billion-dollar builds that take 5–10 years.