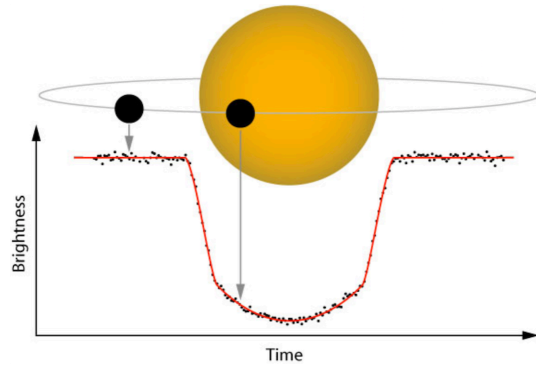# Resonant Worlds Explorer

Math-Exact AI for Exoplanet Discovery

"What once took weeks, we now do in seconds. Not approximately. Exactly."

Live Demo: resonant-planet.vercel.app

Jack Al-Kahwati **@iq19zero**, United States

Gabriel Sánchez **@gabrisds**, Spain

Sahil San **@sahilssan**, United States

Adhvaidh Sunny **@adhvaidhsunny**, United States

Impact – Why This Matters

The Problem:

- **150,000+** Kepler/TESS stars remain unanalyzed

- Small planets and faint signals are lost in noise

- Black-box AI lacks scientific trust

- Manual validation takes **weeks to months**

Our Impact:

- **3–8 seconds** per full pipeline analysis

- **<100ms** for repeat analysis (instant)

- Opens the search for new worlds to anyone: scientists, students, citizen explorers

Creativity – The Modulus Breakthrough

⧗ Traditional Transit Fitting

- Floating-point approximations → compounding errors

⚡ Modulus PAT Fitting

- Exact prime algebra(no rounding error)

- One-shot solution in 0.1s

- 100–1000× fasterthan conventional methods

Key Innovation:

We've transformed exoplanet detection from an approximate optimization into an instant math solution.

Validity – How It Works

1 Fetch NASA data (Kepler/TESS/K2) 1–2s

2 BLS orbital search (optimized) 1–4s

3 Modulus PAT transit fit 0.1s

4 ML classification & reporting 0.8s

⚡ **New target:** 3–8 seconds

🚀 **Cached:** <100ms

Relevance – NASA Data + Web Interface

Data Sources:

- Kepler, K2, TESS →150,000+light curves

- JWST & Hubble spectroscopy integration

Web Interface:

- One-click analysis withreal-time progress

- Explainability dashboard & PDF/CSV export

Alignment with Challenge:

✓ NASA open datasets

✓ AI + ML classification

✓ User-friendly interface

✓ Scientific transparency

Results – Precision + Scale

Metric	Result
Detection Limit	0.5 Earth radii
Processing Speed	3–8s analysis ⚡
Throughput	450–720 stars/hour
False Positives	<5%

Vision – Scaling Math to the Stars

Near Term (3 months)

- Deploy Modulus-Medium (32B) model
- Process entire Kepler archive

Next Year

- Real-time TESS alerts
- Multi-planet detection pipeline

"With Modulus, we've reduced exoplanet detection from weeks → seconds.
That's not just faster science—it's different science."

Try it → resonant-planet.vercel.app