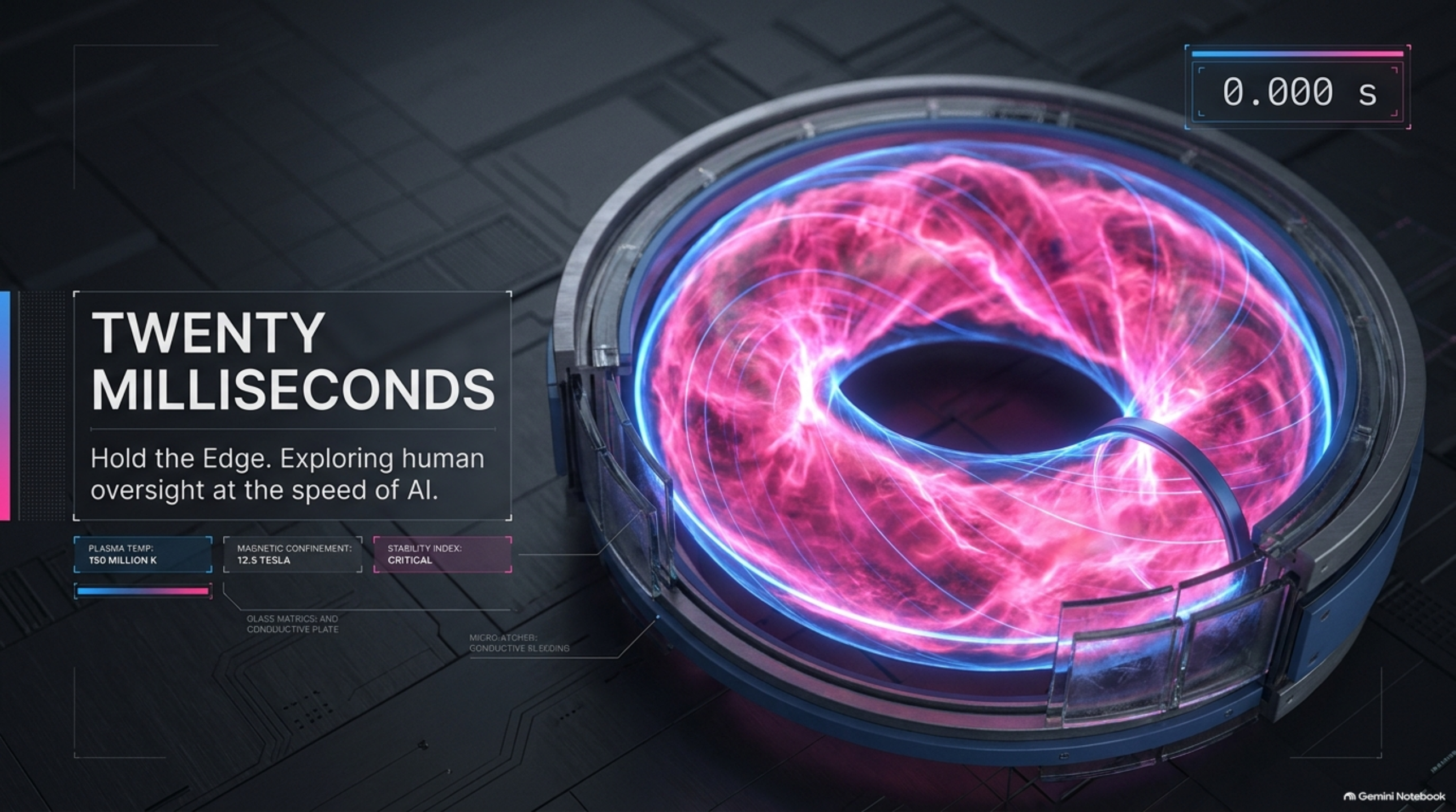
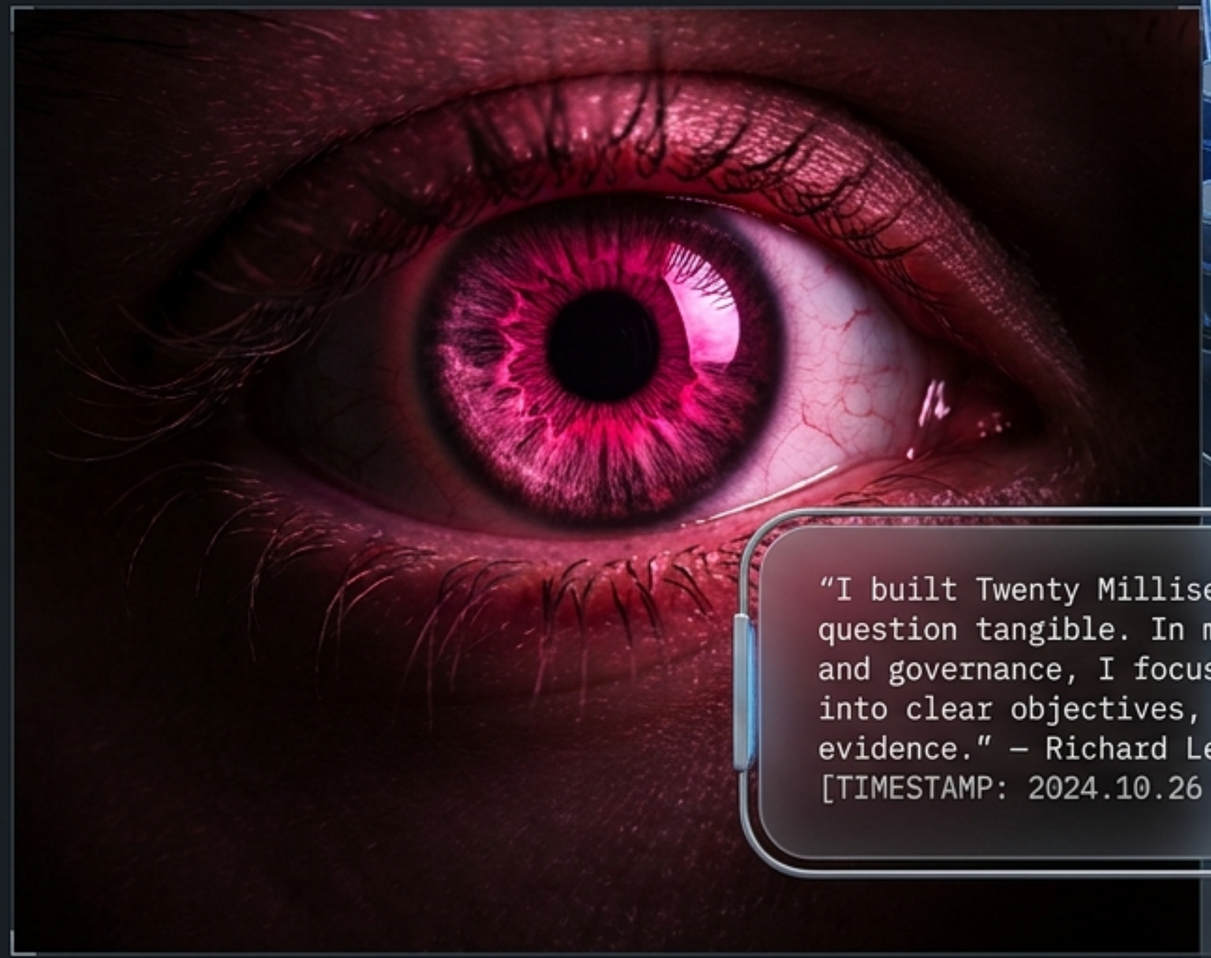
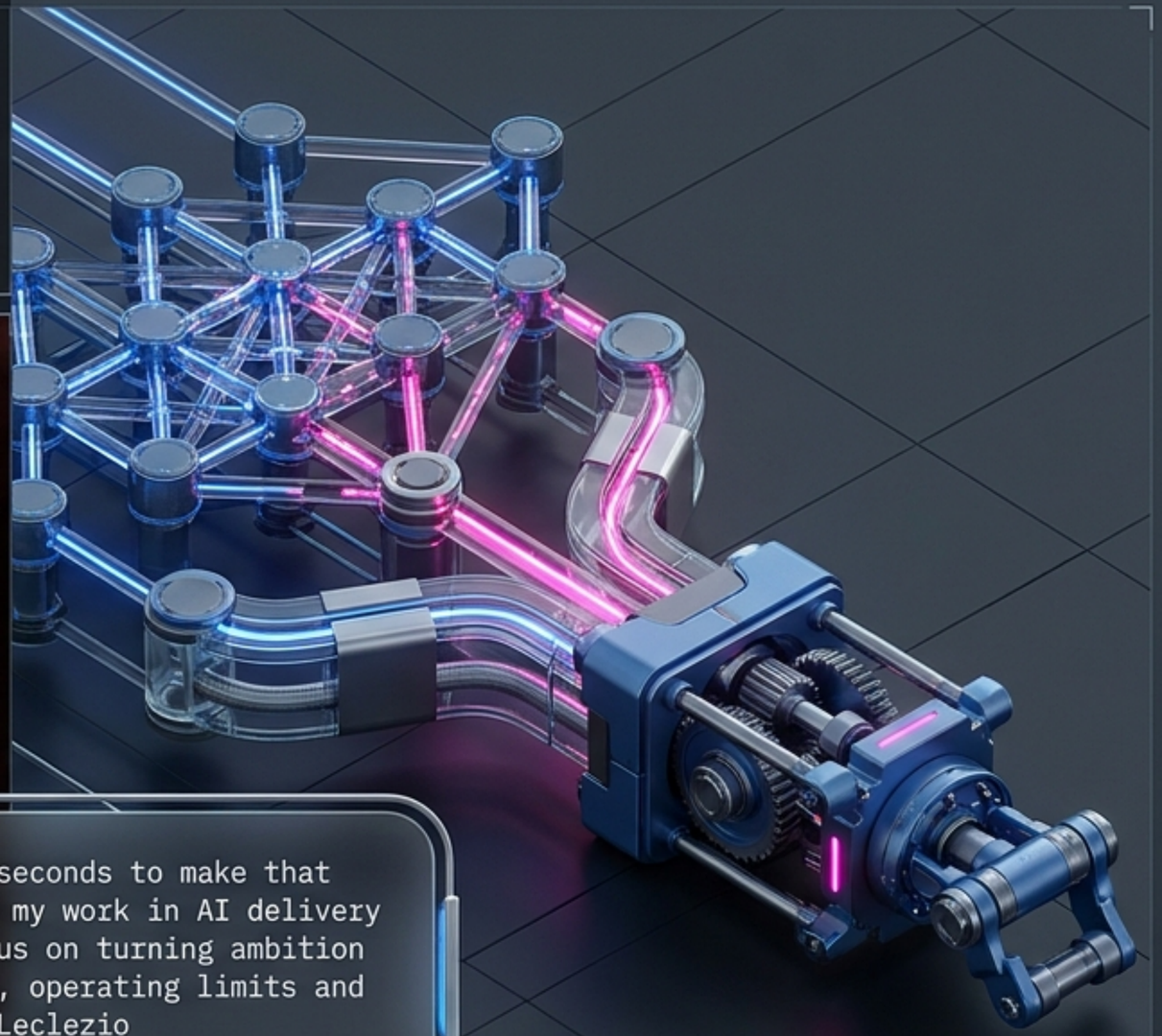

0.000 s
TWENTY MILLISECONDS
Hold the Edge. Exploring human oversight at the speed of AI.
PLASMA TEMP:
T50 MILLION K
MAGNETIC CONFINEMENT:
12.5 TESLA
STABILITY INDEX:
CRITICAL
GLASS MATRICS: AND
CONDUCTIVE PLATE
MICRO ATCHED:
CONDUCTIVE BLEDDING
Gemini Notebook

The precipice of human reaction.

What does human oversight actually mean when a system moves faster than biological constraints allow us to react?



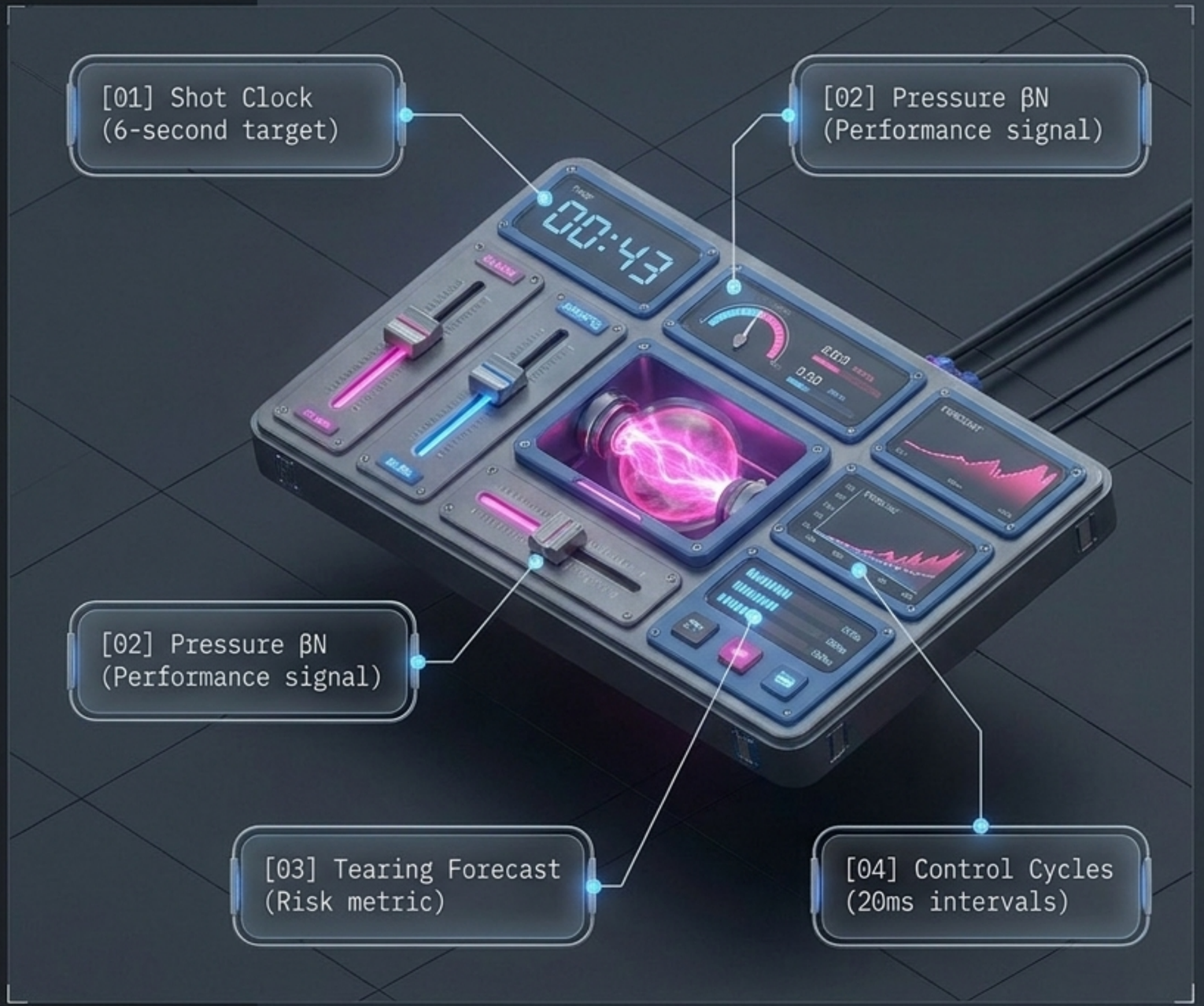


"I built Twenty Milliseconds to make that question tangible. In my work in AI delivery and governance, I focus on turning ambition into clear objectives, operating limits and evidence." — Richard Leclezio
[TIMESTAMP: 2024.10.26 14:32:05 GMT]

Gemini Notebook

Play at the edge of the stability limit.

An educational simulation game designed to pressure-test the phrase “human in the loop.” It compresses the complexities of plasma control into a simplified physics model, requiring no prior background to play. The objective: keep the plasma stable for six simulated seconds. Higher pressure earns a higher score.



Gemini Notebook

Hold the shape. Hold the edge. Heating raises the internal pressure. Magnetic geometry alters the physical operating margin. The controller must balance maximum performance against inevitable structural instability.



Gemini Notebook

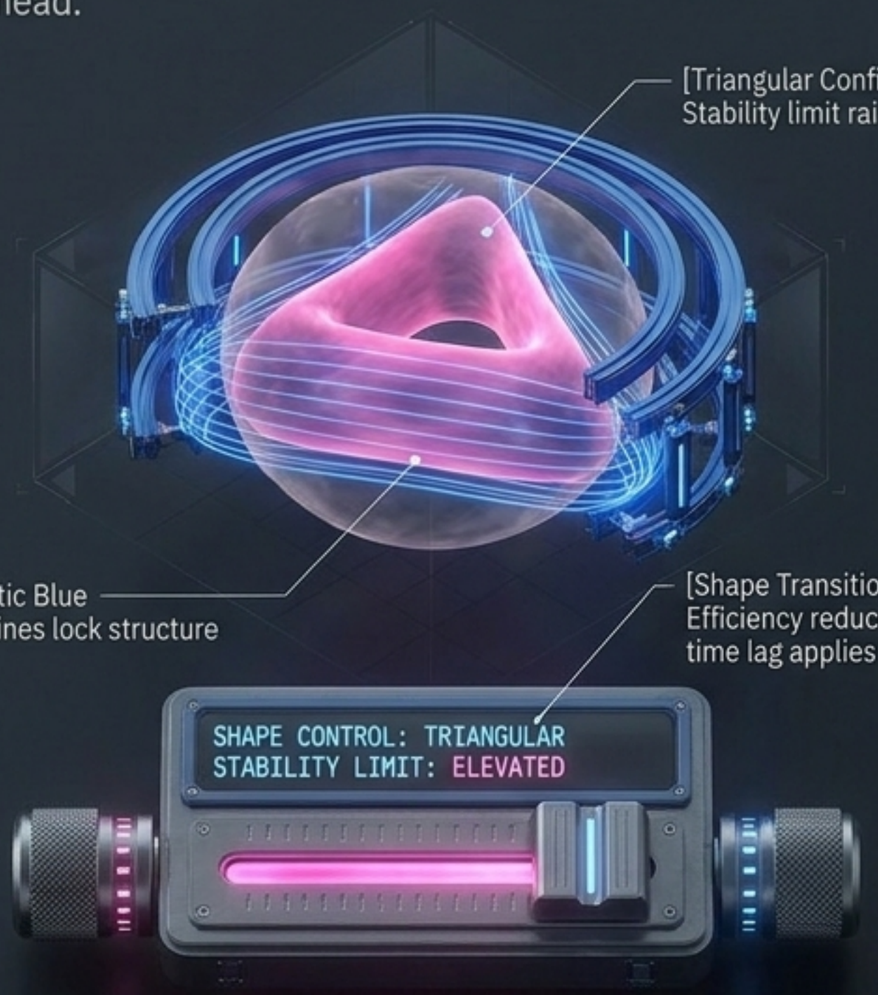
Control 01: Adjust the Heating.

More heat equals higher normalised pressure (βN) and faster scoring, but rapidly decreases your stability margin.



Control 02: Adjust the Shape.

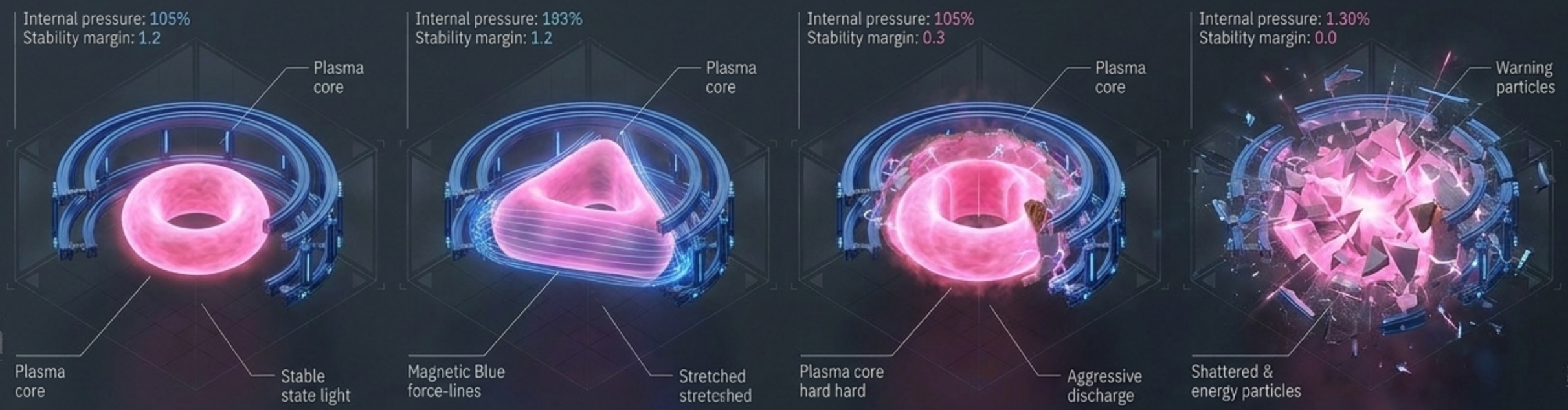
Making the plasma more triangular raises the stability limit. However, shape changes take time and reduce heating efficiency. Plan ahead.

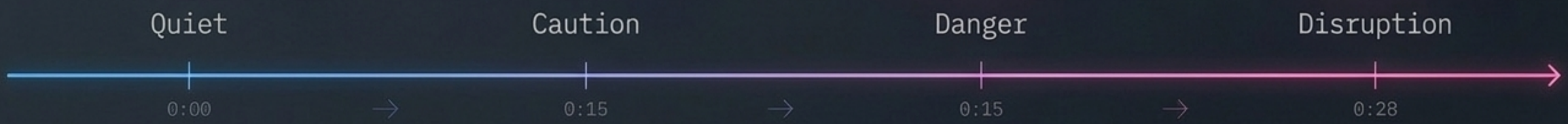


Gemini Notebook

The mechanics of a disruption.

Watch the pressure, stability margin, and risk forecast. If the forecast rises or the margin shrinks, heating must be pulled back immediately. A disruption—a structural “tearing”—ends the 6-second shot early.



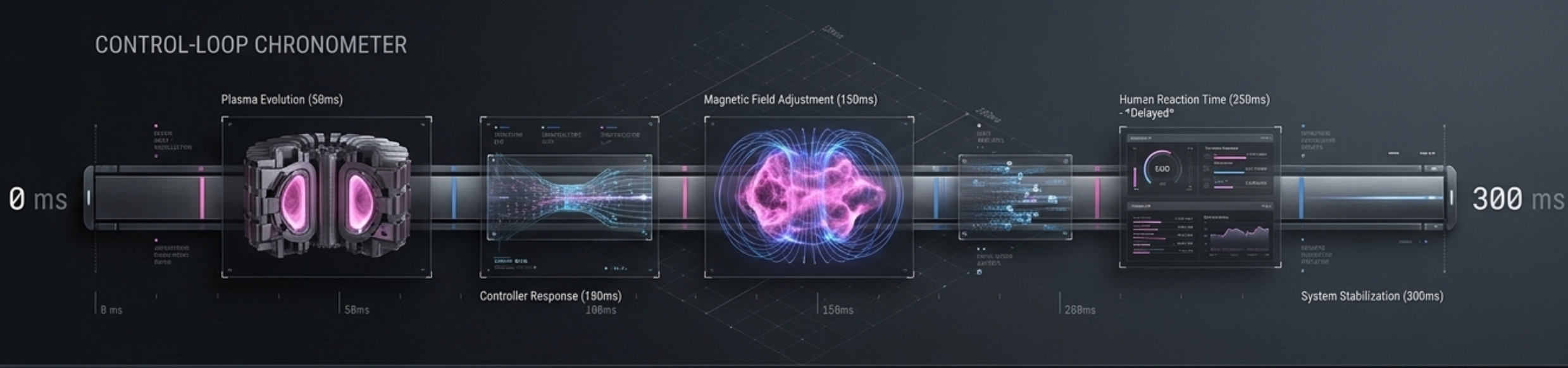


Gemini Notebook

A fundamentally different kind of fast.

To understand the oversight challenge, we must put the controller, the physical plasma, and biological human response on the exact same clock.

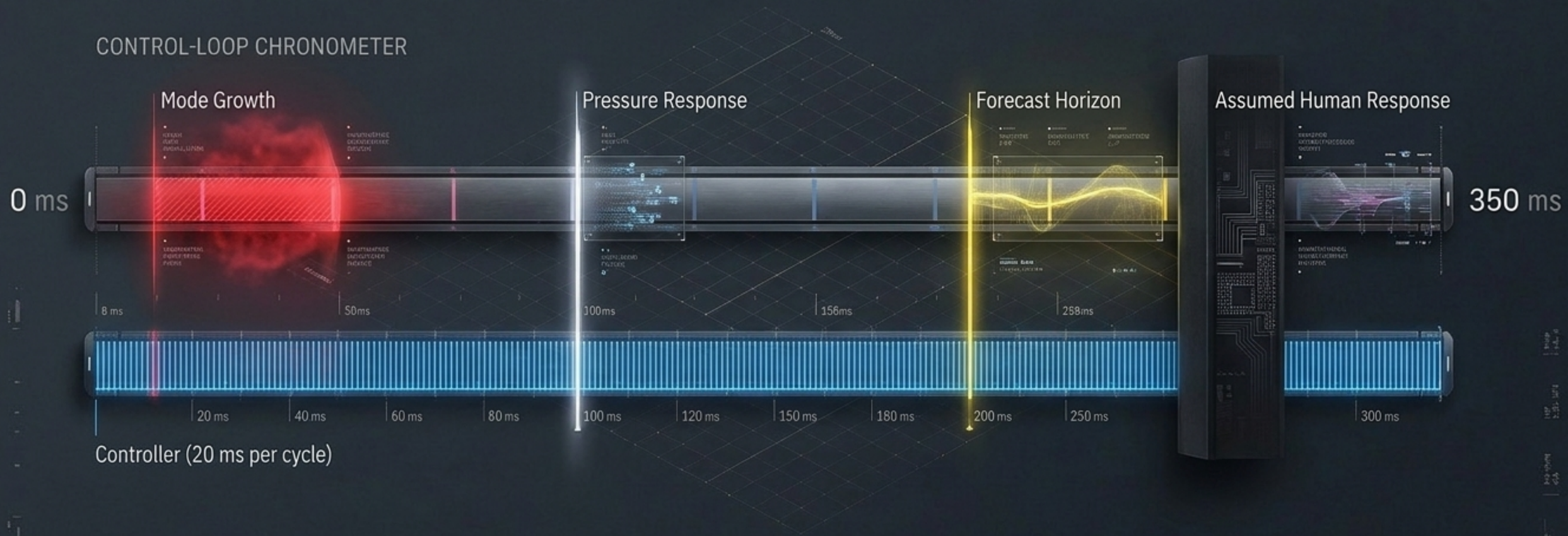
CONTROL-LOOP CHRONOMETER



Gemini Notebook

Twelve decisions before you blink.

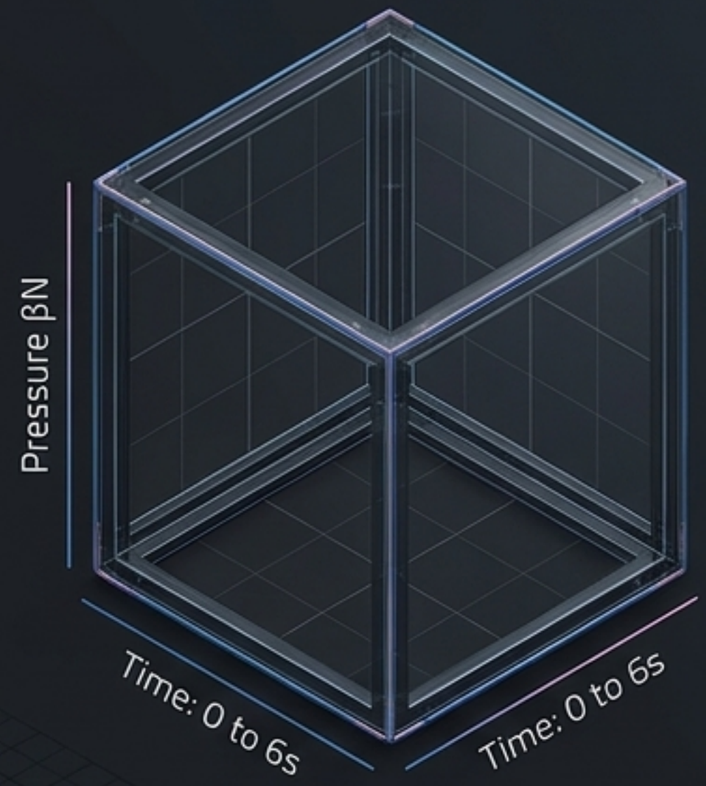
- 5 intervals inside the model's 100 ms pressure-response timescale.
- 10 intervals inside the 200 ms forecast horizon.
- 12 intervals pass before the benchmarked 250 ms human response time.

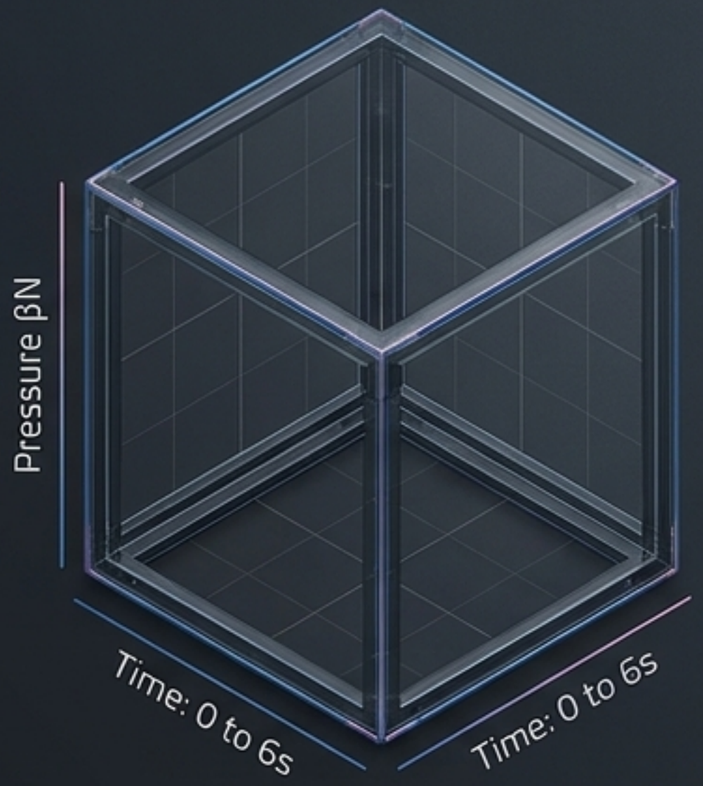


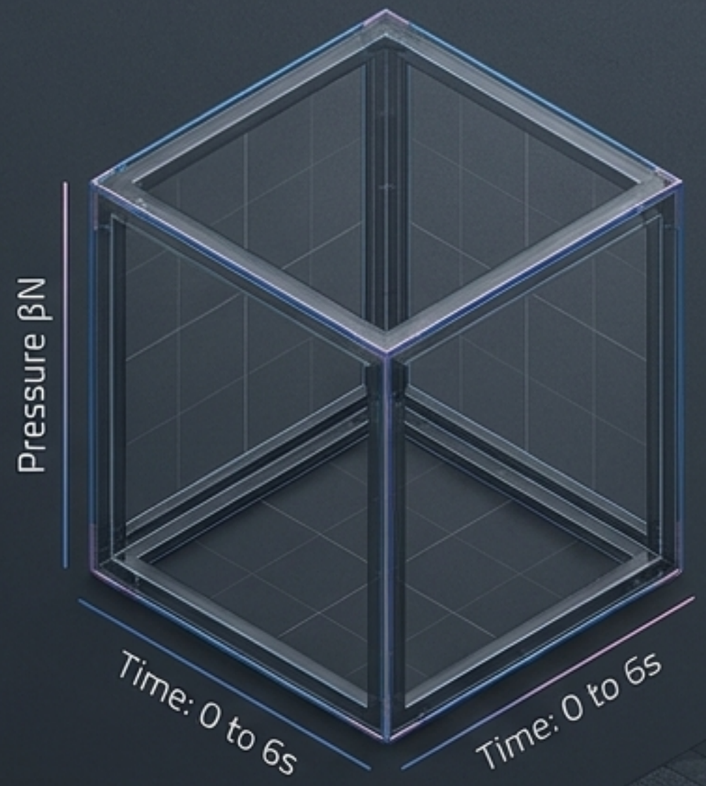
Gemini Notebook

Same plasma. Different loop.

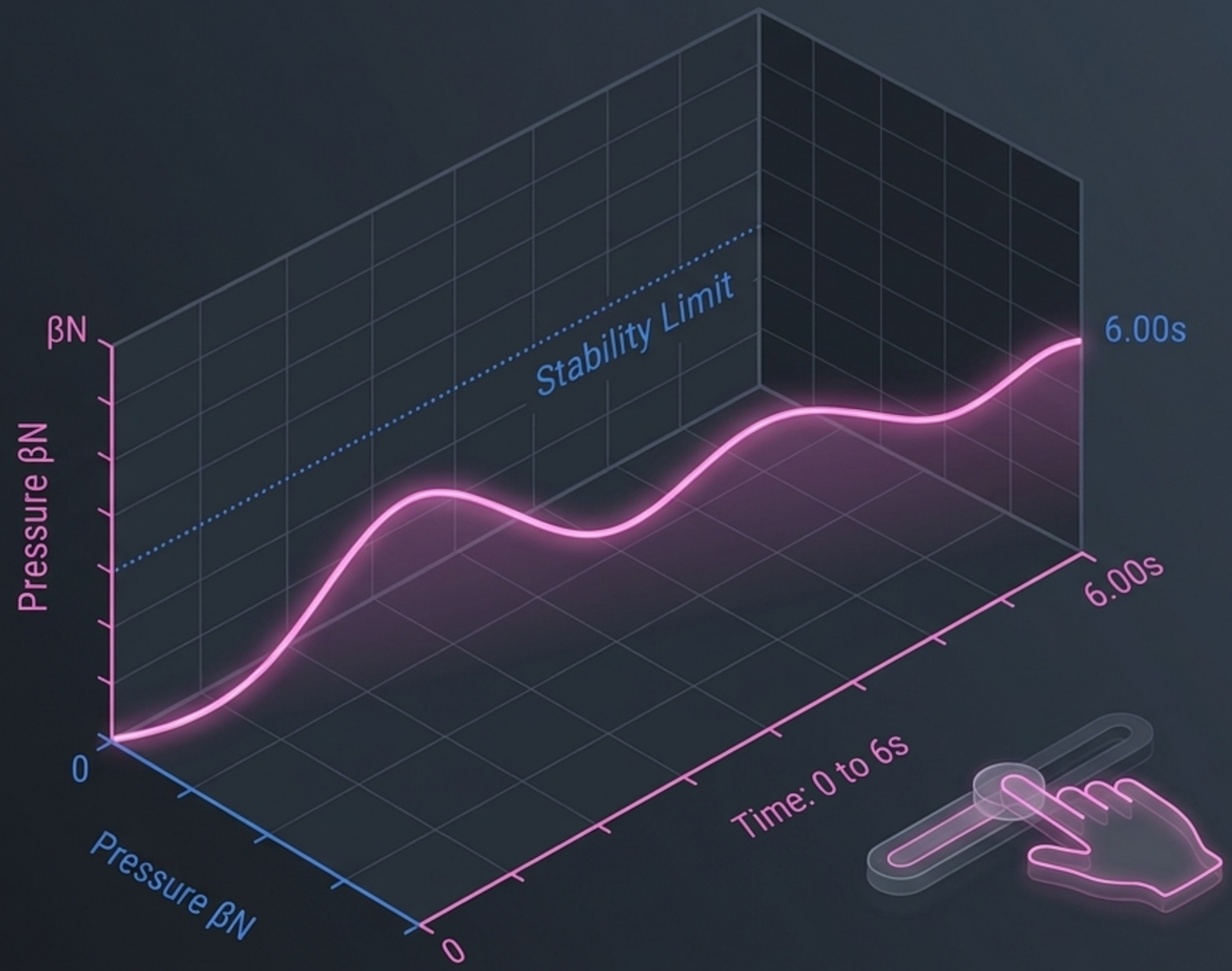
Practice slowly. Try it in real time. Then step back and let the controller fly. These benchmark runs demonstrate why the pace of the feedback loop ultimately dictates the realm of the possible.







Gemini Notebook



RUN 01 / HUMAN
AT 1/10 SPEED

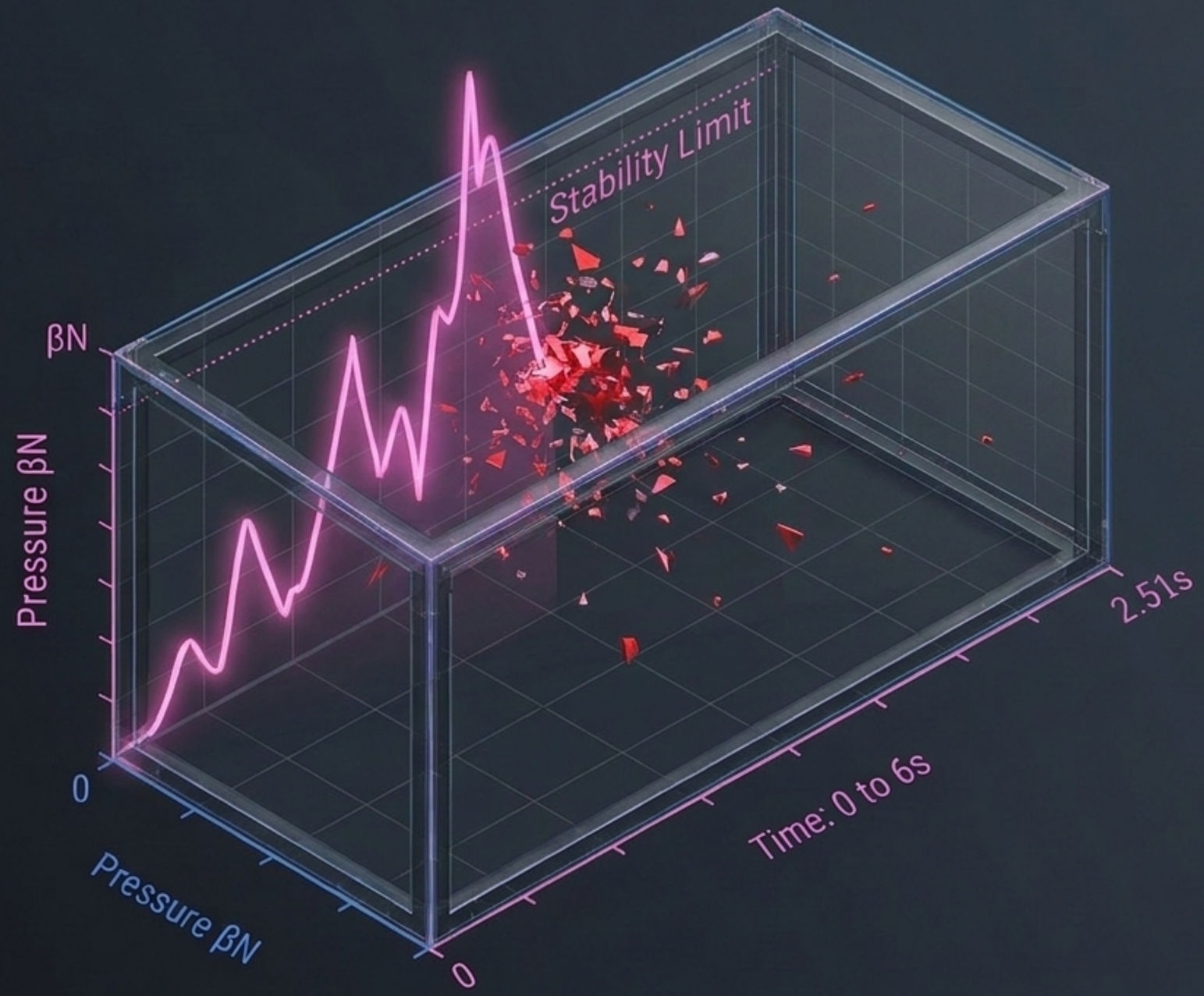
RESULT:
24 / 24 SHOTS COMPLETED.

MEAN PERFORMANCE:
12.0 βN·S.

TIME COMPLETED:
6.00 S.

INSIGHT: SLOW MOTION PRACTICE GIVES HUMAN HANDS AND EYES THE REQUISITE TIME TO RESPOND TO WARNINGS AND ADJUST SHAPE PROACTIVELY.

Gemini Notebook



RUN 02 / HUMAN
AT REAL TIME

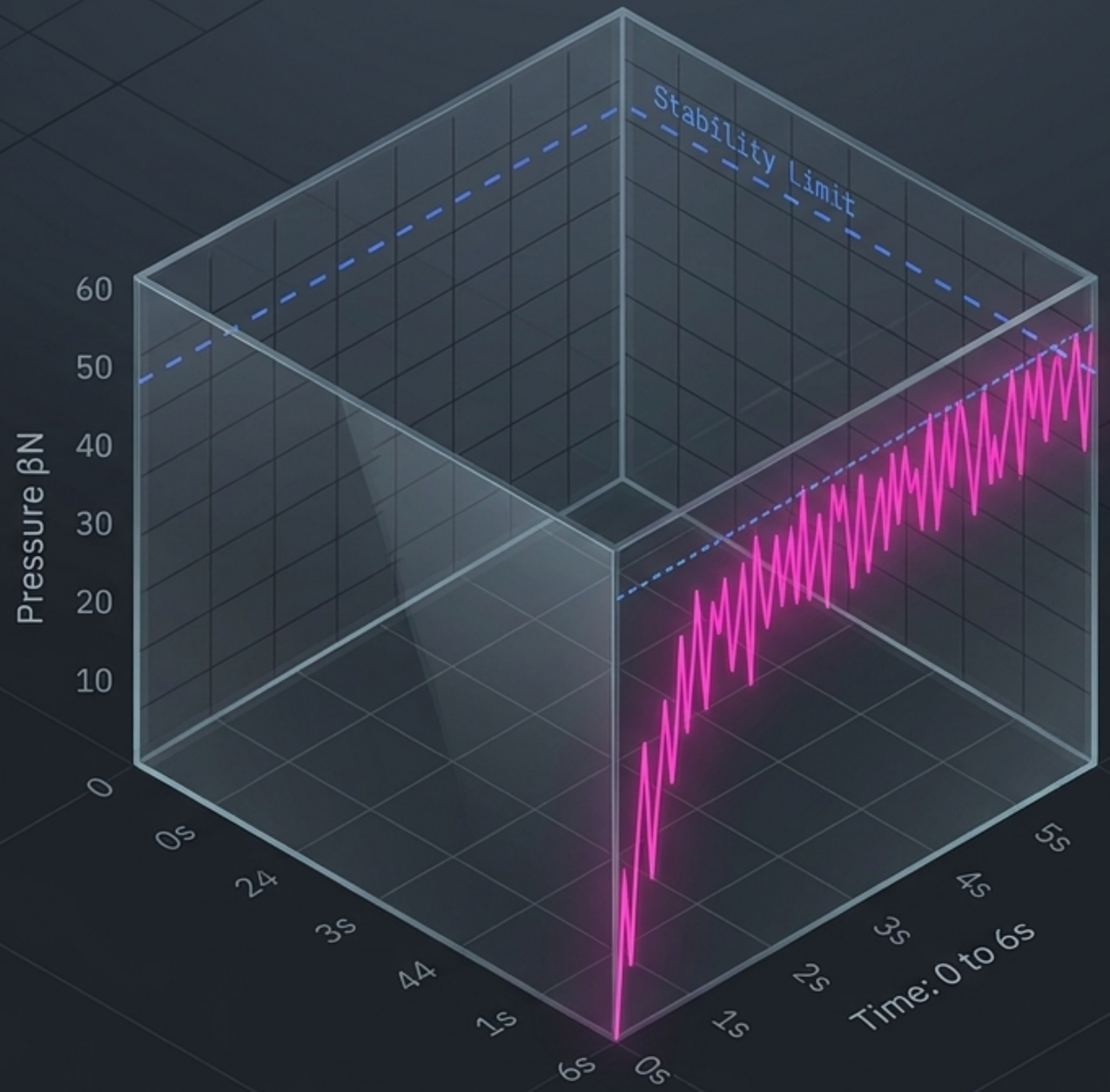
RESULT:
02 / 24 SHOTS COMPLETED.

MEAN PERFORMANCE:
5.0 βN·S.

TIME COMPLETED:
ENDED EARLY AT 2.51 S.

INSIGHT: THE SAME WARNING NOW FLASHES FOR A FRACTION OF A SECOND. HUMAN REACTION CANNOT OUTPACE THE 10–50 MS MODE GROWTH. CATASTROPHIC EARLY TERMINATION IS ALMOST INEVITABLE.

Gemini Notebook



RUN 03 / THE 20MS CONTROLLER

RESULT: 24 / 24 SHOTS COMPLETED.

MEAN PERFORMANCE: 16.2 βN·s.

TIME COMPLETED: 6.00 S.

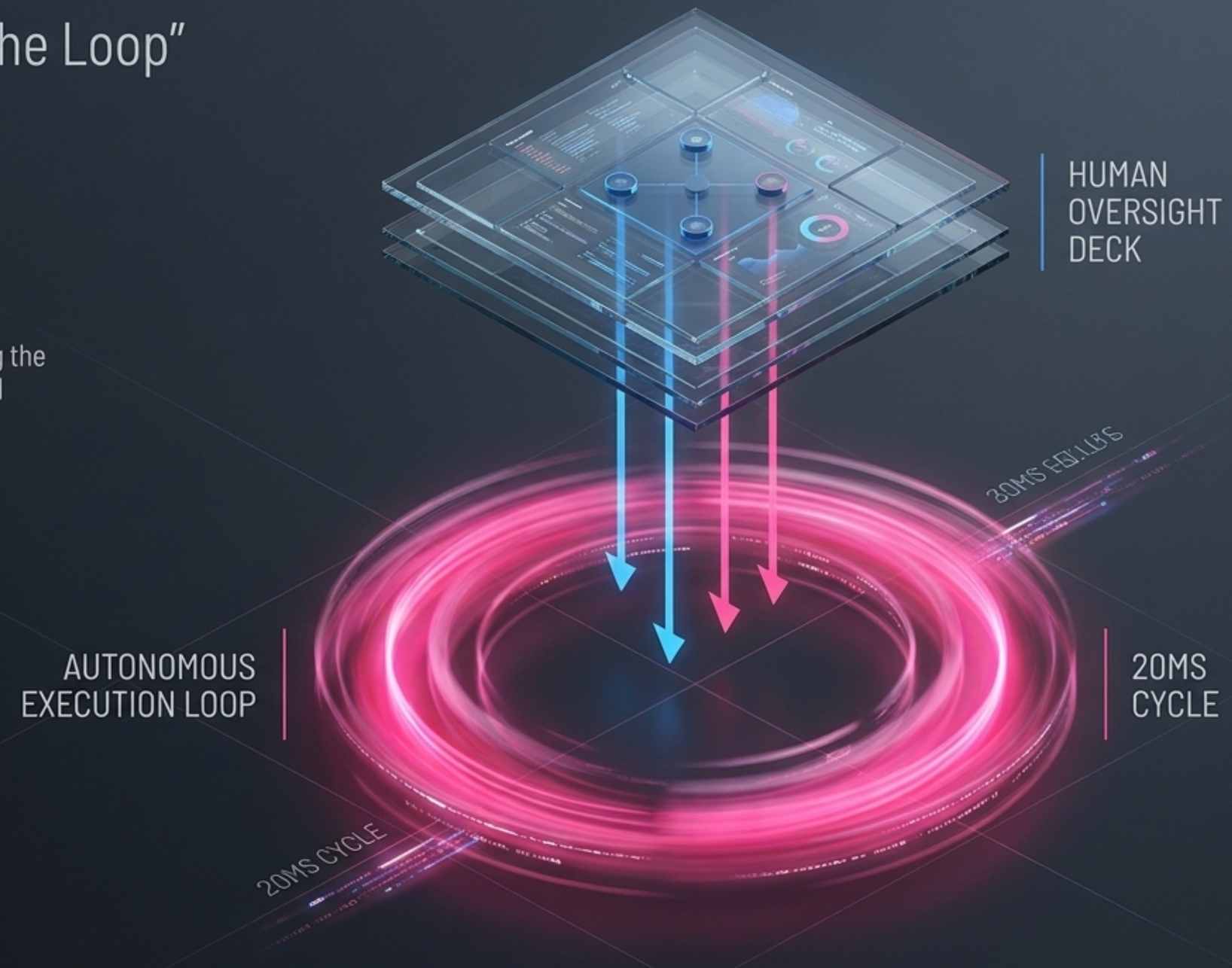
INSIGHT: THE AI EXECUTES REPEATED, MICRO-ADJUSTMENTS 50 TIMES PER SECOND, HOLDING PRESSURE OPTIMALLY BELOW THE LIMIT TO ACHIEVE MAXIMUM POSSIBLE PERFORMANCE.

Gemini Notebook

Redefining “Human in the Loop”

When a system moves faster than biological reaction, direct intervention is a myth. Meaningful human oversight human oversight shifts from driving the vehicle to designing the track.

Core Principle: True oversight means deciding the goals, setting the operational boundaries, and rigorously reviewing the outcomes. Those responsibilities must be fulfilled before the system ever starts making decisions.



Gemini Notebook

Applying the timeline to your domain.

SYSTEM STATUS: MATRIX ACTIVE 08:05:23:59



AI Leaders & Programme Teams: Make the conversation about automation concrete. Explore exactly which decisions humans should make, which must be delegated, and what needs to be designed pre-deployment.

FOCUS: STRUCTURE & DELEGATION

METRIC: DECISION VELOCITY

TIME: 00:04:12:96 00:04:12:98



Risk, Governance & Control: Pressure-test the assumption of human oversight. Weigh response times, hard operating limits, and evidence when determining if control is actually practical.

FOCUS: LIMITS & RESPONSE

METRIC: CONTROL LATENCY < 20MS

DOMAIN: CROSS-FUNCTIONAL APPLICATION 00:04:12:98



Builders & Curious Minds: Learn through your hands. Fly the plasma, observe the controller, and connect direct experience to the science of predictive feedback.

FOCUS: EXPERIENCE & FEEDBACK

METRIC: PREDICTIVE MODEL ACCURACY

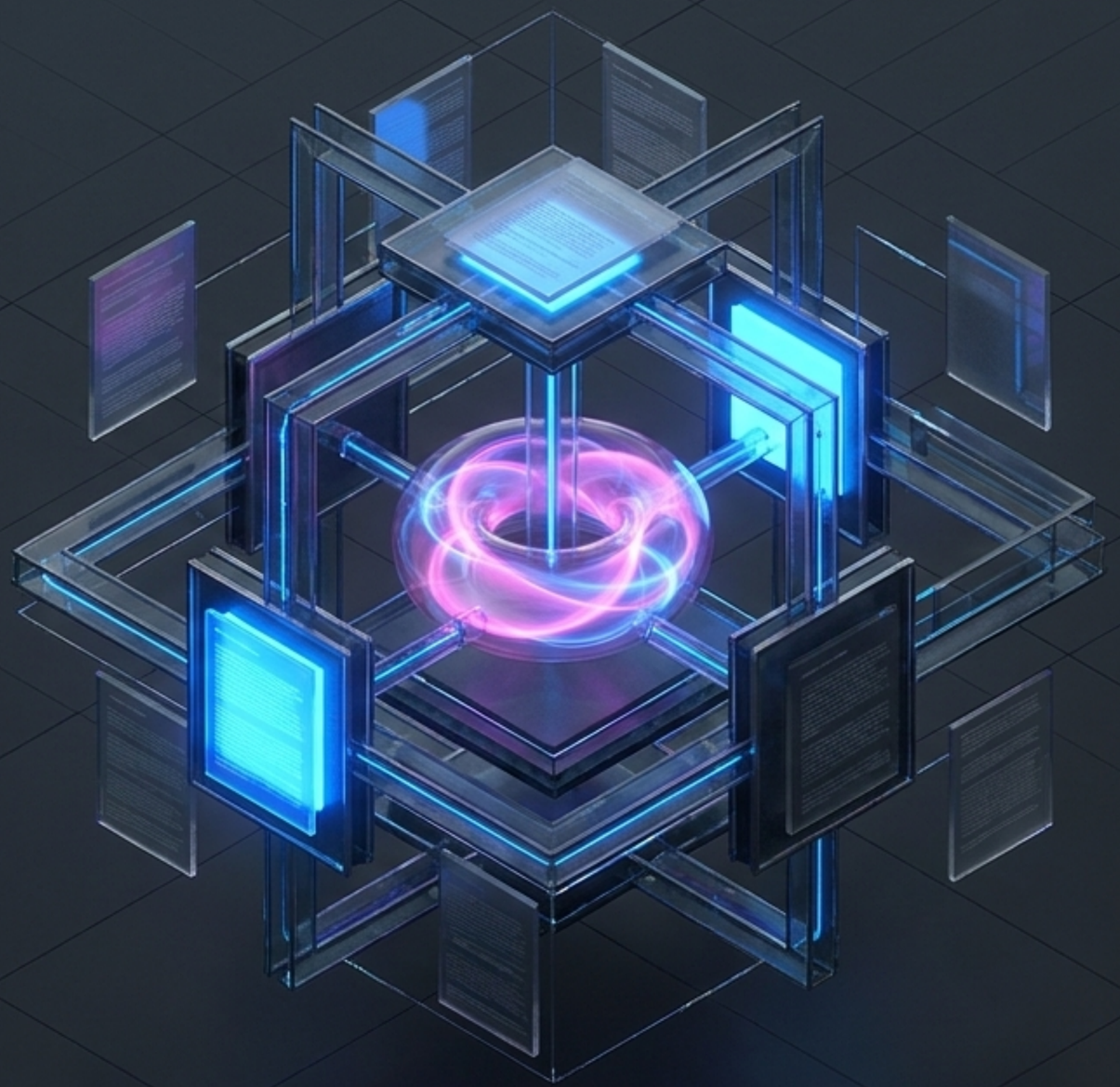
Gemini Notebook

Prediction before intervention.

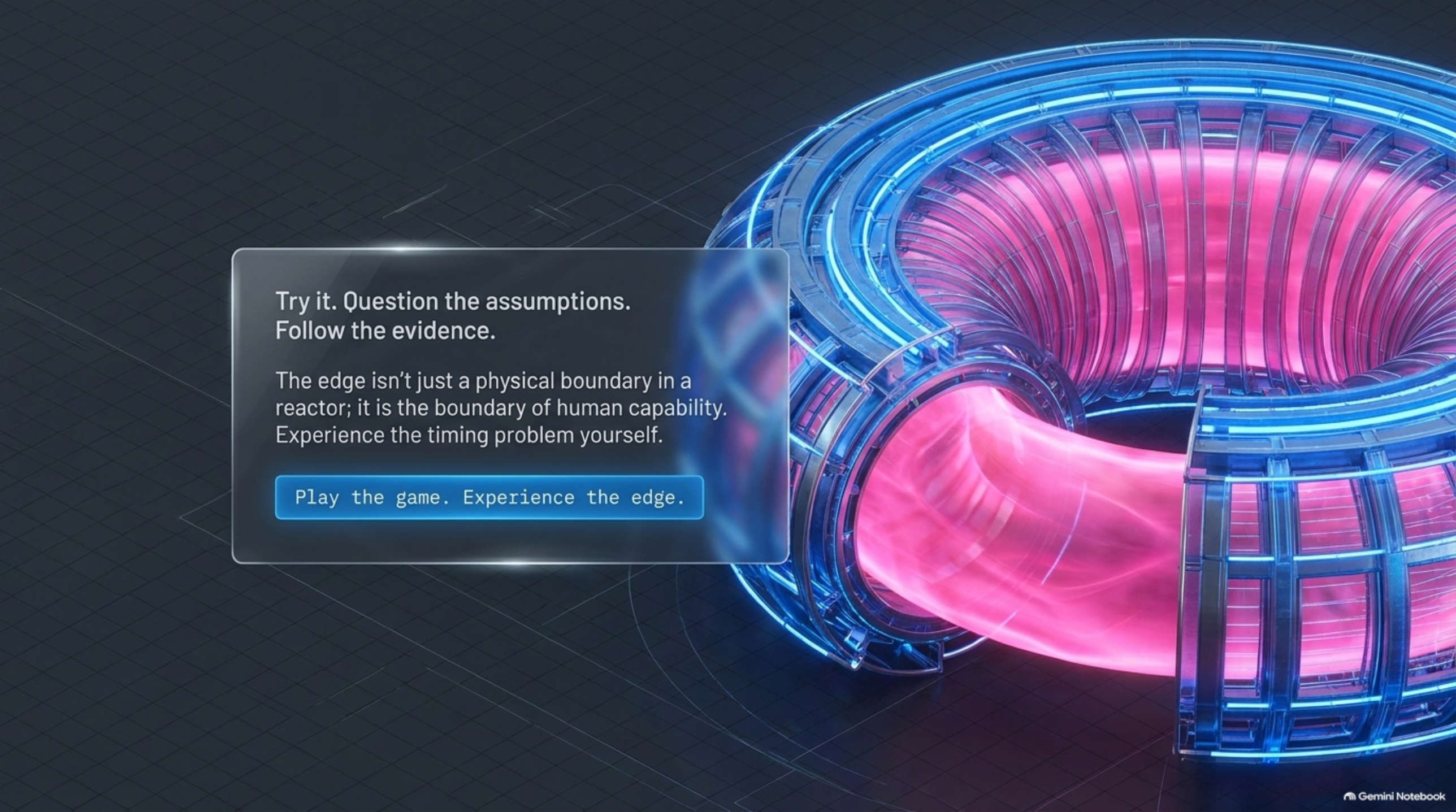
This simulation acts as a deliberately small pressure-time proxy (using a rule-based model and scripted stability limit). However, it is rooted in real experimental work.

The Foundation:

- DIII-D / Seo et al.: Demonstrated machine-learning approaches to plasma control and tearing avoidance.
- PPPL's PACMAN Report: Established the architecture connecting diagnostics, predictors, controllers, and actuators at 20ms to 200ms timescales.



Gemini Notebook


Try it. Question the assumptions.
Follow the evidence.
The edge isn’t just a physical boundary in a reactor; it is the boundary of human capability. Experience the timing problem yourself.
Play the game. Experience the edge.
Gemini Notebook