Fusion Energy: Clean, Safe, Limitless, Reliable, & Secure

Almost* all our energy comes from fusion.
Our goal is to harness this by creating
tiny stars on earth

*everything except tidal power!

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- **Market**: $40Tn (Bloomberg) or $850 Bn per annum by 2040

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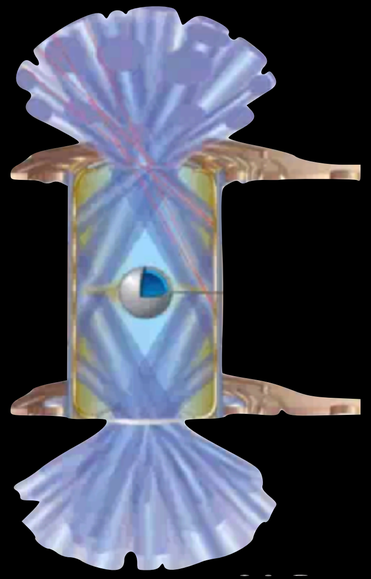
NIF Demonstrated Key Laser Inertial Fusion Physics

NIF ‘indirect’ drive



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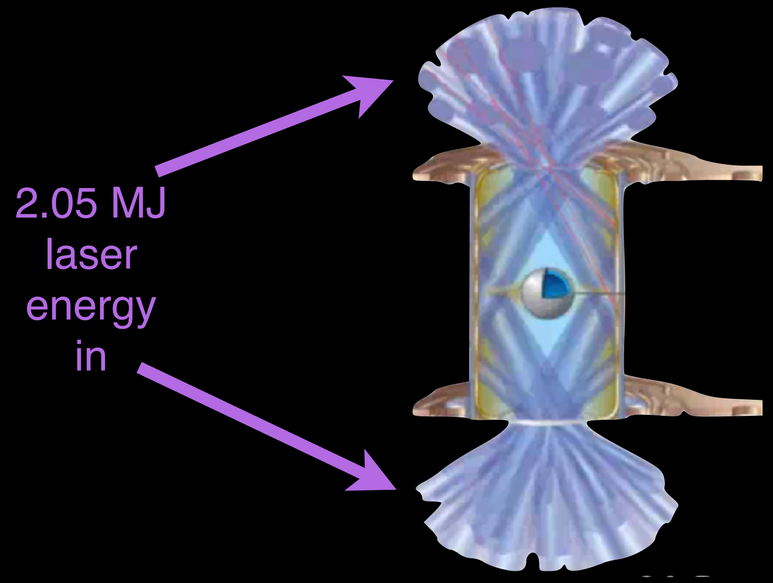

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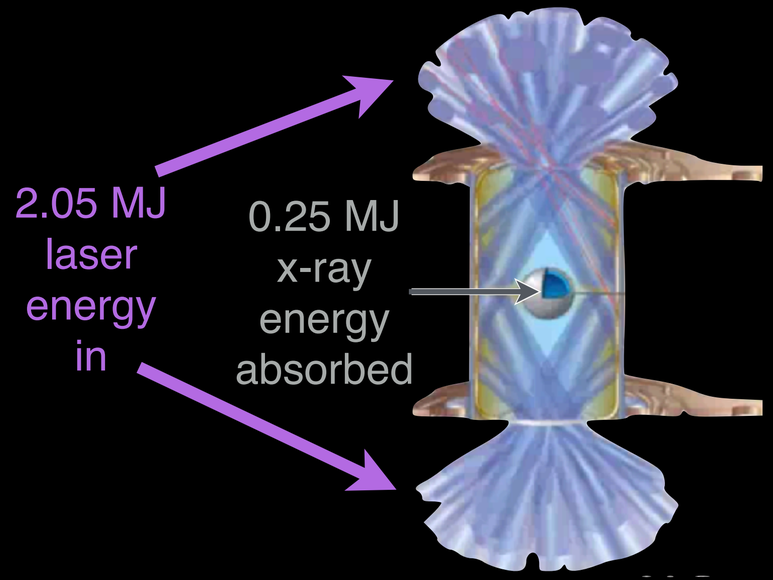

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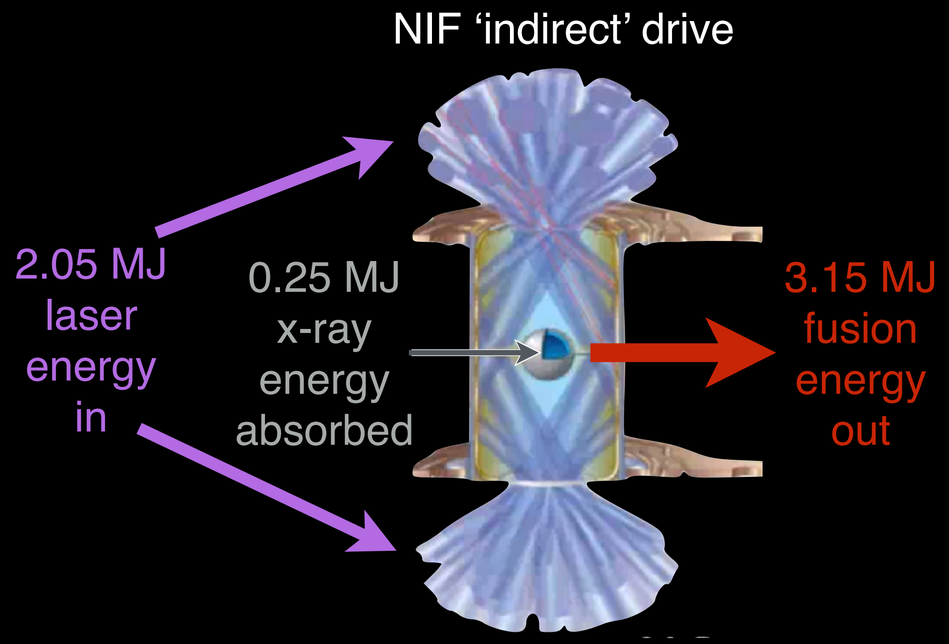

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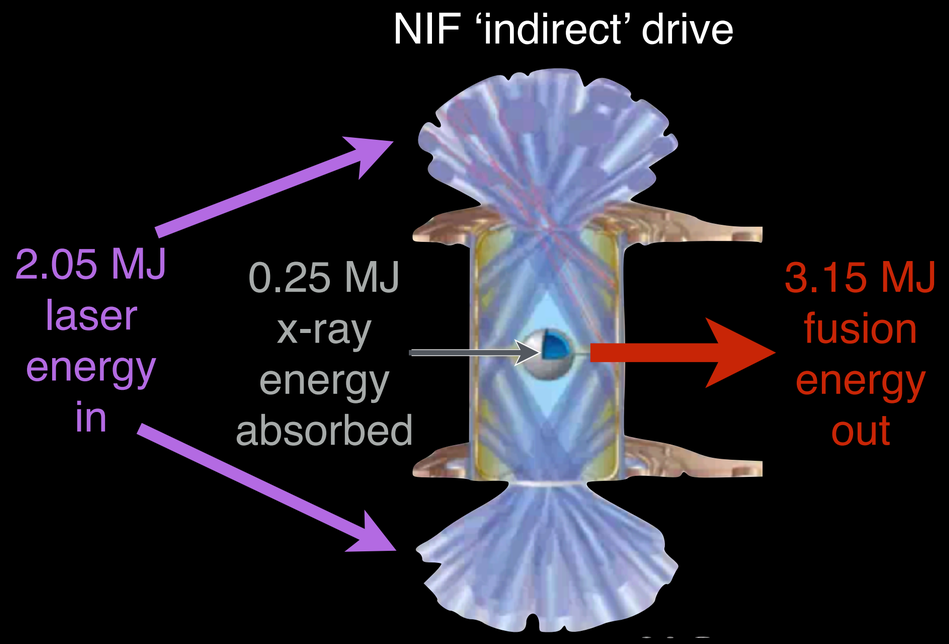

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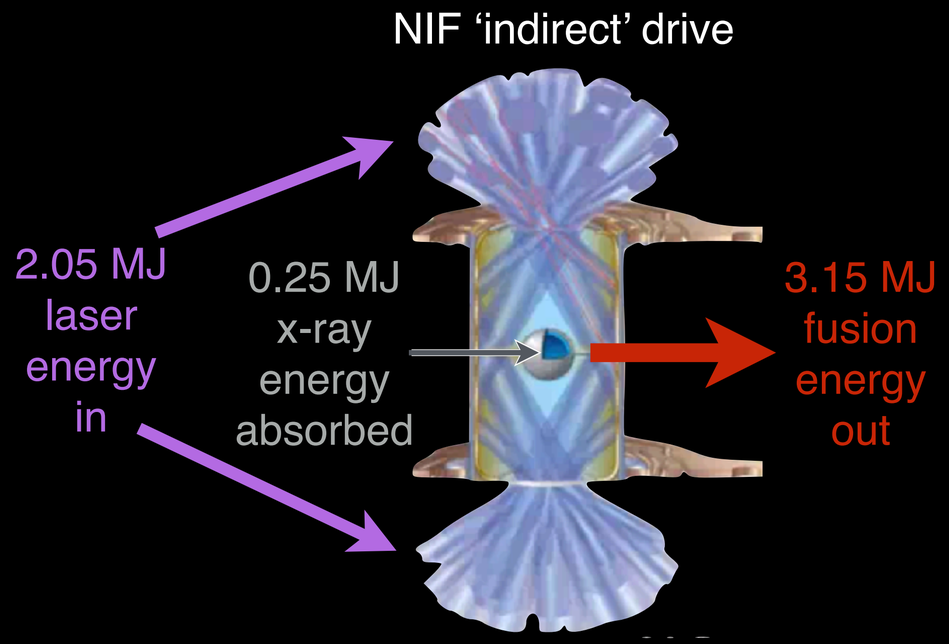

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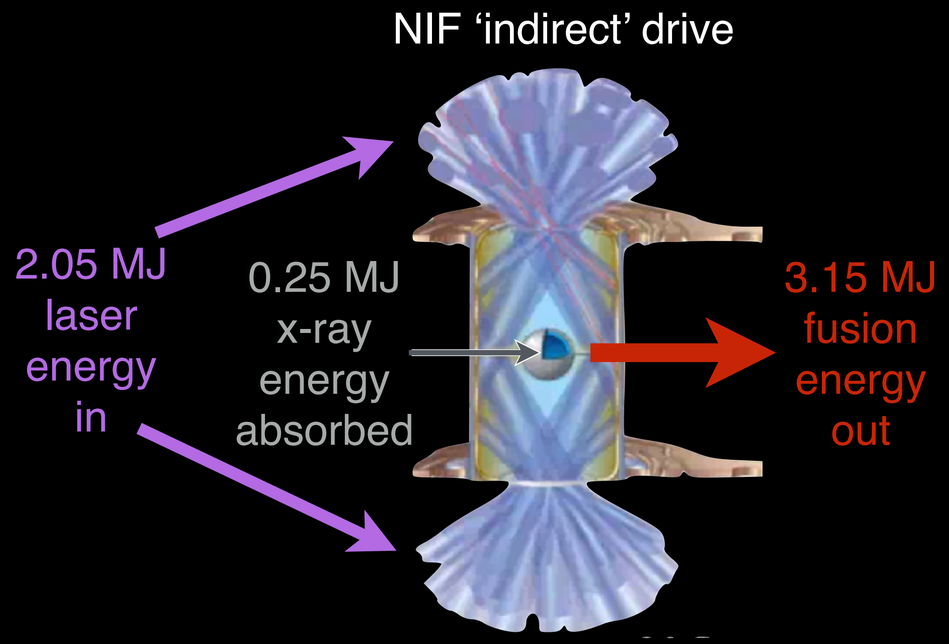

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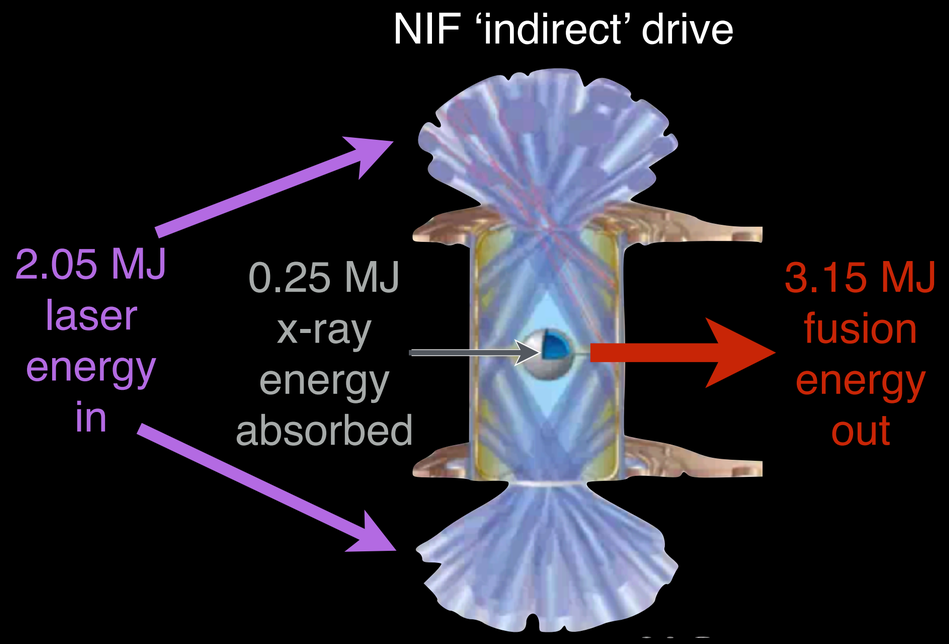

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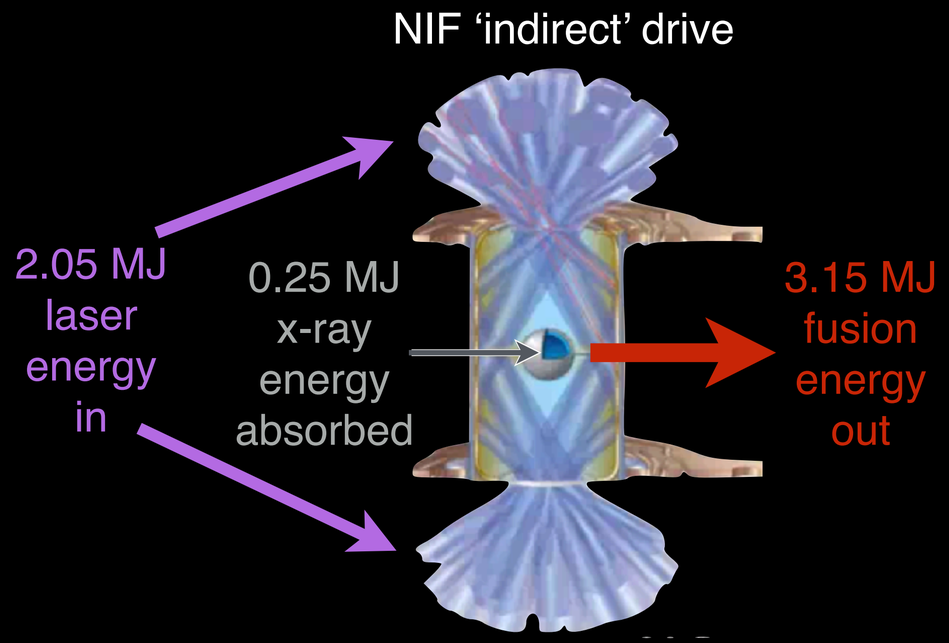

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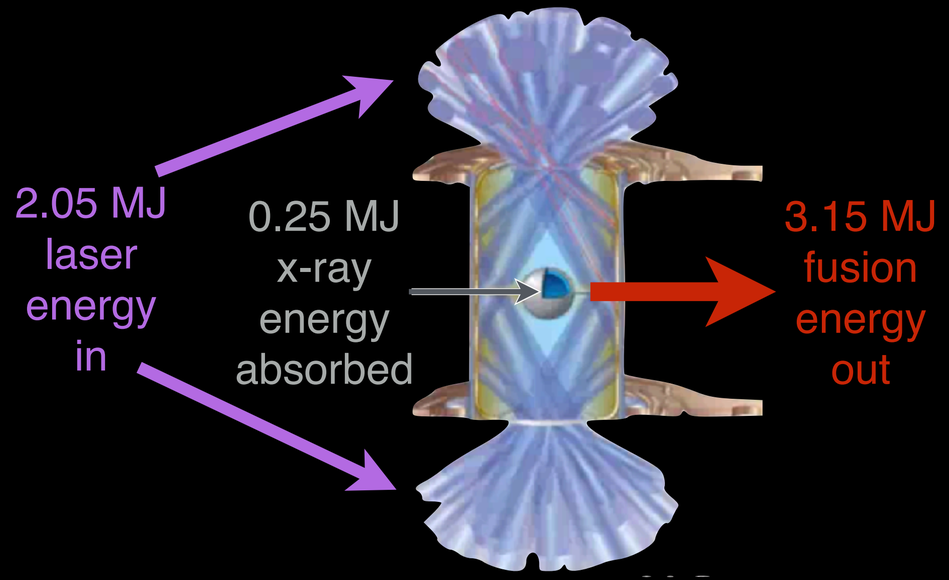

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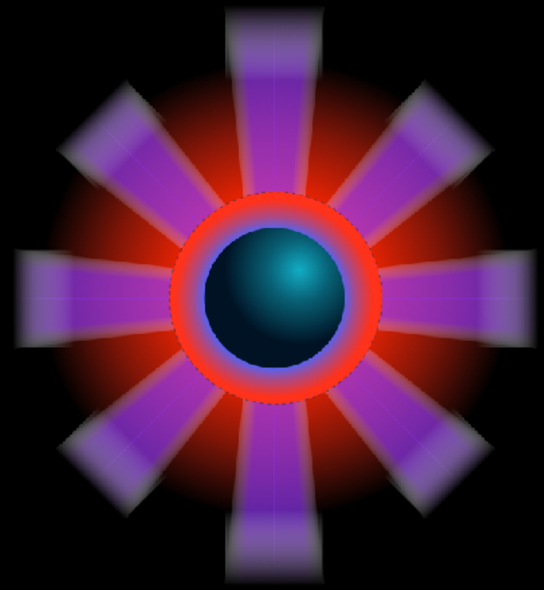

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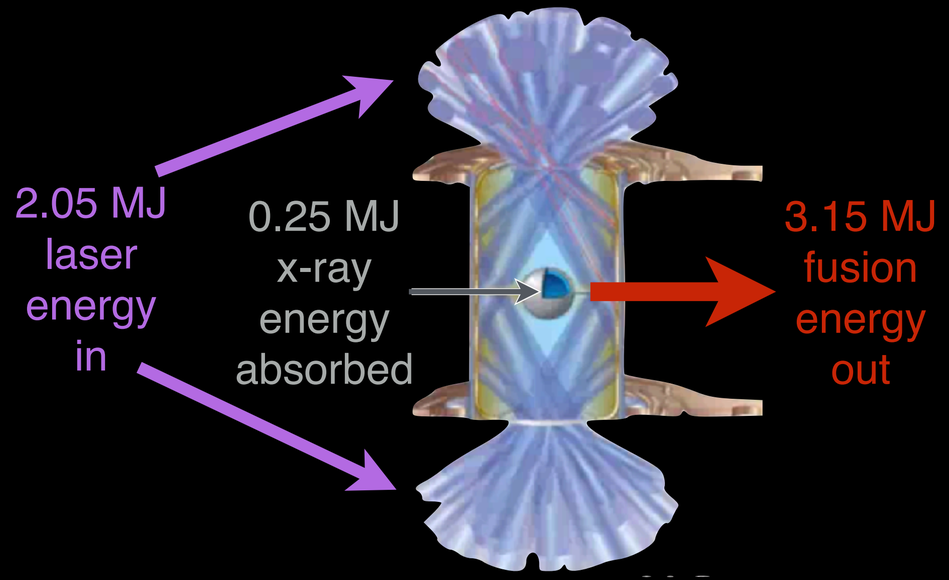

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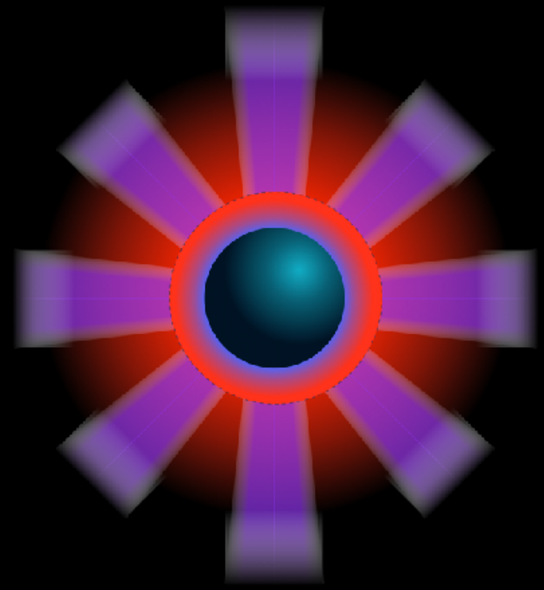

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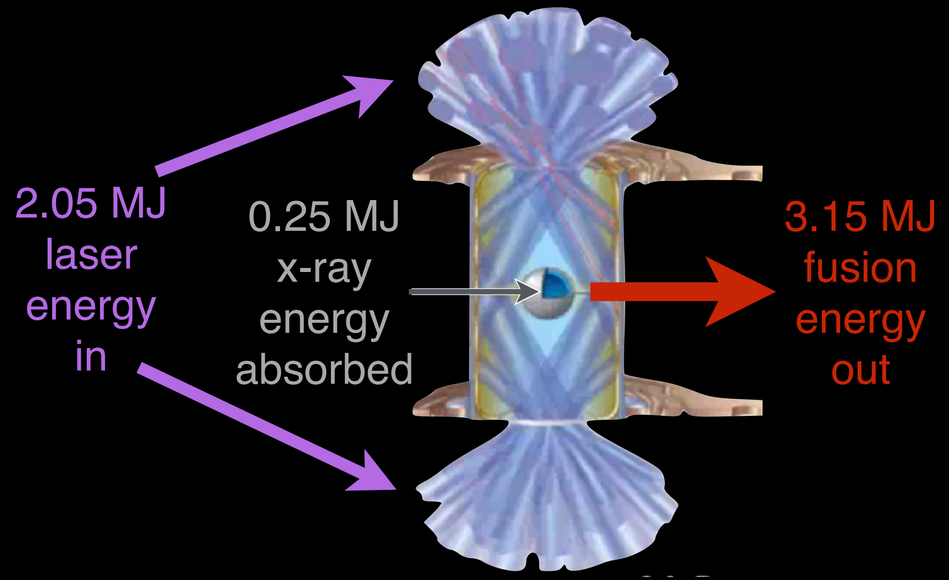

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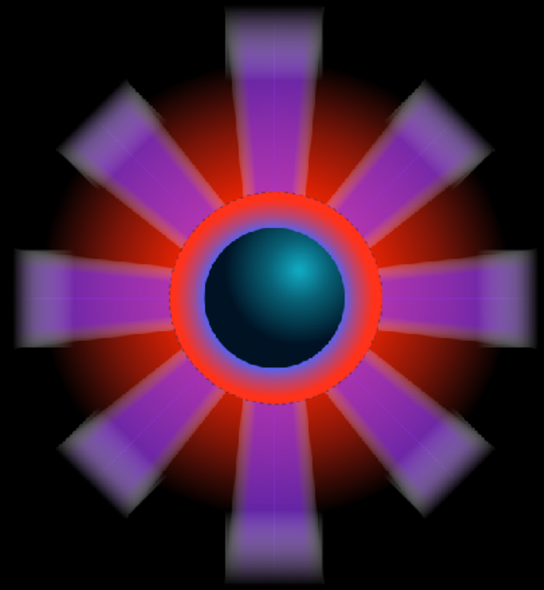

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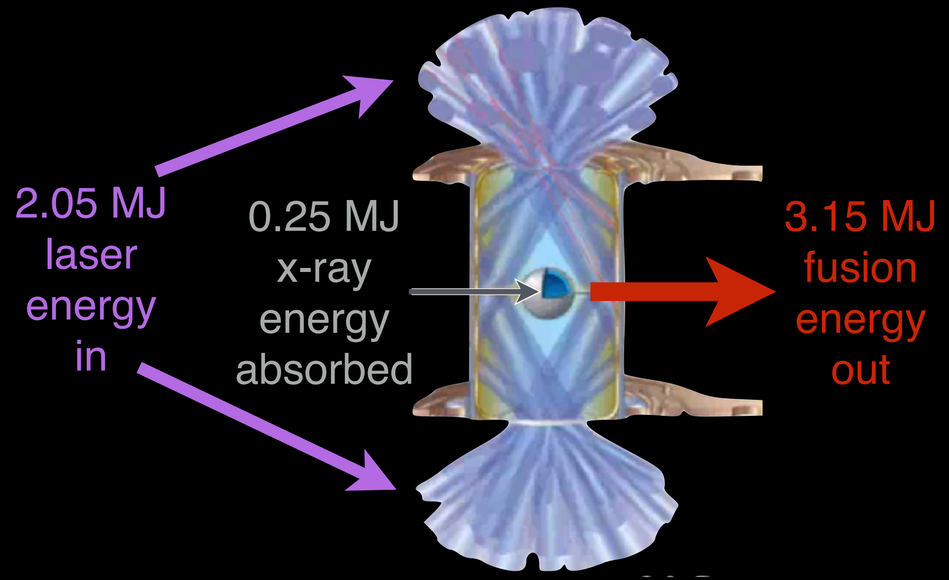

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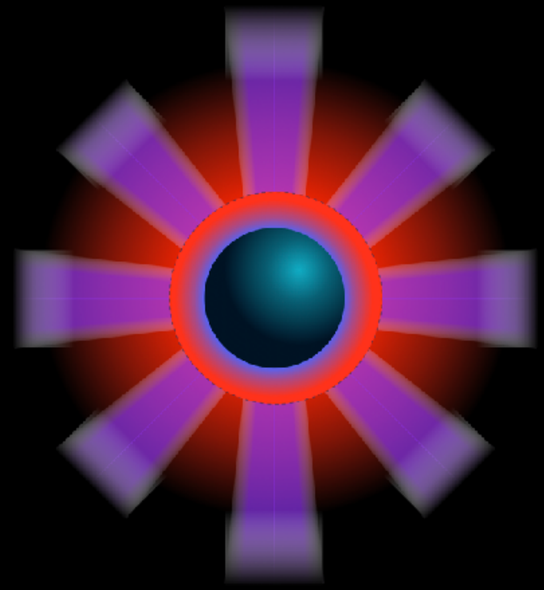

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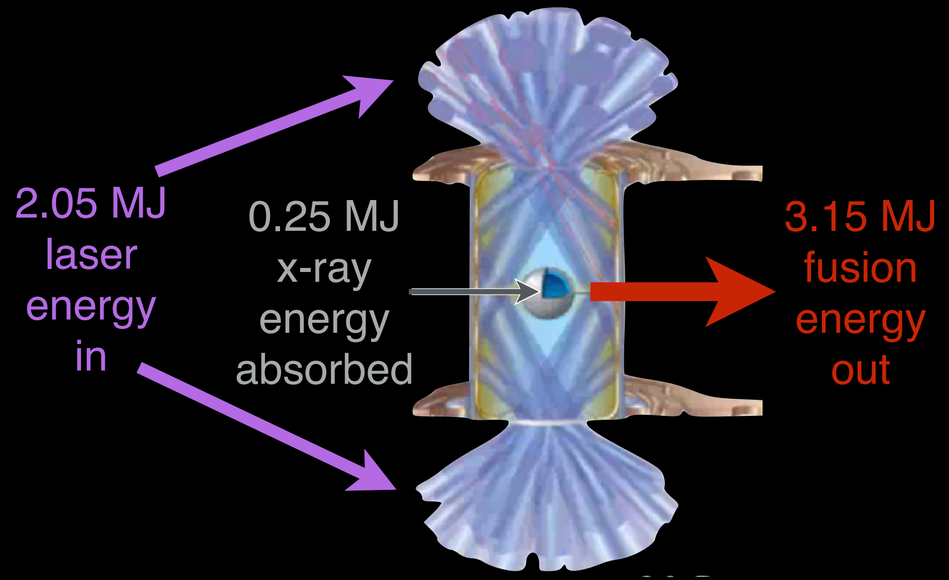

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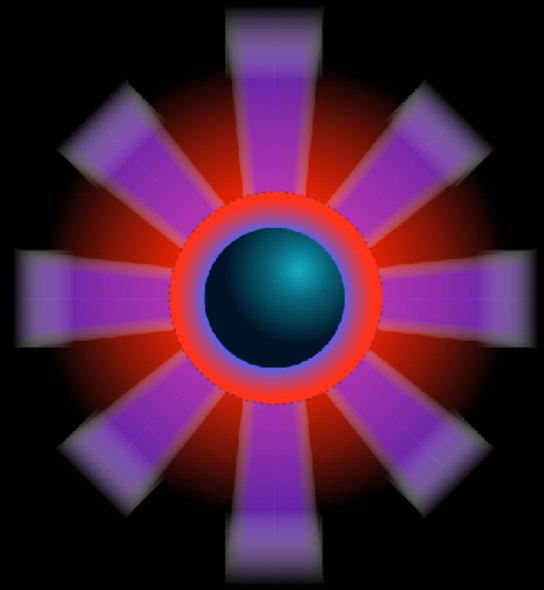

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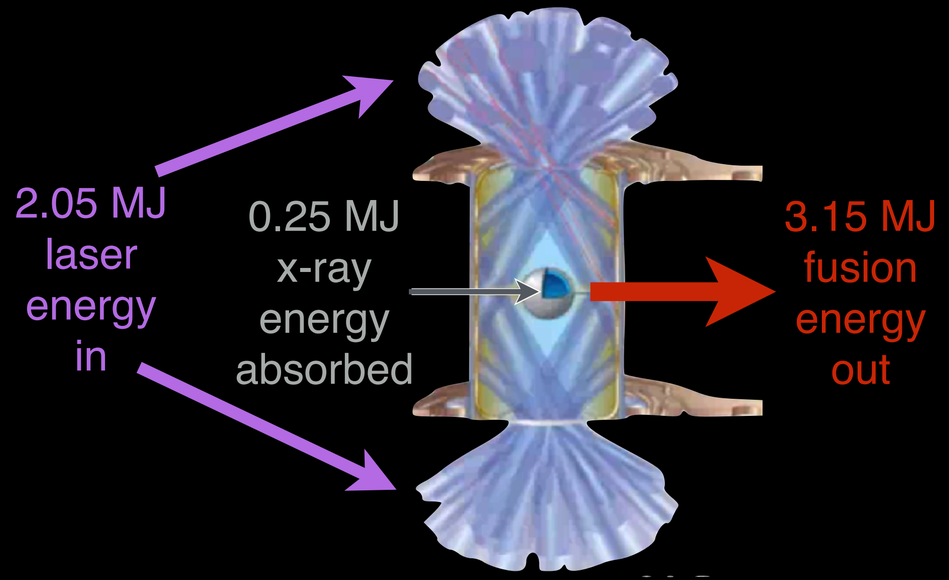

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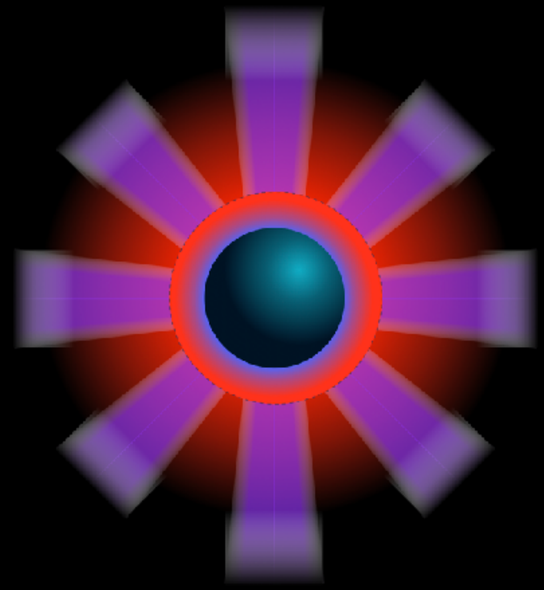

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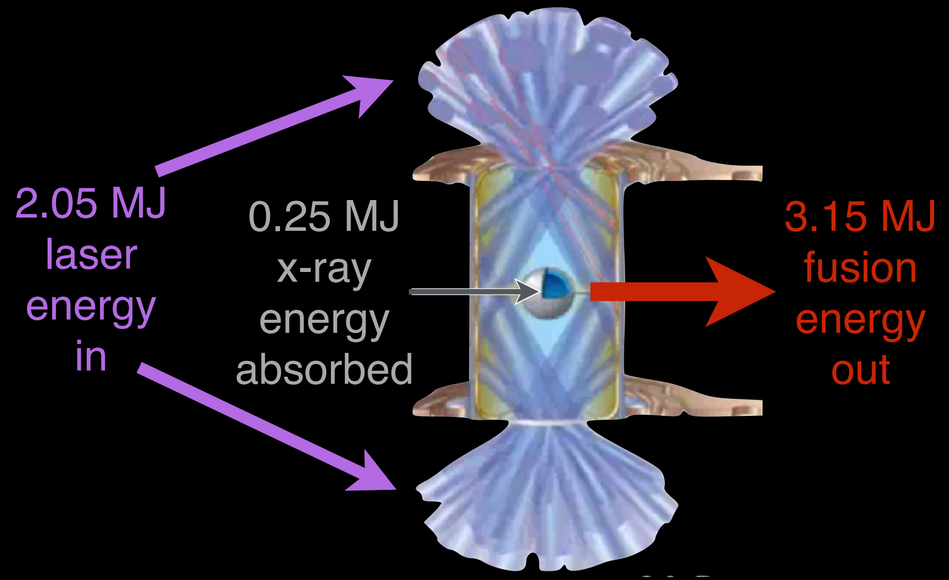

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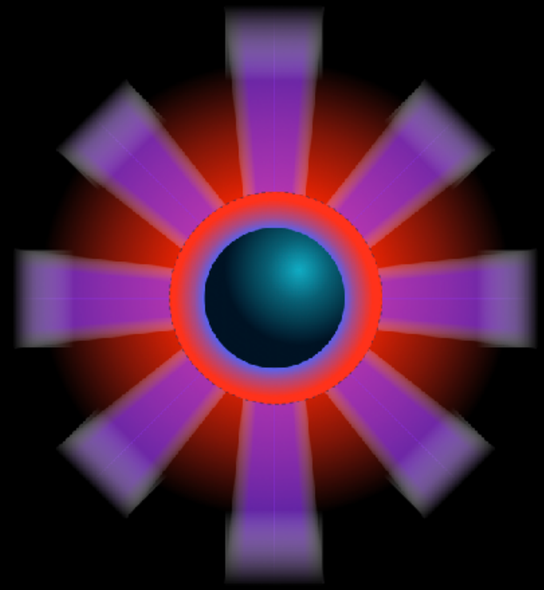

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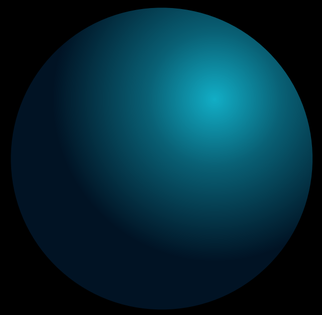

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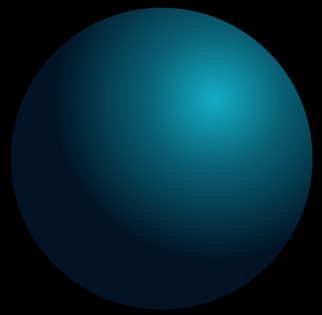

The fusion fuel is held within a hollow spherical shell

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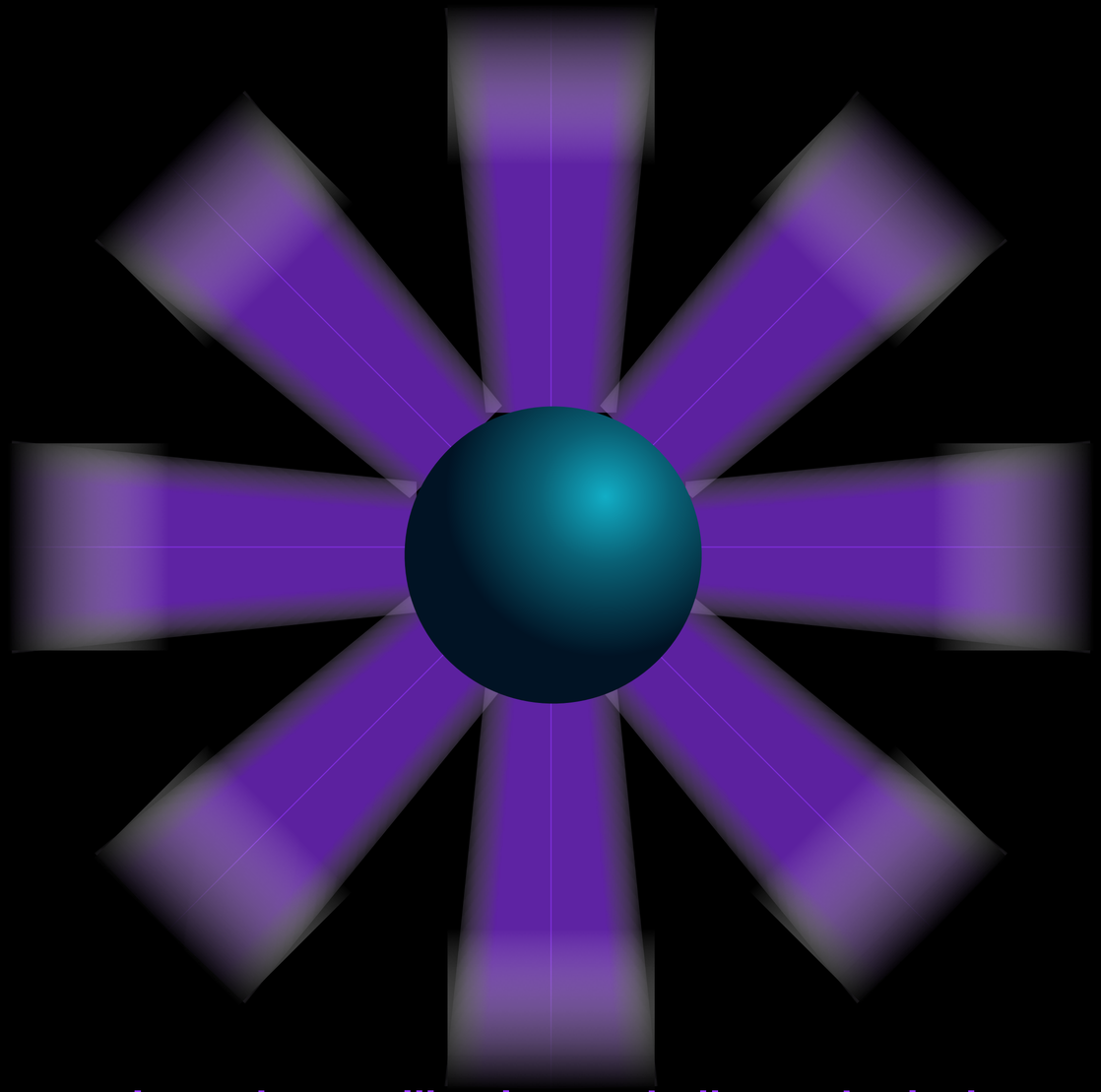

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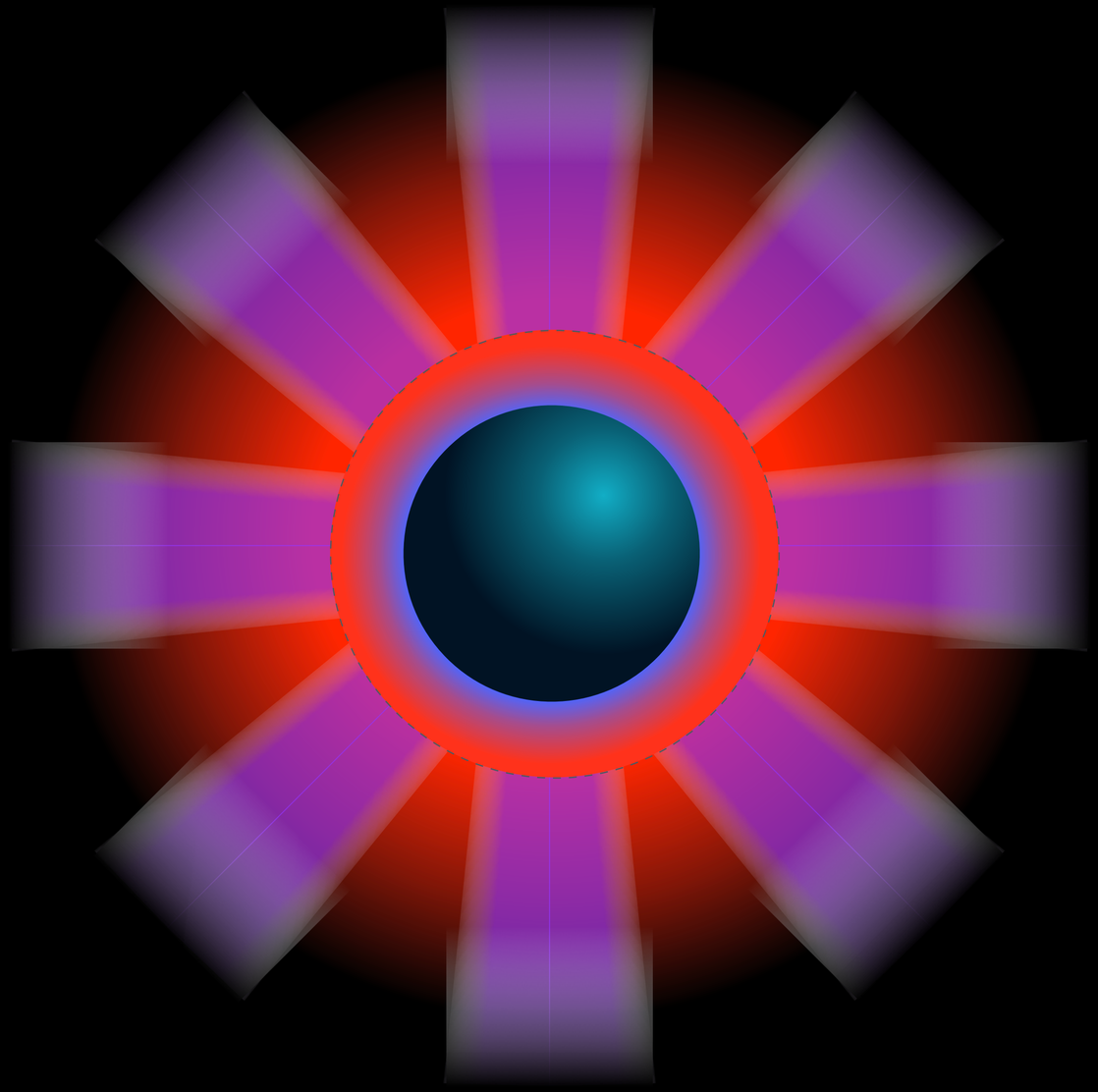

Hot, ablated plasma
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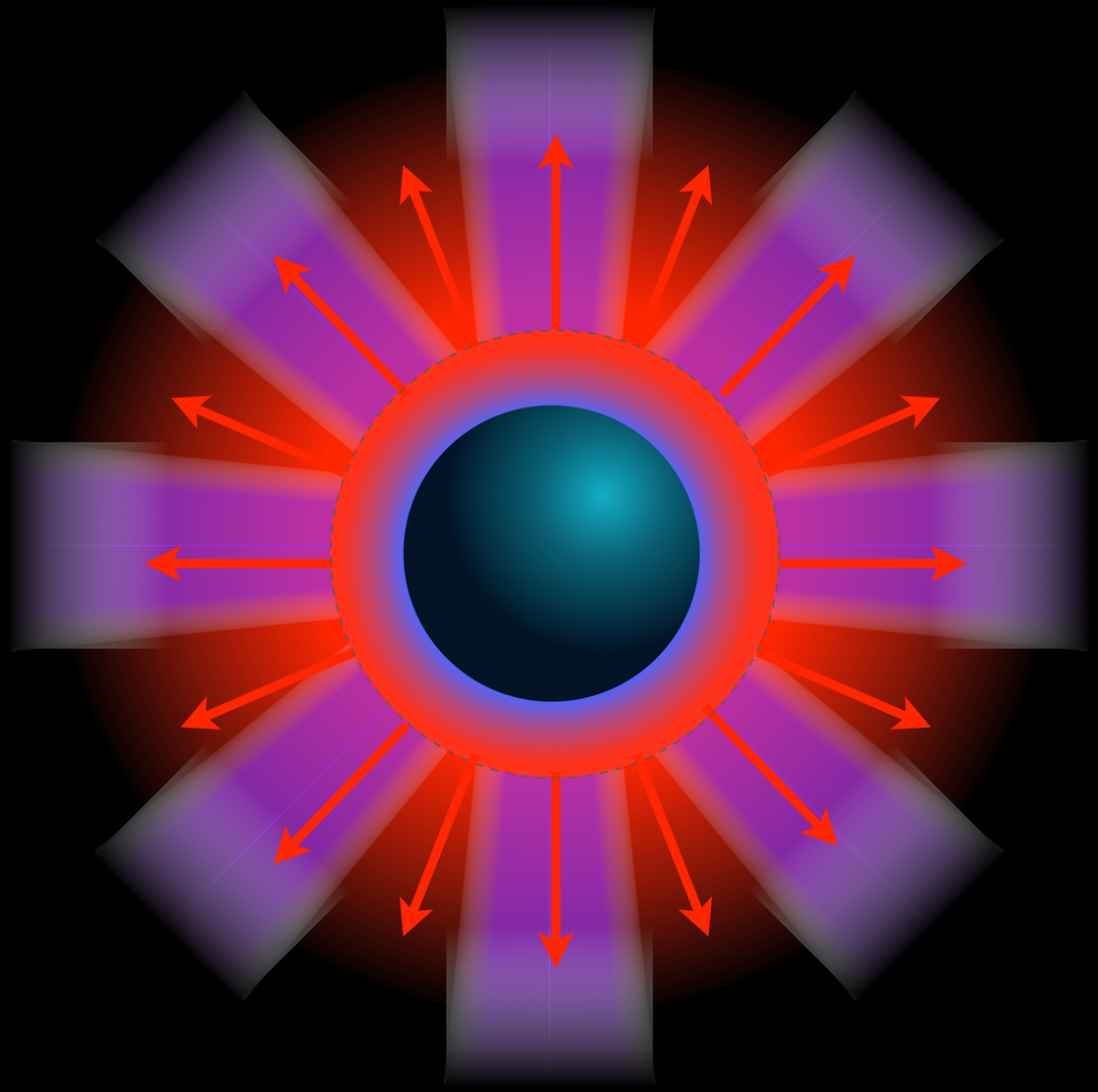

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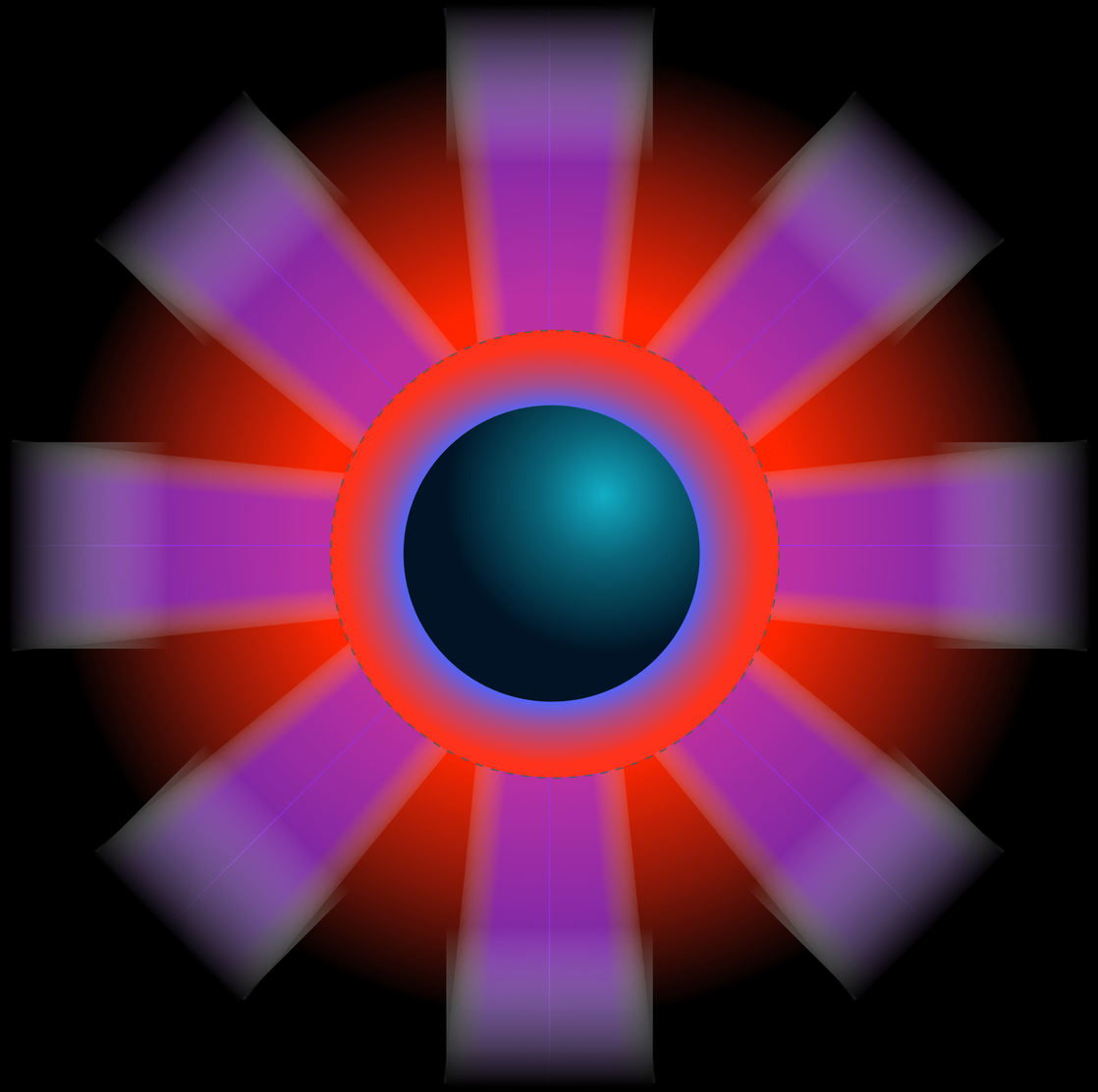

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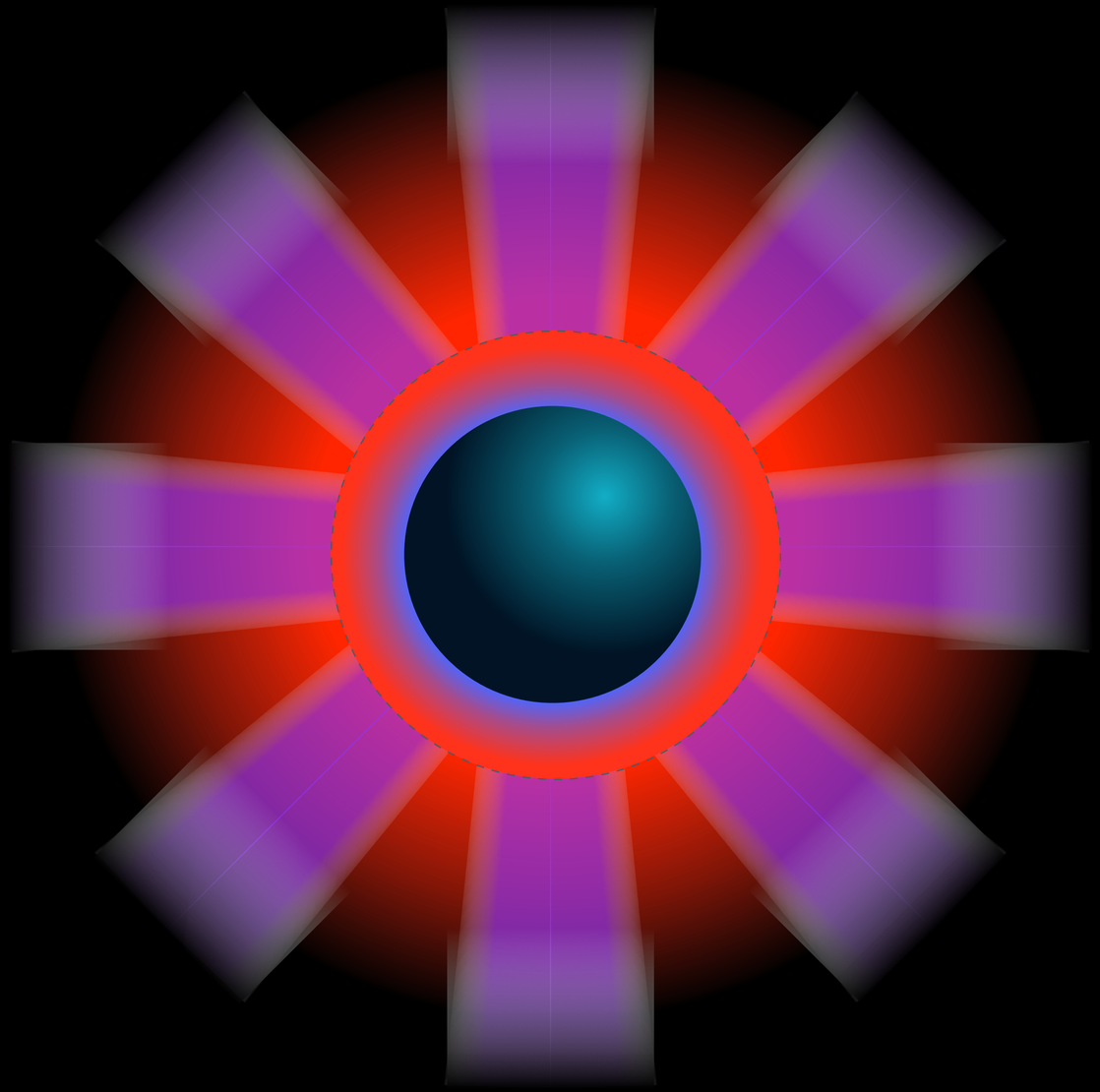

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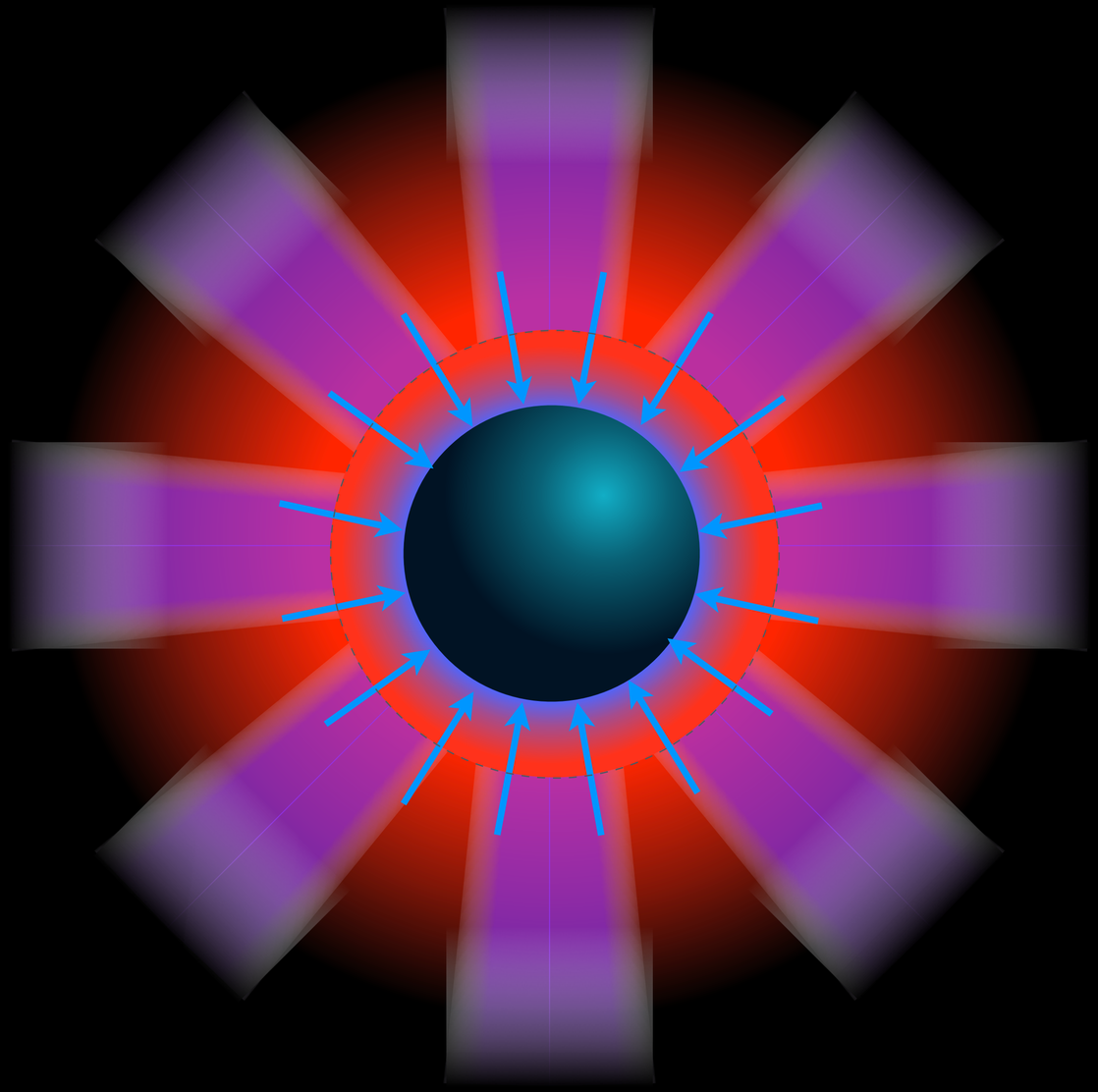

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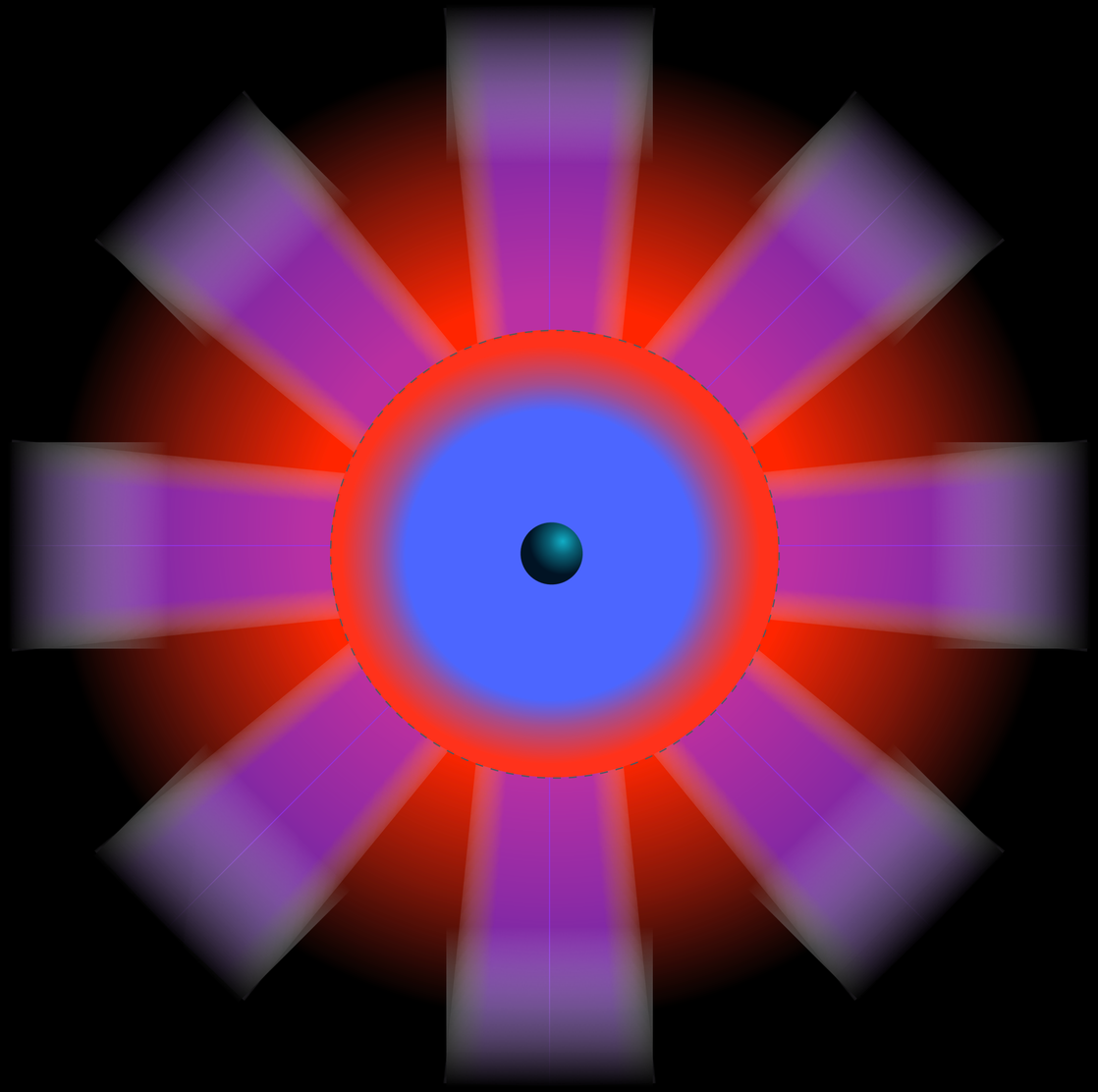

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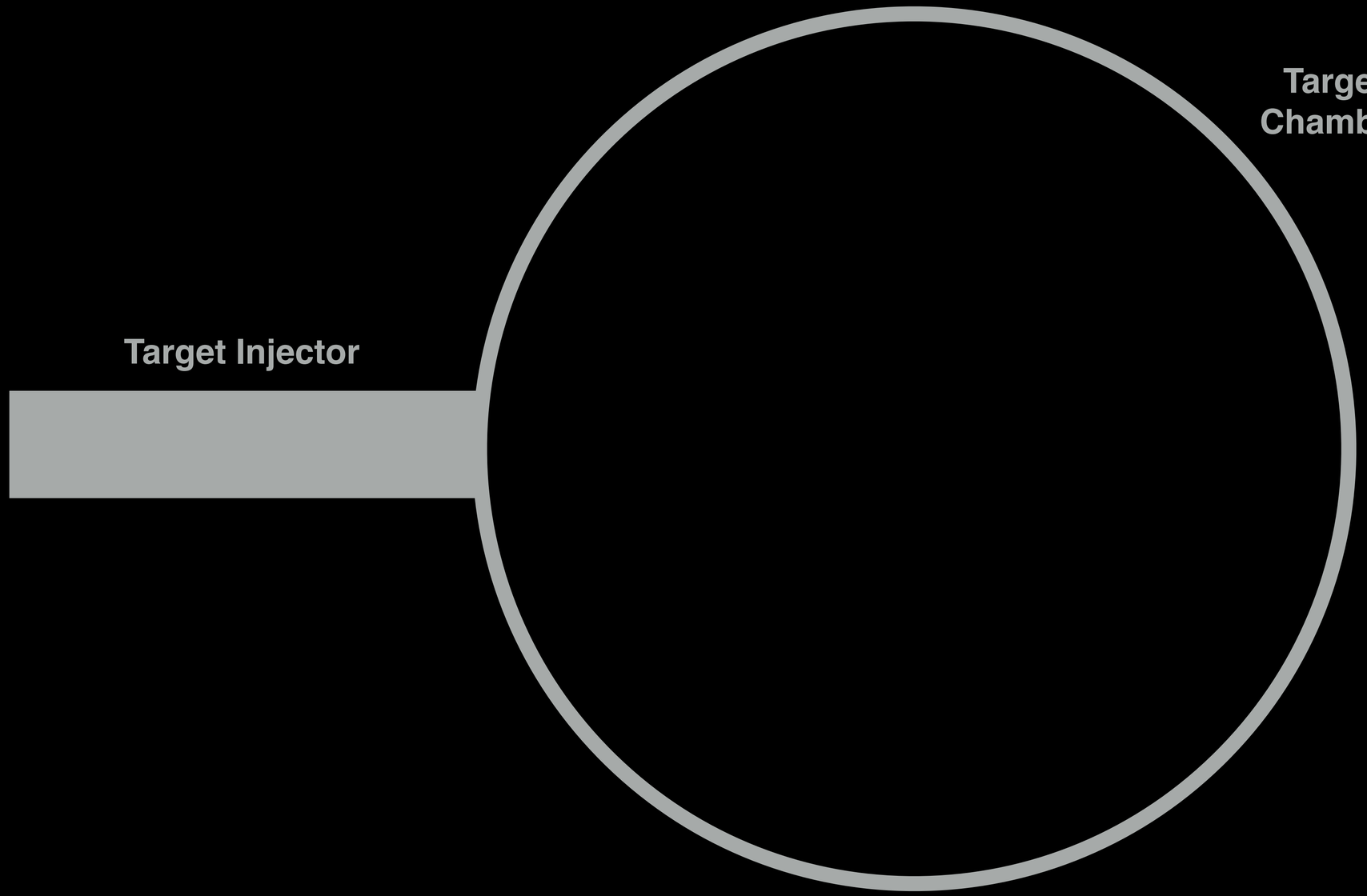

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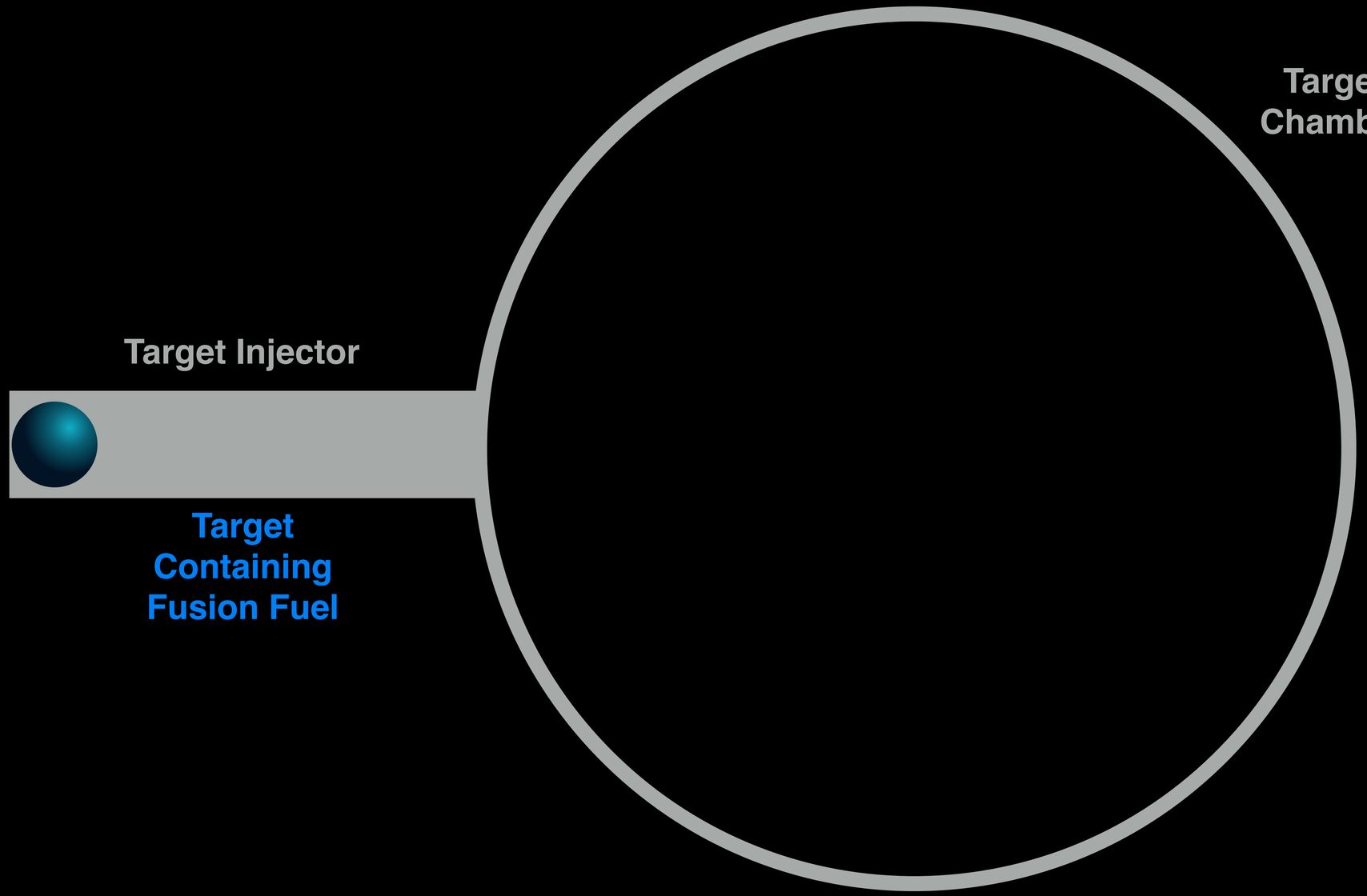

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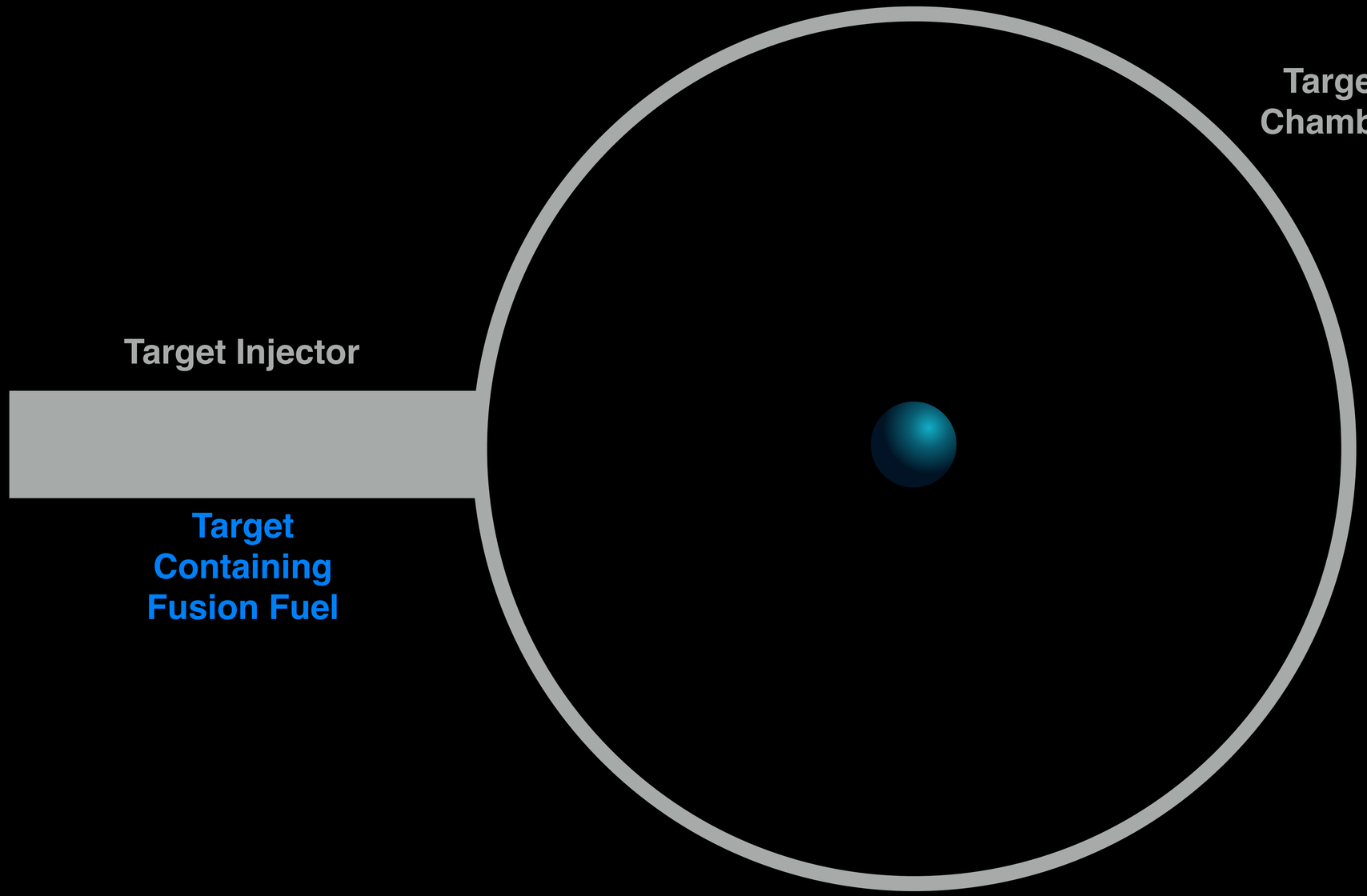

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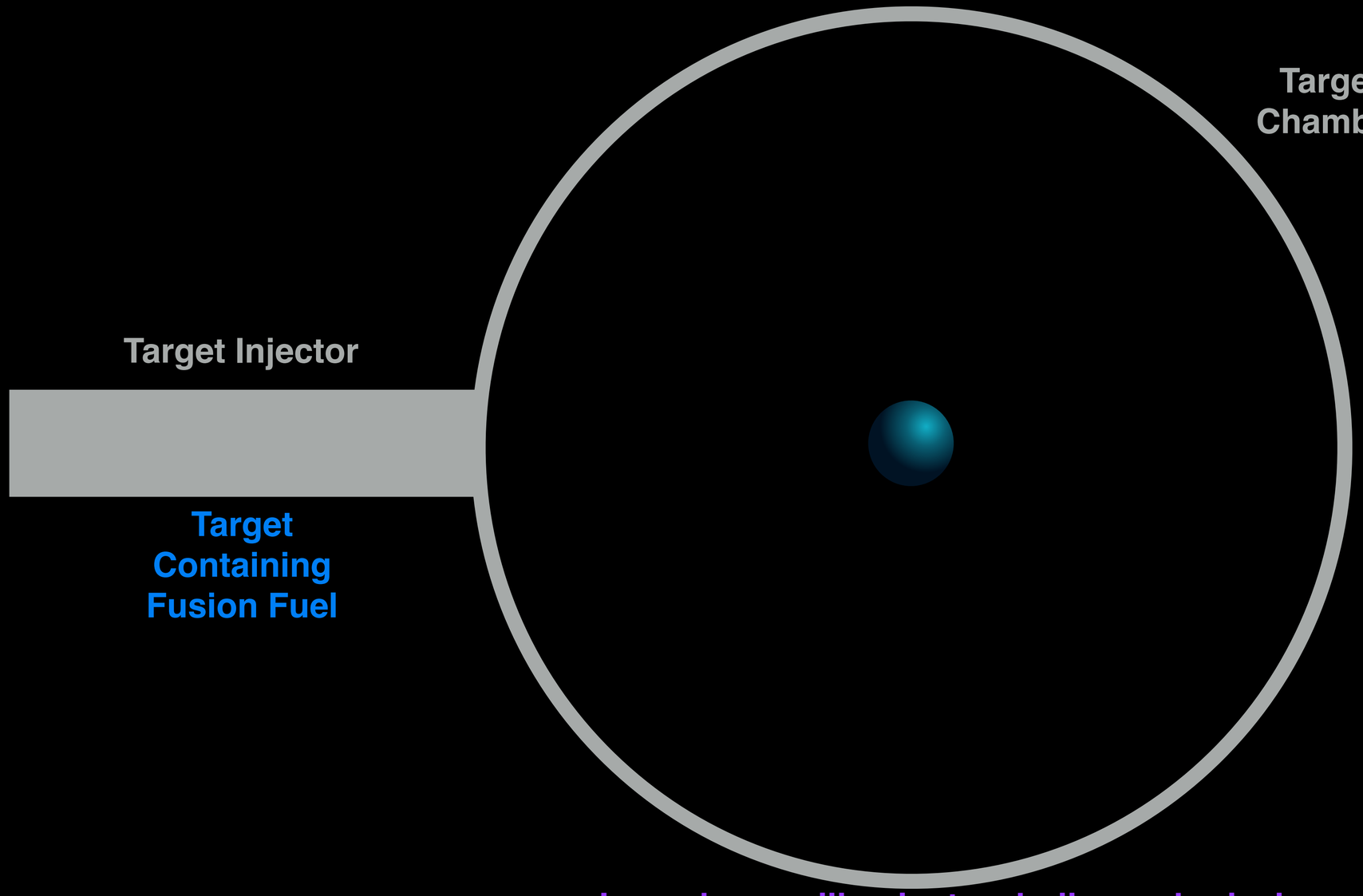

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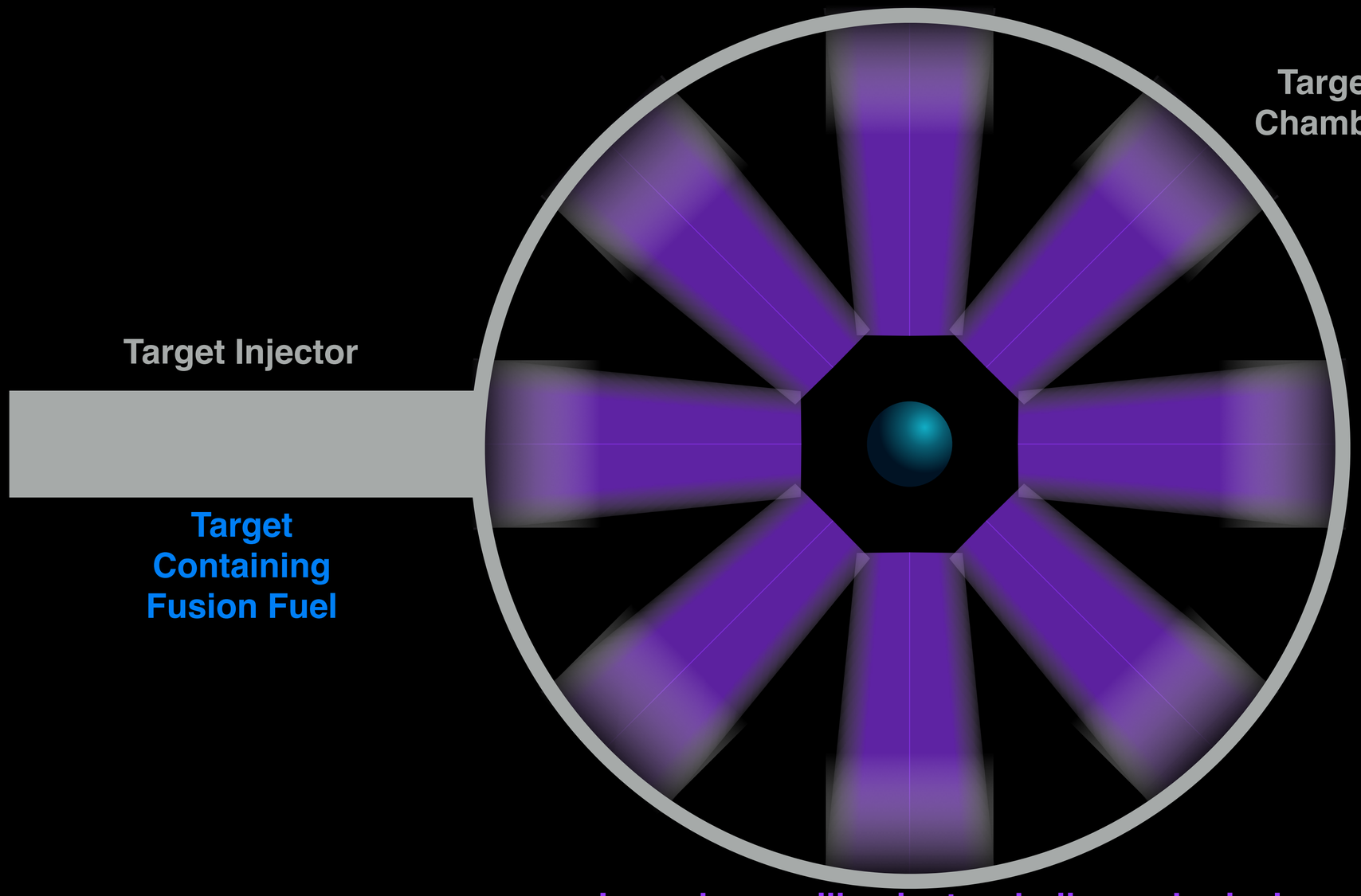

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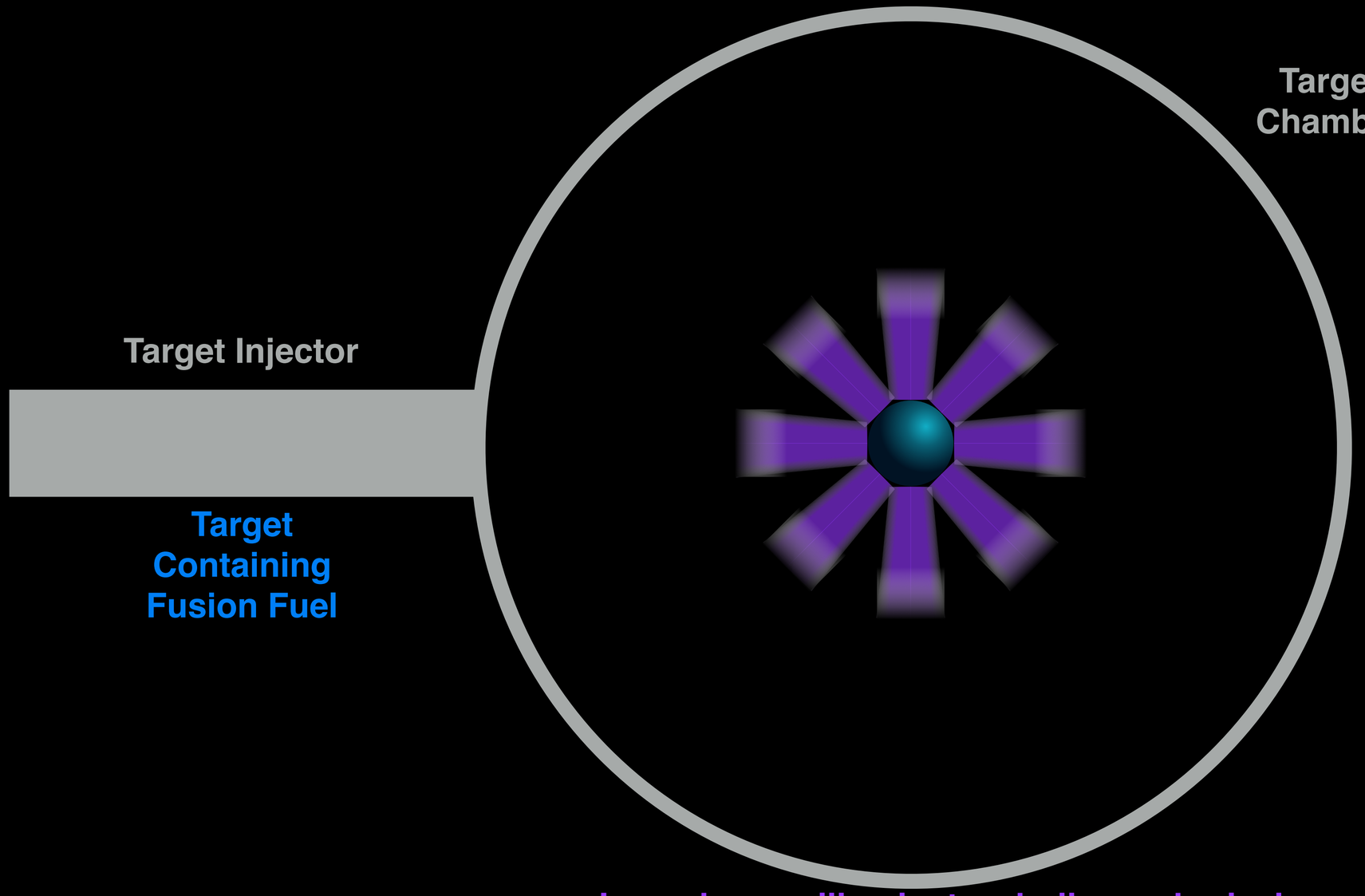

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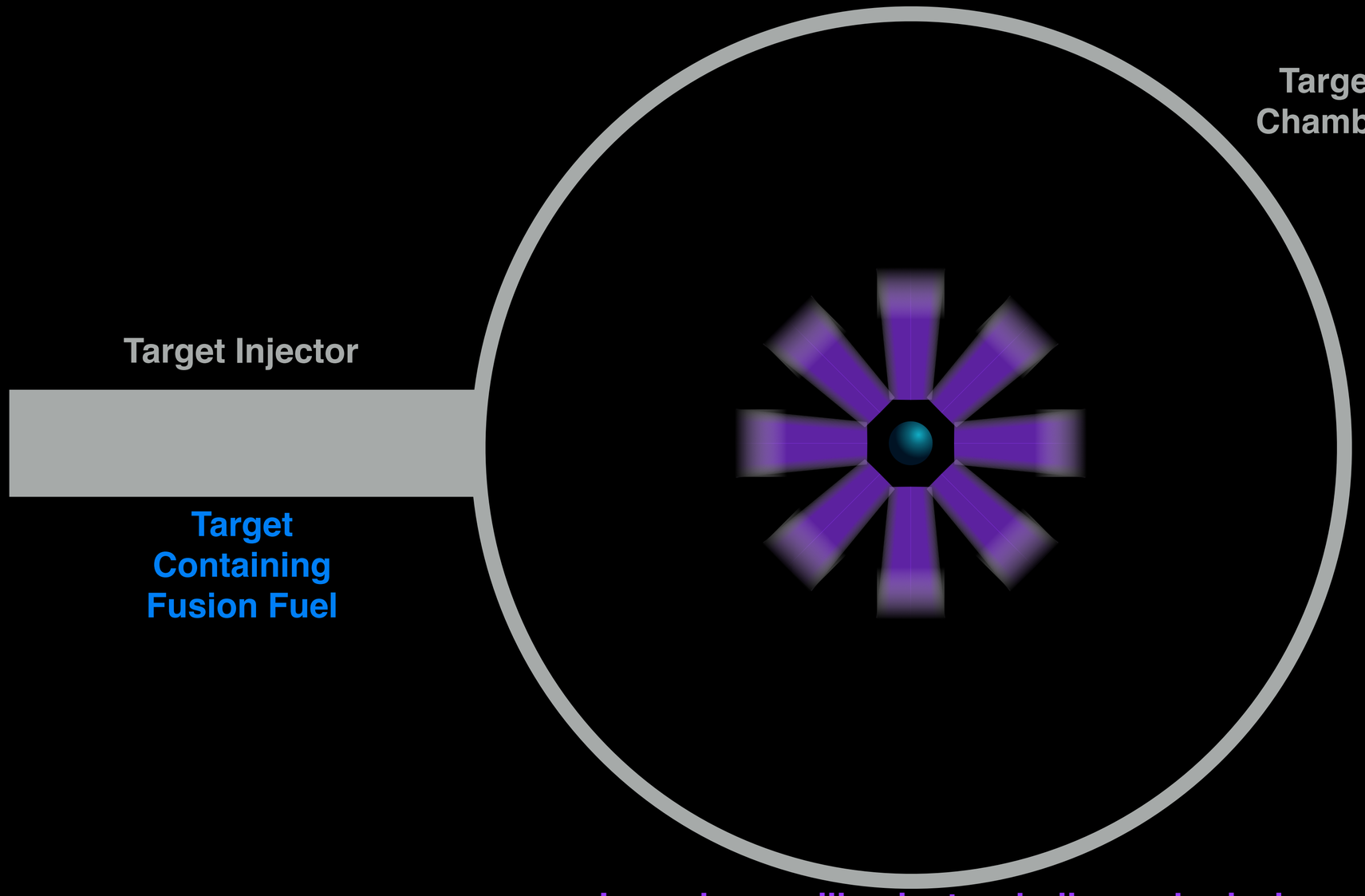

Laser beams illuminate a hollow spherical shell containing the fusion fuel

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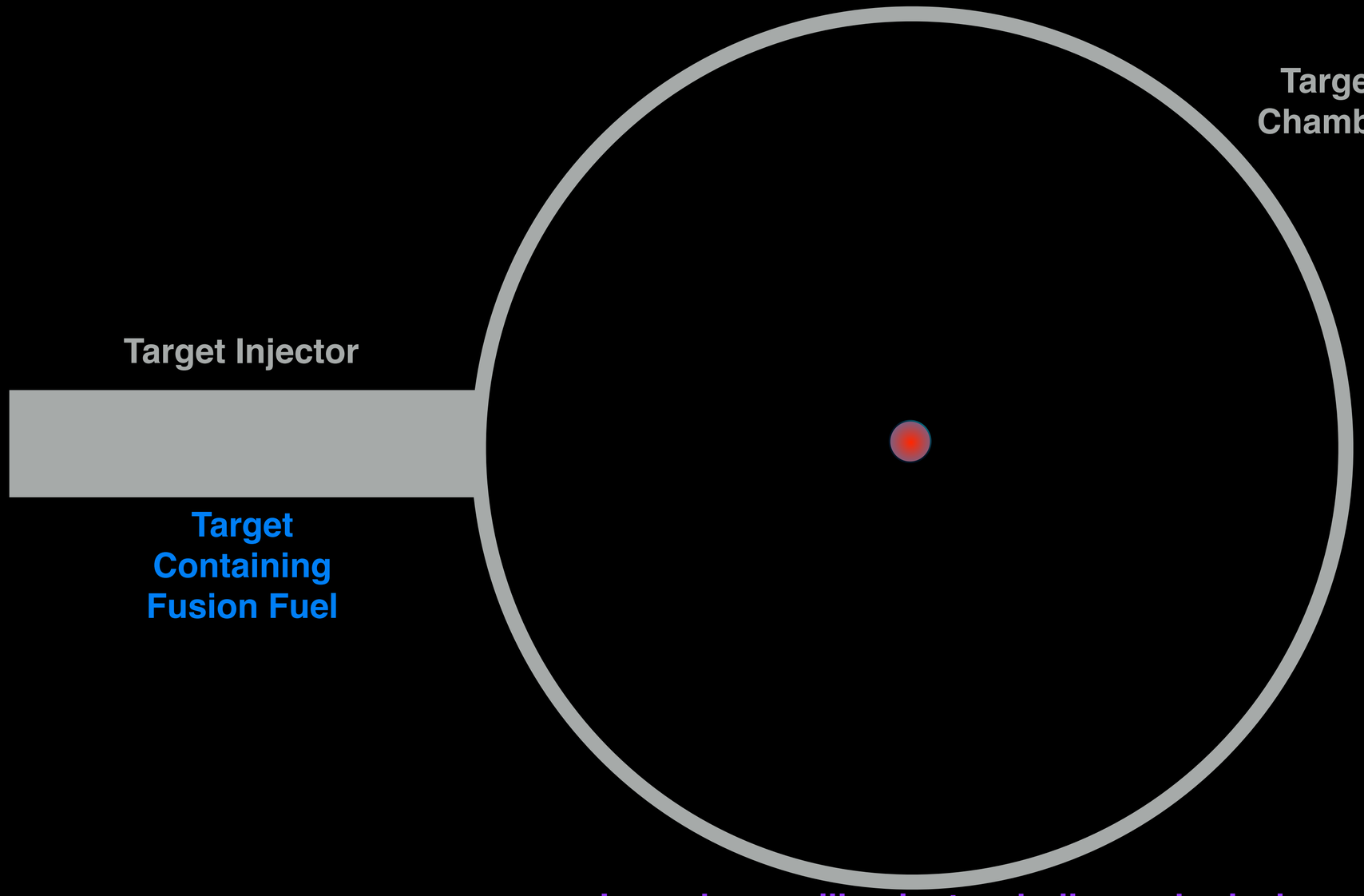

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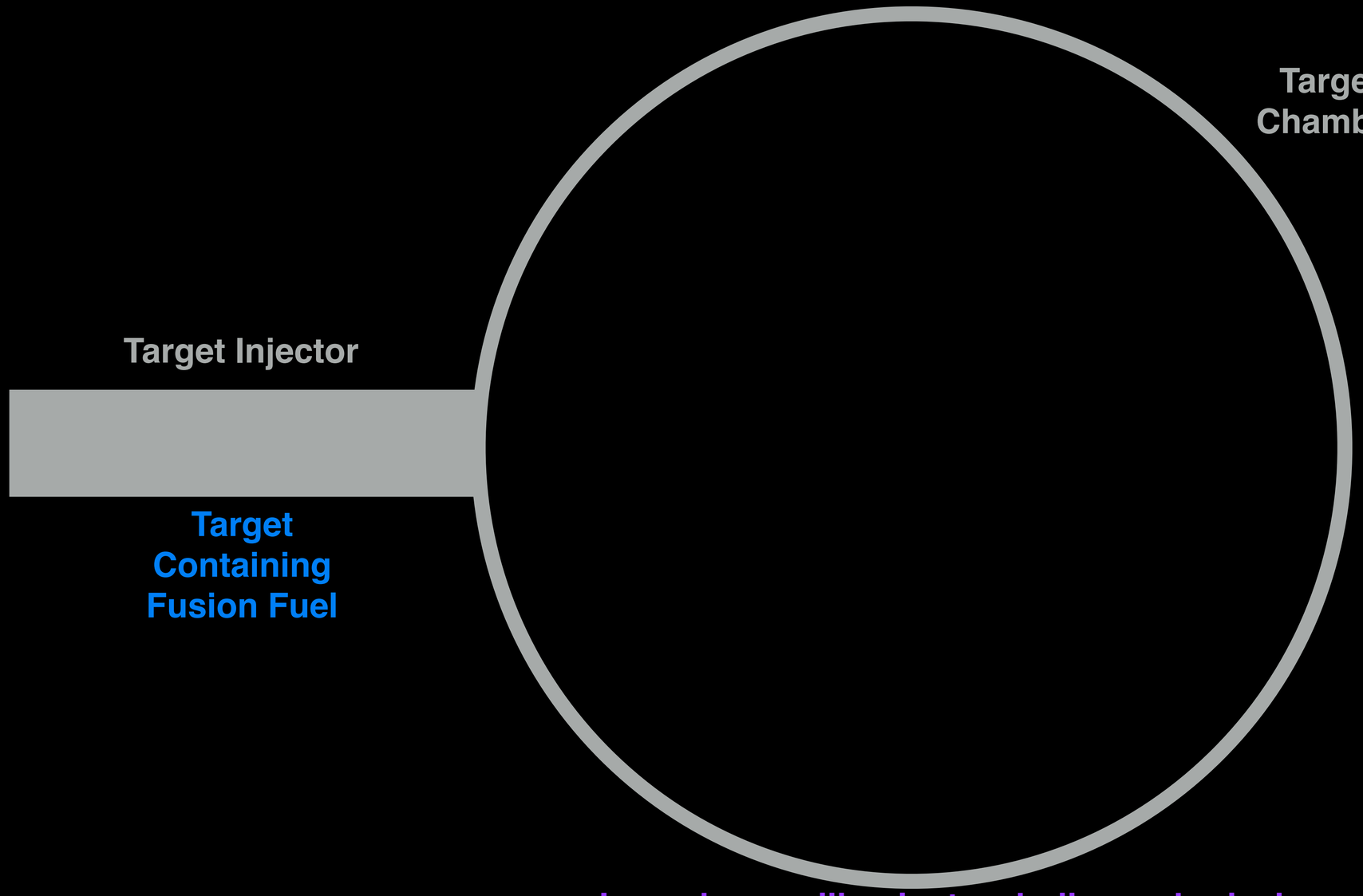

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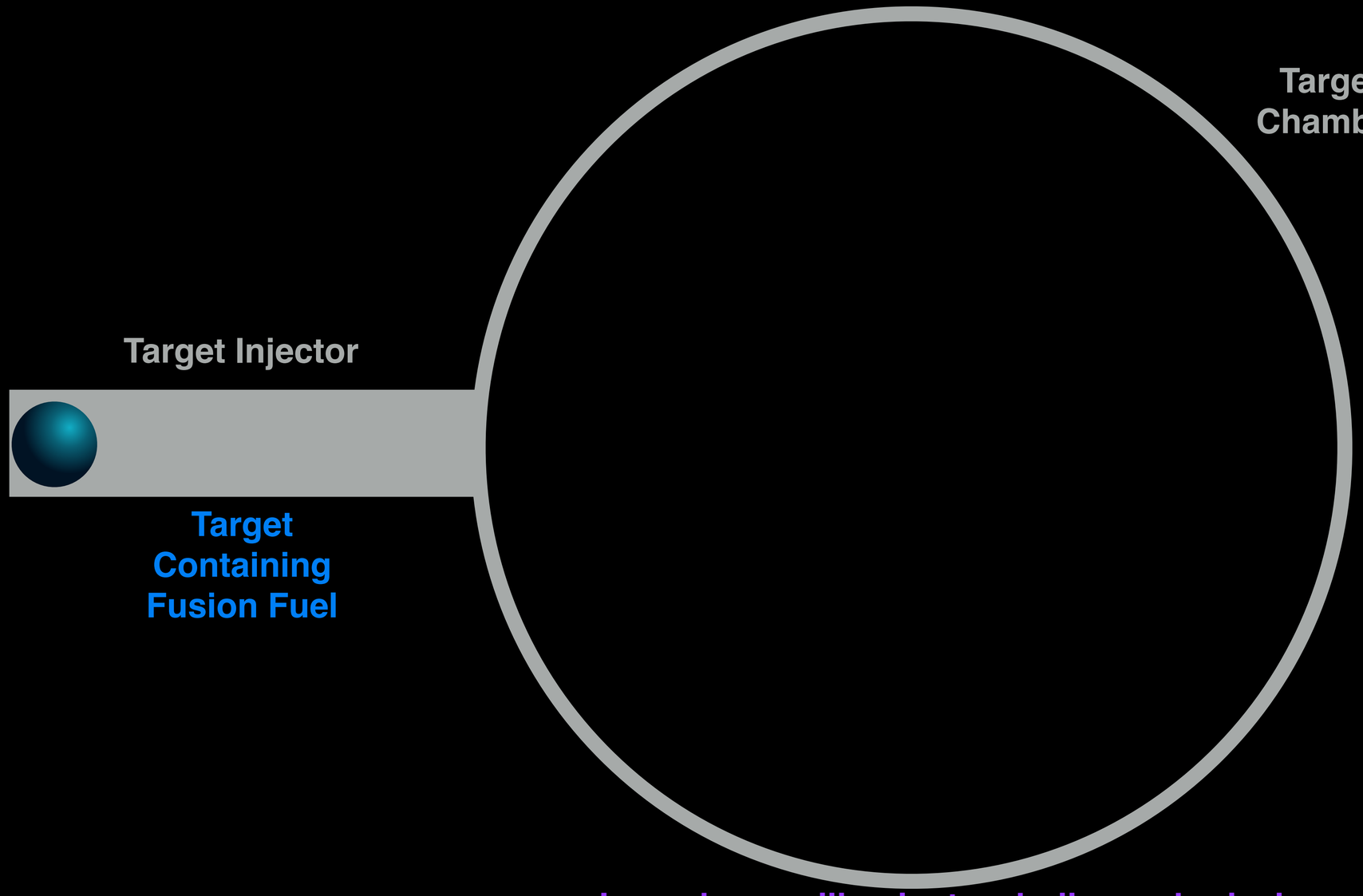

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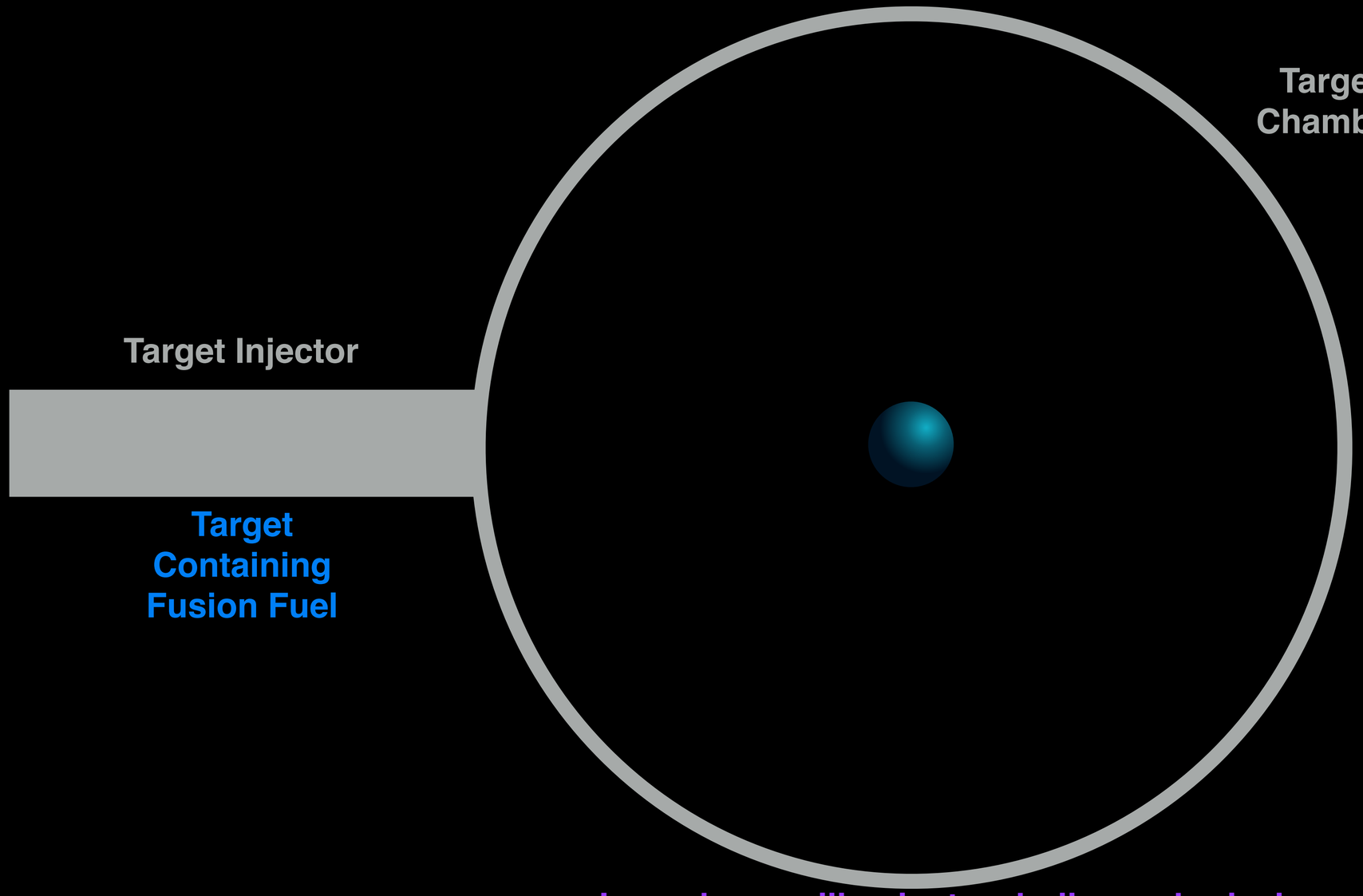

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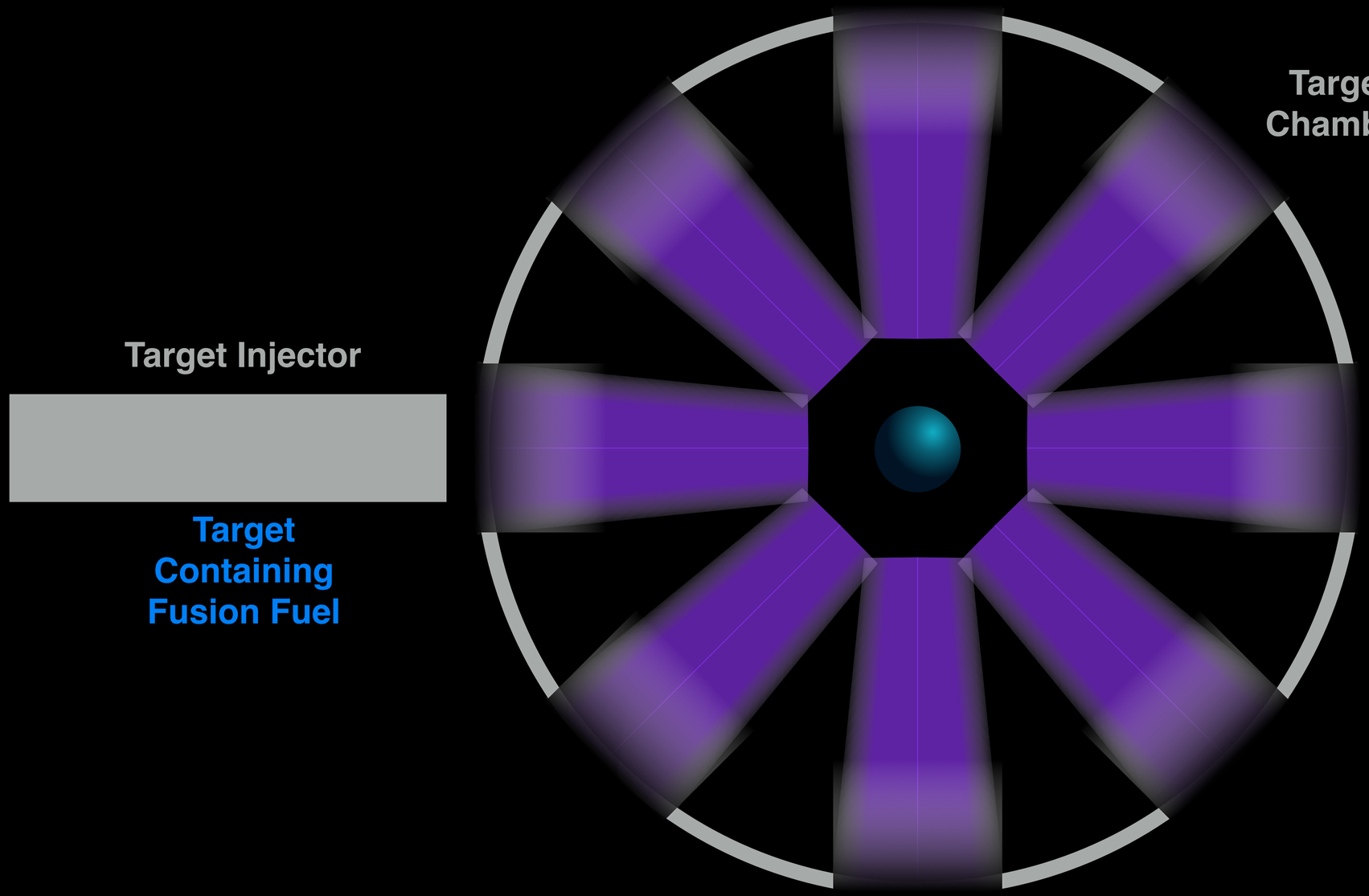

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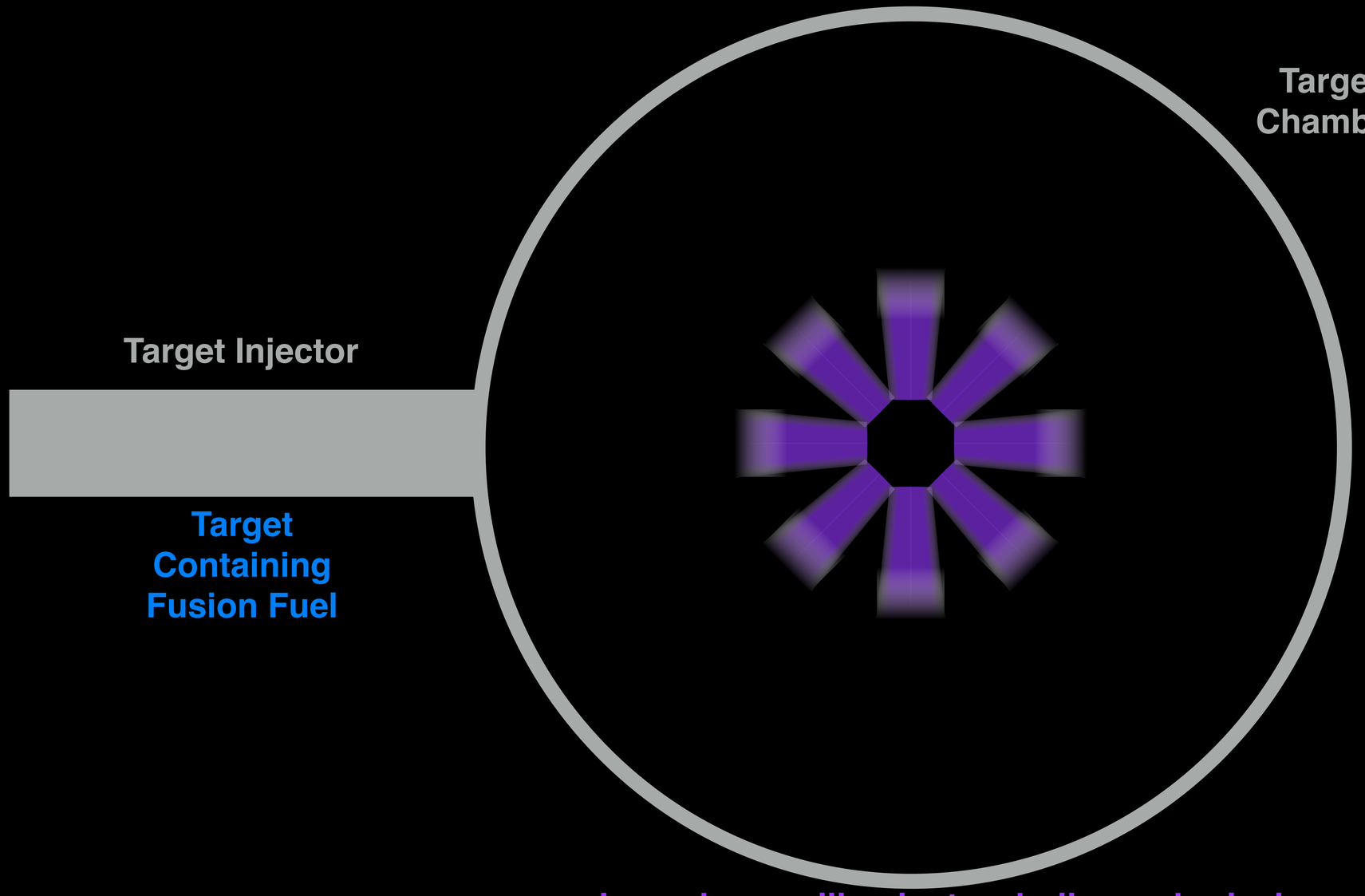

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From scientific experiment to power production

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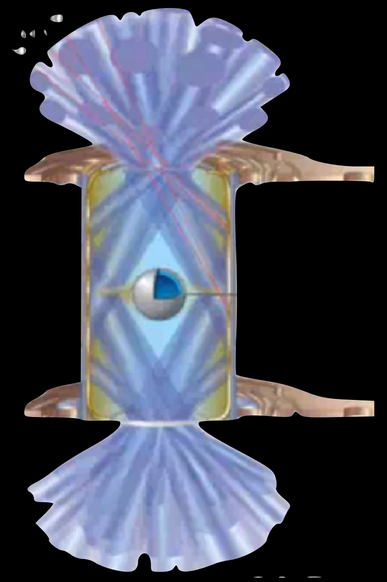
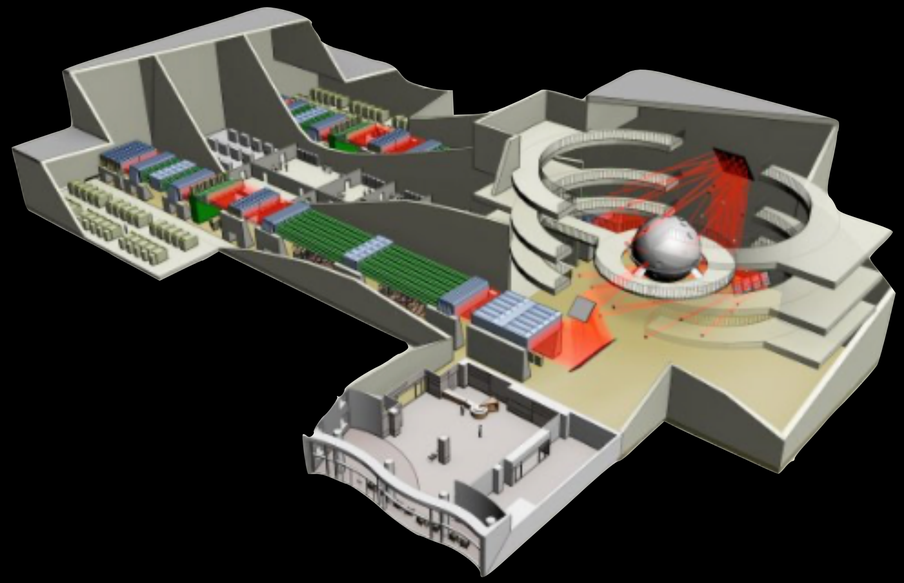


Laser Fusion power-plant



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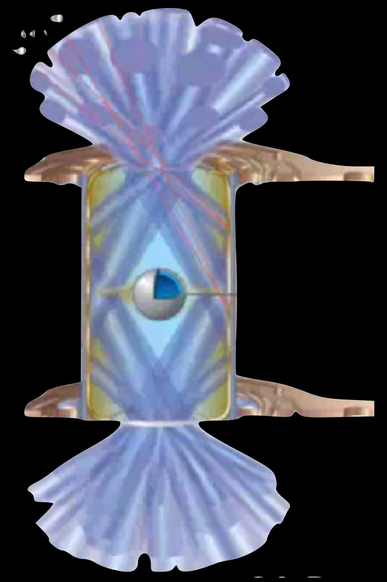

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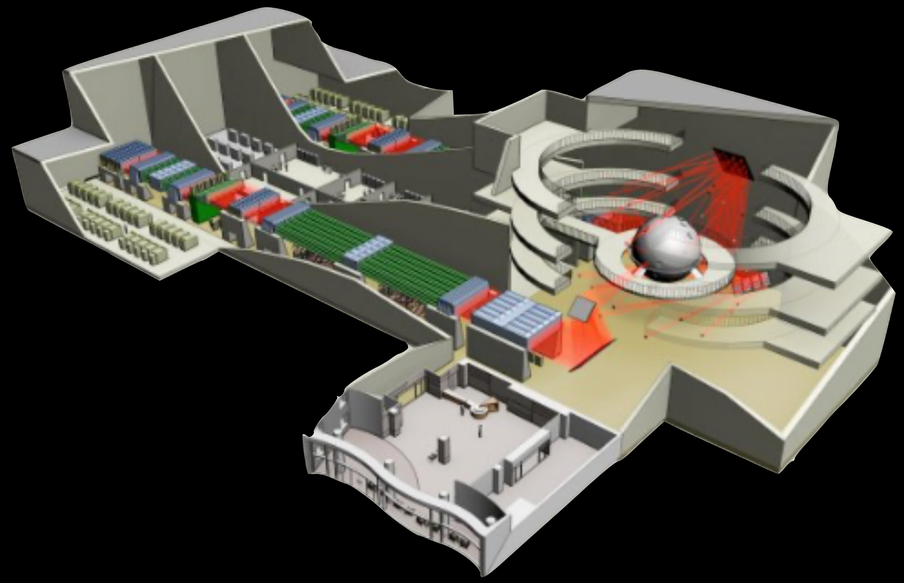

- Laser efficiency:

From scientific experiment to power production

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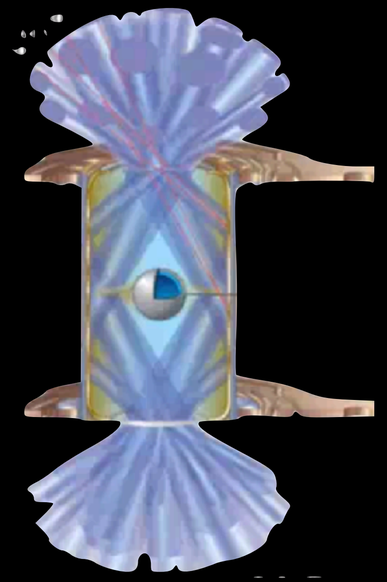

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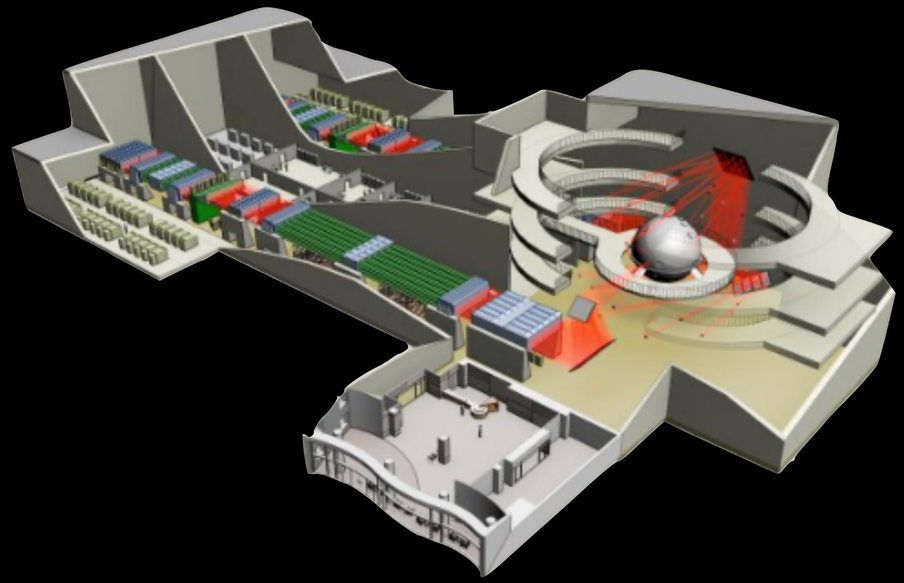

- Laser efficiency: 0.6%

From scientific experiment to power production

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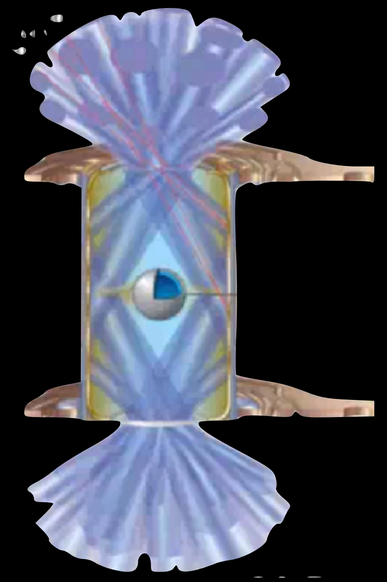

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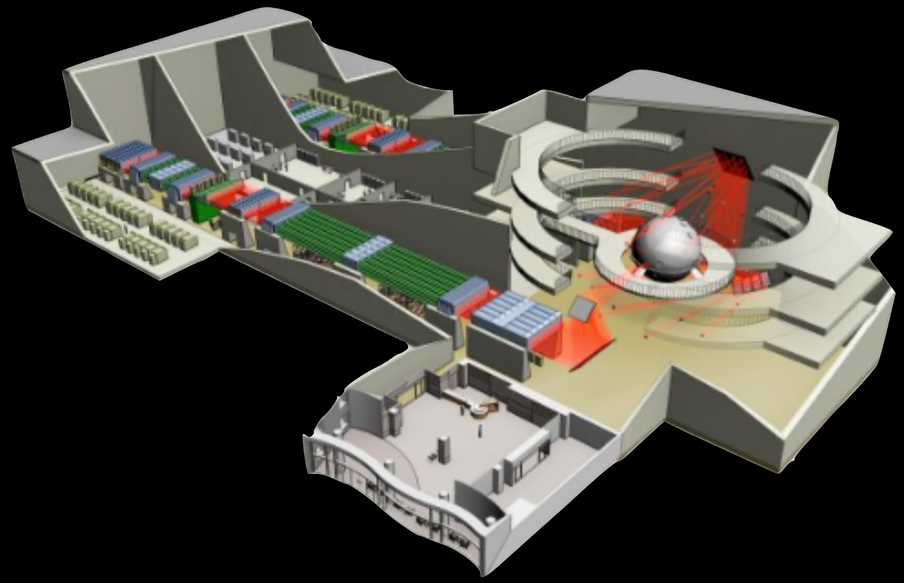
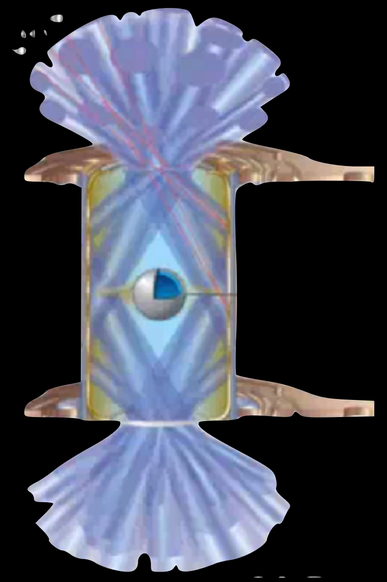


- Laser efficiency: 0.6% ~10%

From scientific experiment to power production

NIF: science



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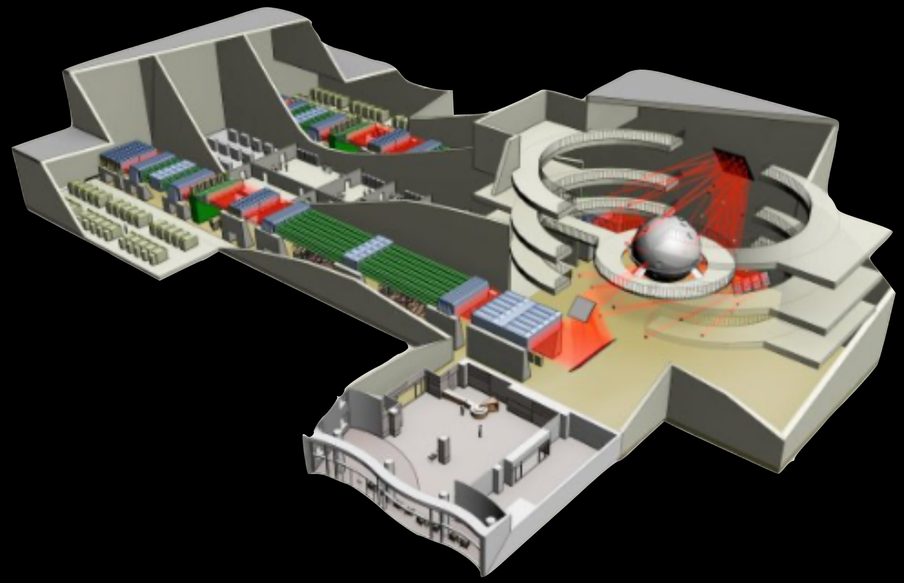
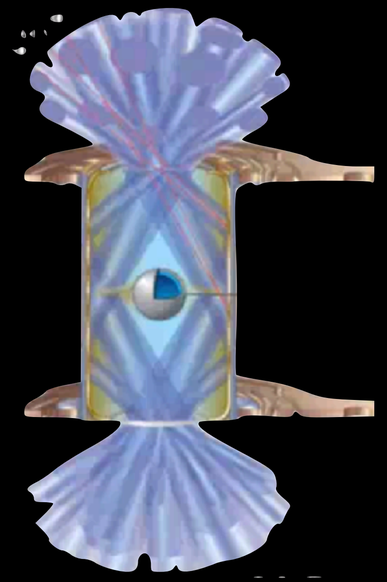


- Laser efficiency: 0.6% ~10%
- Shot frequency:

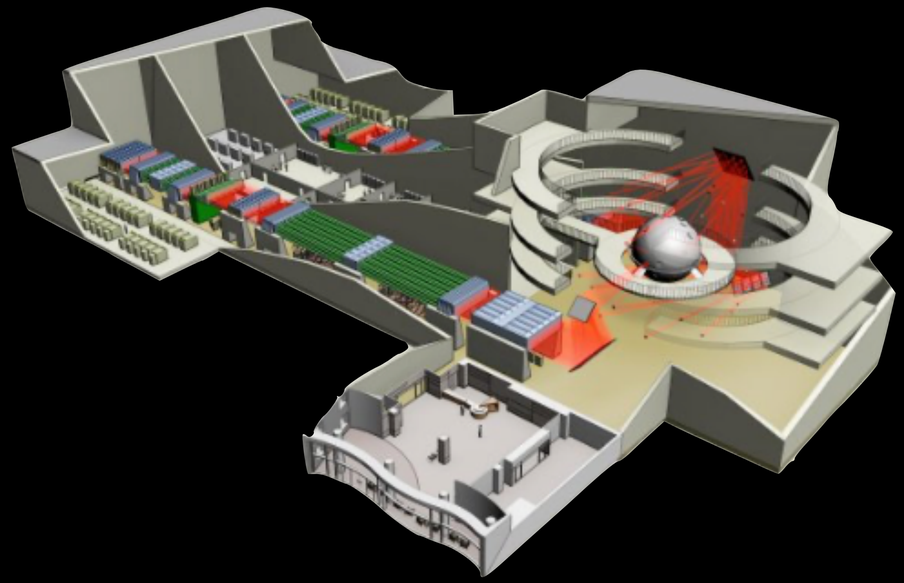
From scientific experiment to power production

NIF: science



- Laser efficiency: 0.6%
- Shot frequency: 3 per day

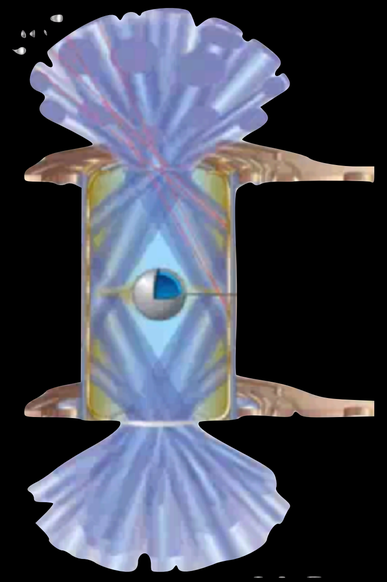
Laser Fusion power-plant



~10%

From scientific experiment to power production

NIF: science



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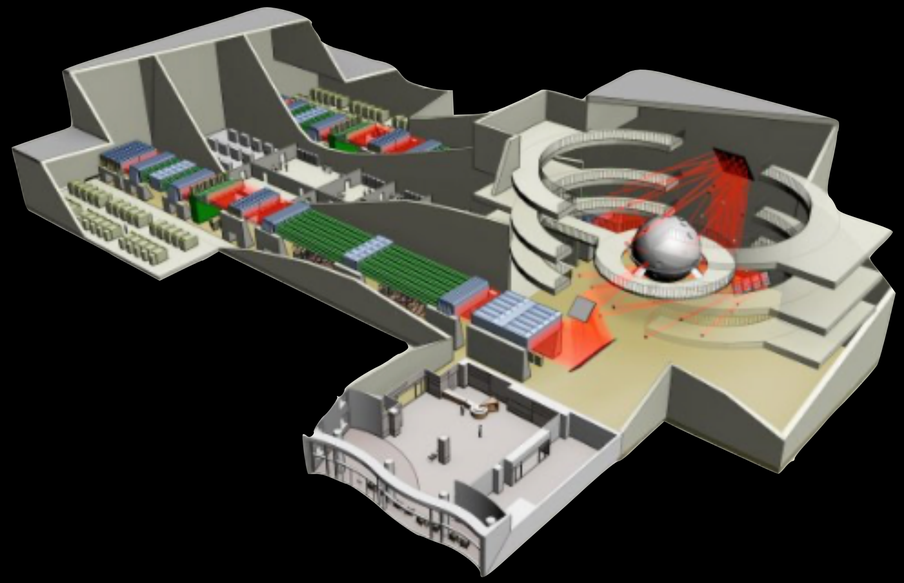

~10%

10 per second

From scientific experiment to power production

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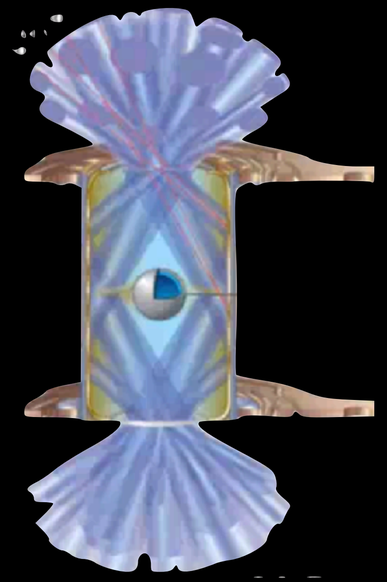
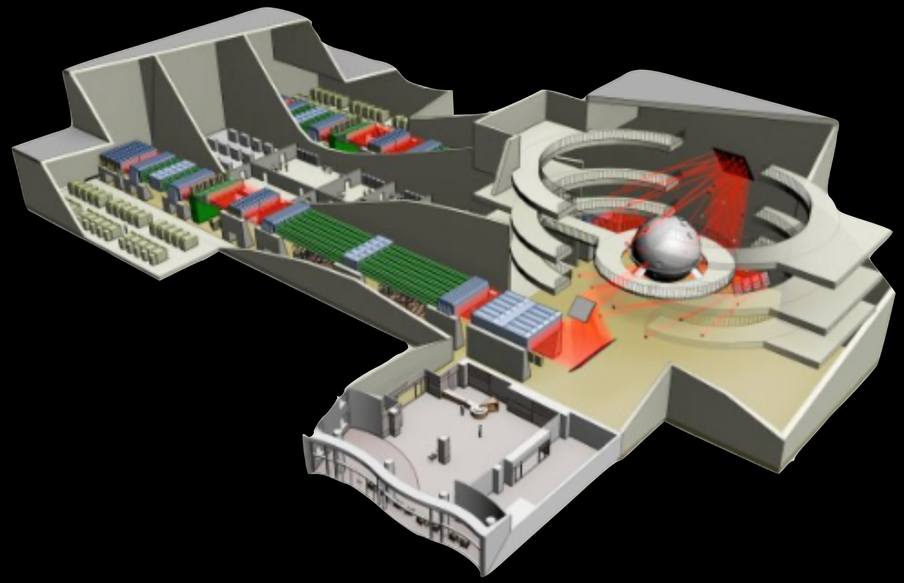


- Laser efficiency: 0.6%
- Shot frequency: 3 per day
- Cost per target:

Laser Fusion power-plant



~10%

10 per second

From scientific experiment to power production

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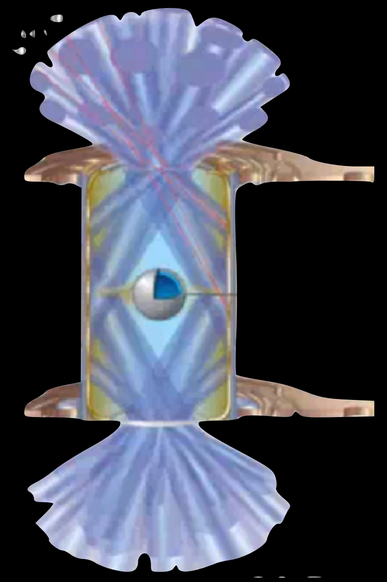
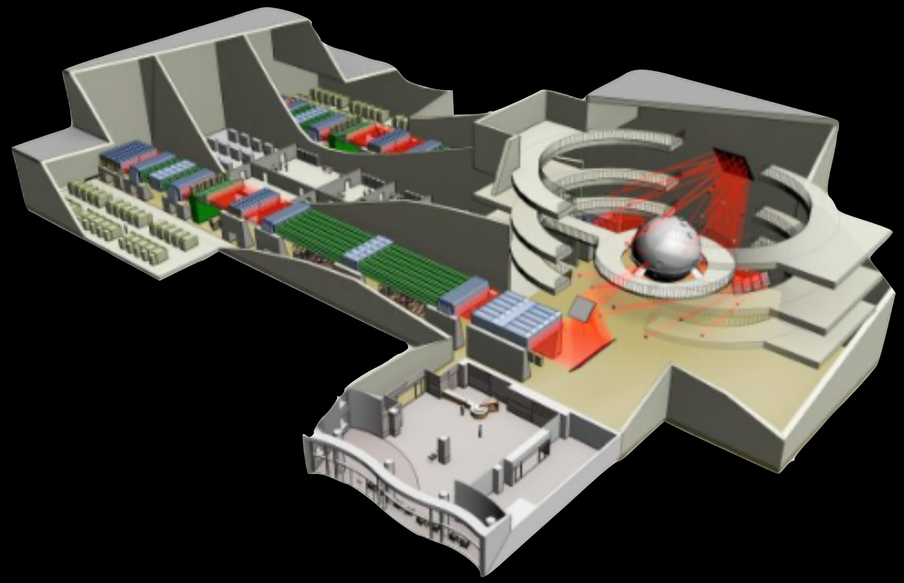


- Laser efficiency: 0.6%
- Shot frequency: 3 per day
- Cost per target: £100,000

Laser Fusion power-plant

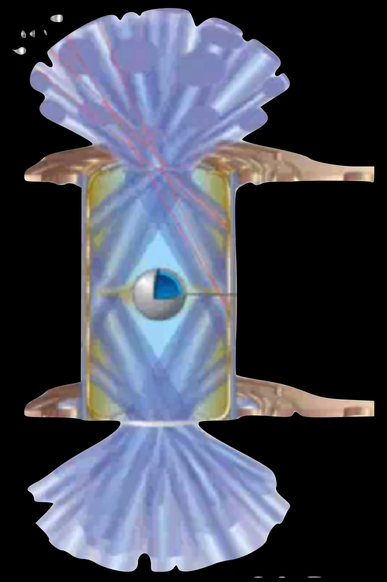


~10%

10 per second

From scientific experiment to power production

NIF: science



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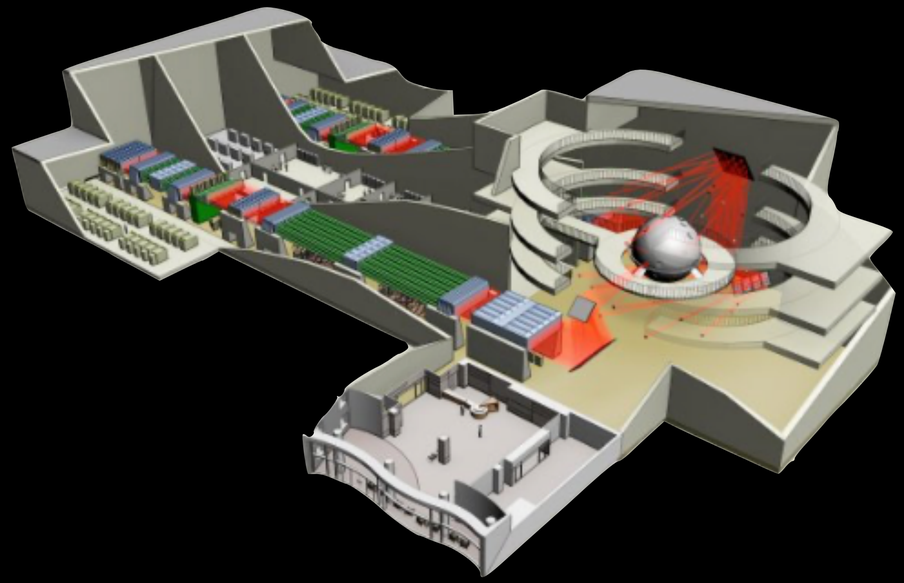

• Laser efficiency:	0.6%	~10%
• Shot frequency:	3 per day	10 per second
• Cost per target:	£100,000	50p

From scientific experiment to power production

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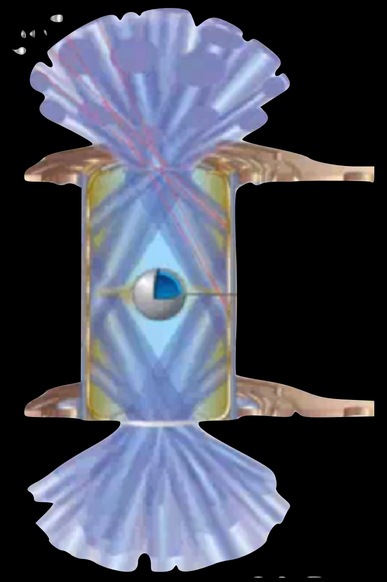

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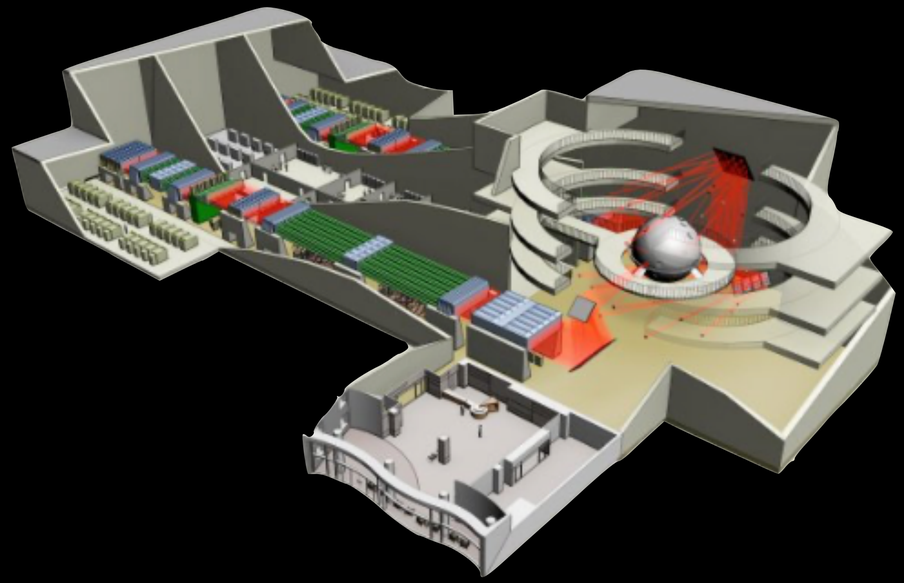
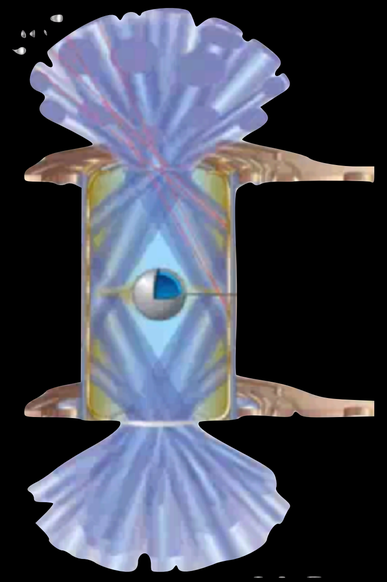


• Laser efficiency:	0.6%	~10%
• Shot frequency:	3 per day	10 per second
• Cost per target:	£100,000	50p
• Fusion ‘gain’:		

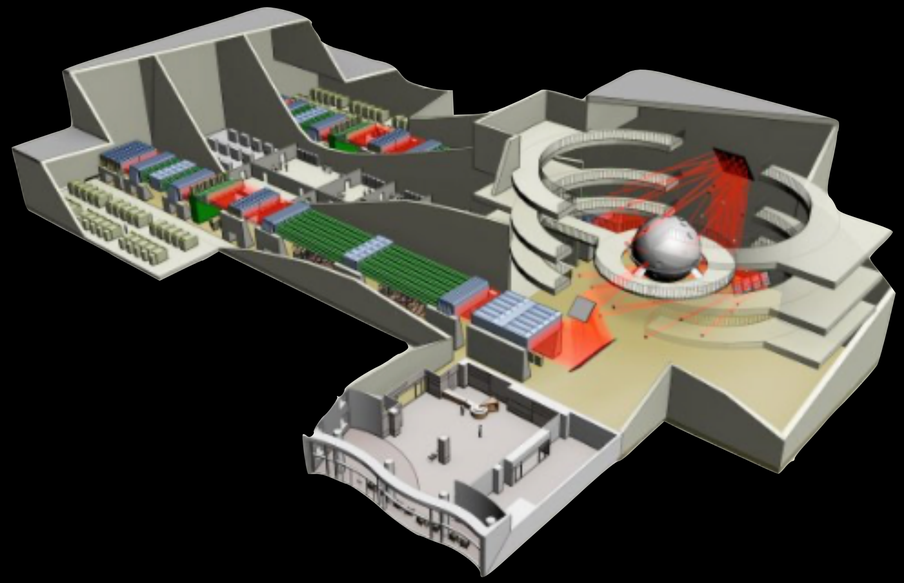
From scientific experiment to power production

NIF: science



- Laser efficiency: 0.6%
- Shot frequency: 3 per day
- Cost per target: £100,000
- Fusion ‘gain’: 1.5

Laser Fusion power-plant



~10%

10 per second

50p

From scientific experiment to power production

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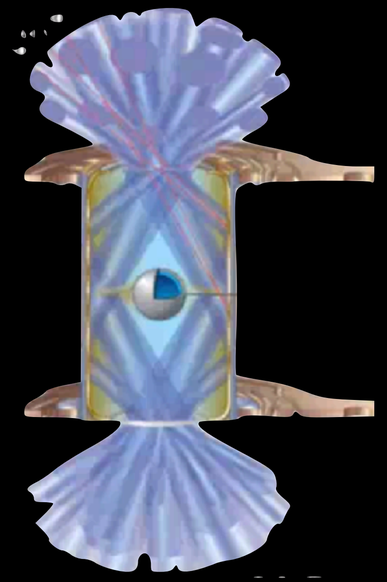

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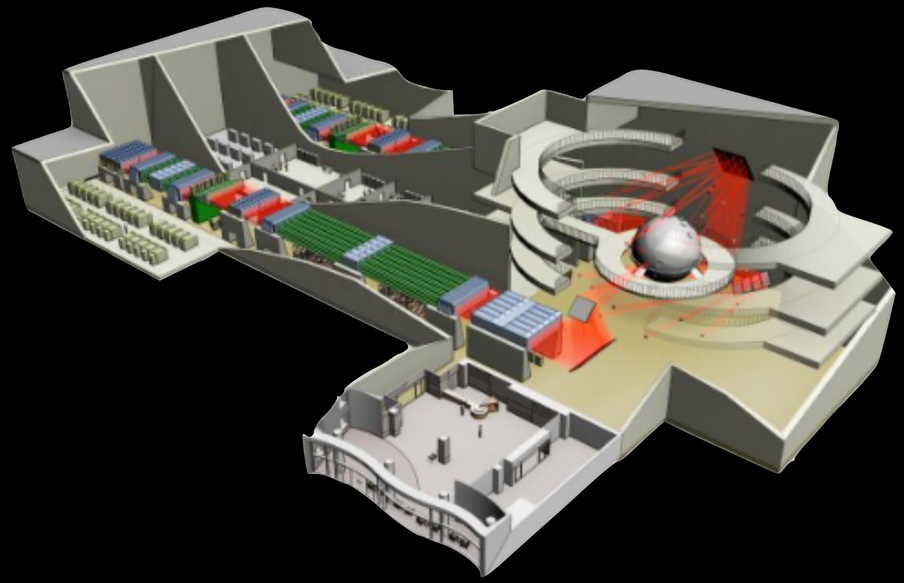
- Fusion ‘gain’: 1.5

Laser Fusion power-plant



~10%

10 per second

50p

> 50

From scientific experiment to power production

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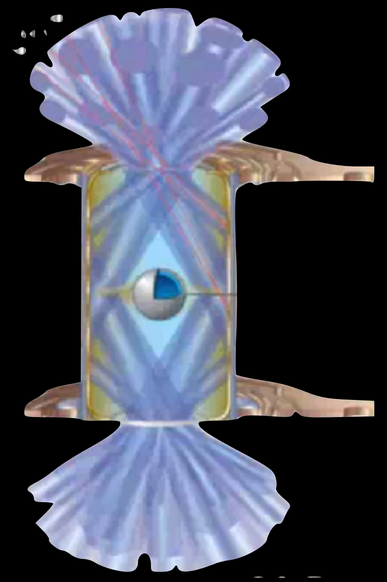
Laser Fusion power-plant



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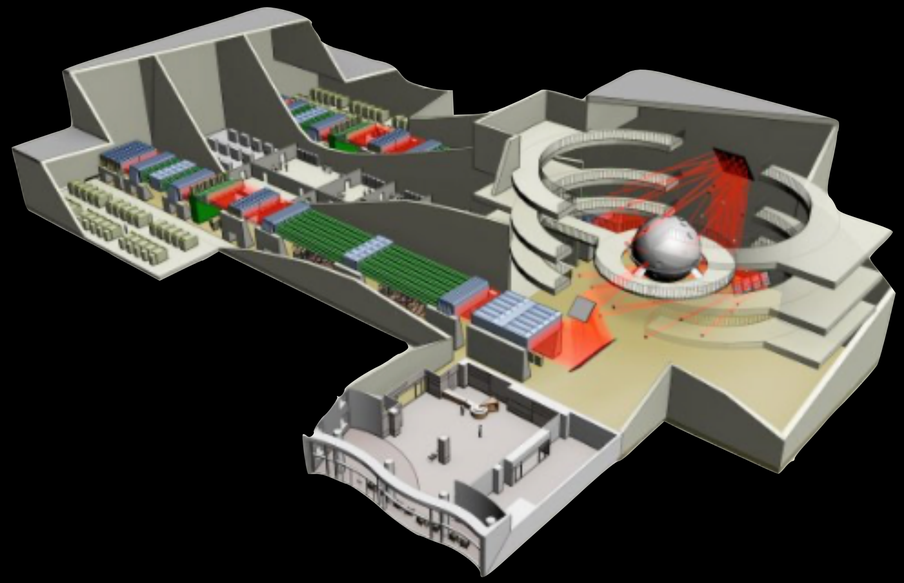

• Laser efficiency:	0.6%	~10%
• Shot frequency:	3 per day	10 per second
• Cost per target:	£100,000	50p
• Fusion ‘gain’:	1.5	> 50

The UK’s Leading Role in Developing Laser Fusion

*Central Laser Facility, STFC Rutherford Appleton Laboratory, Harwell

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  - Pan-European Laser Fusion project led by the UK’s CLF*

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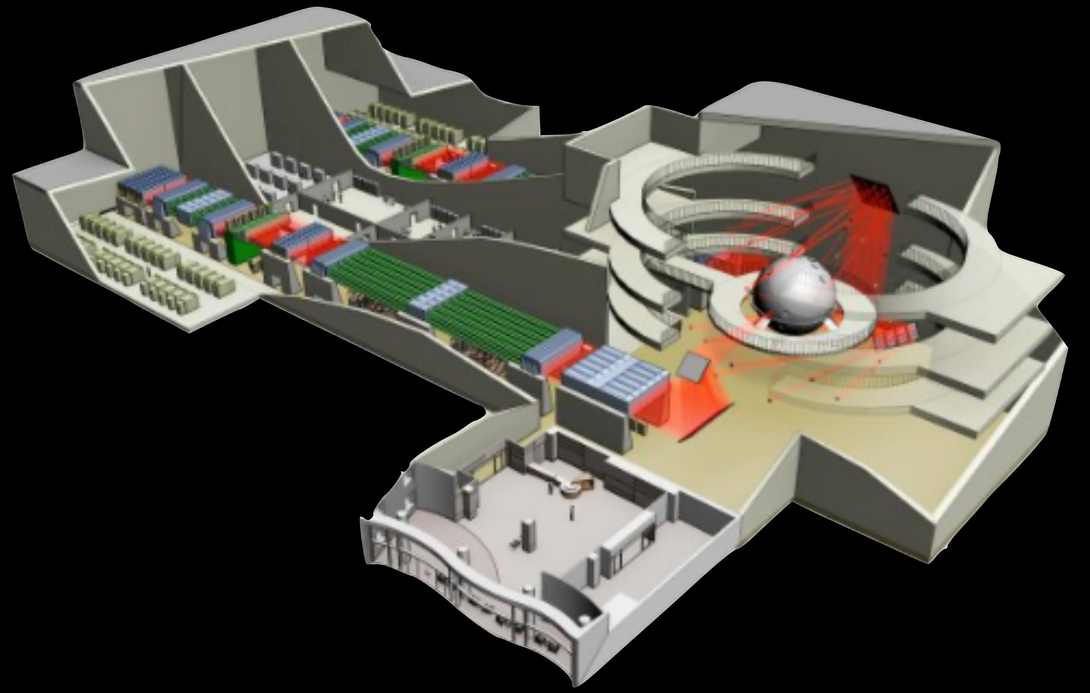

HiPER conceptual design

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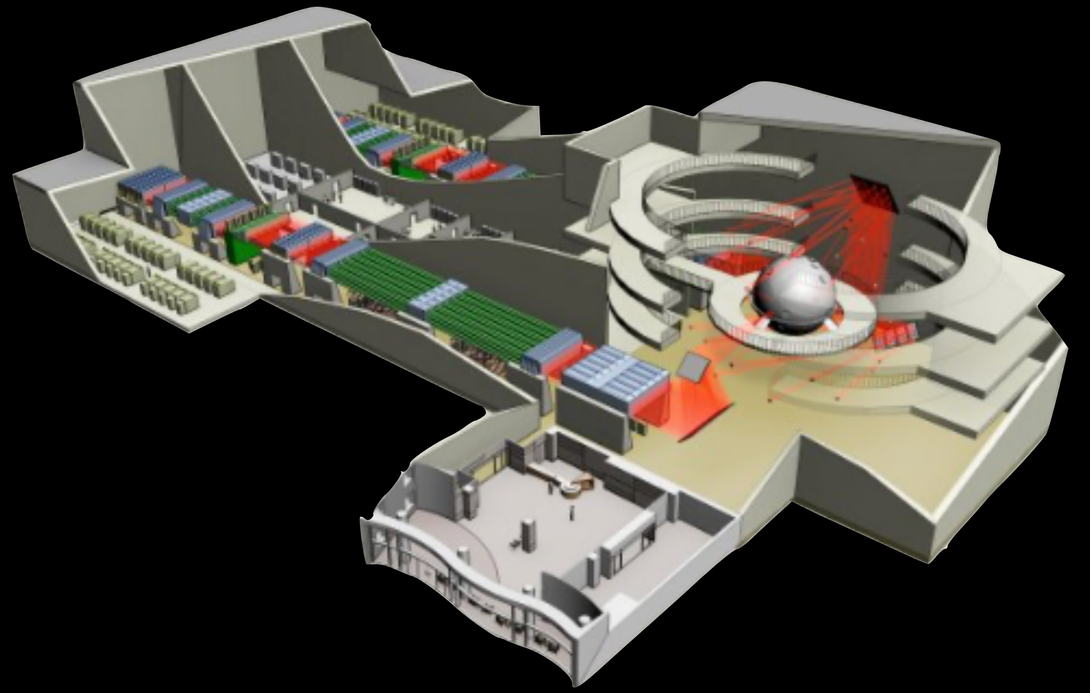
  - Ran 2007-2013: Mothballed



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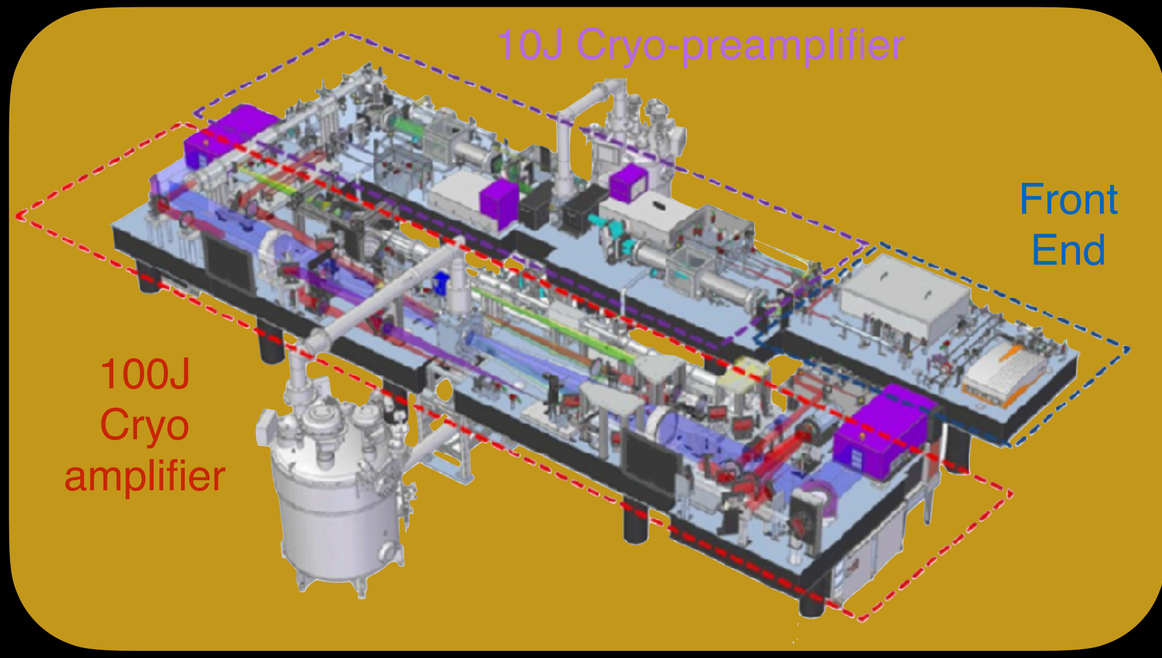

CLF's 100J, 10Hz, Diode-pumped 'DiPOLE' laser

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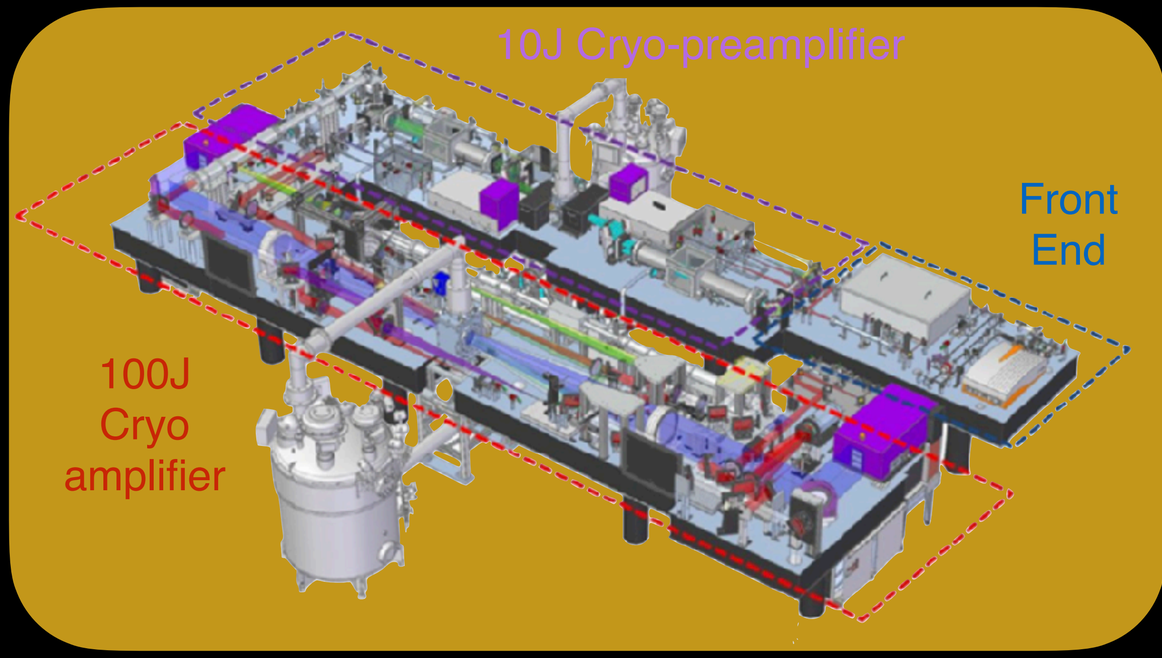

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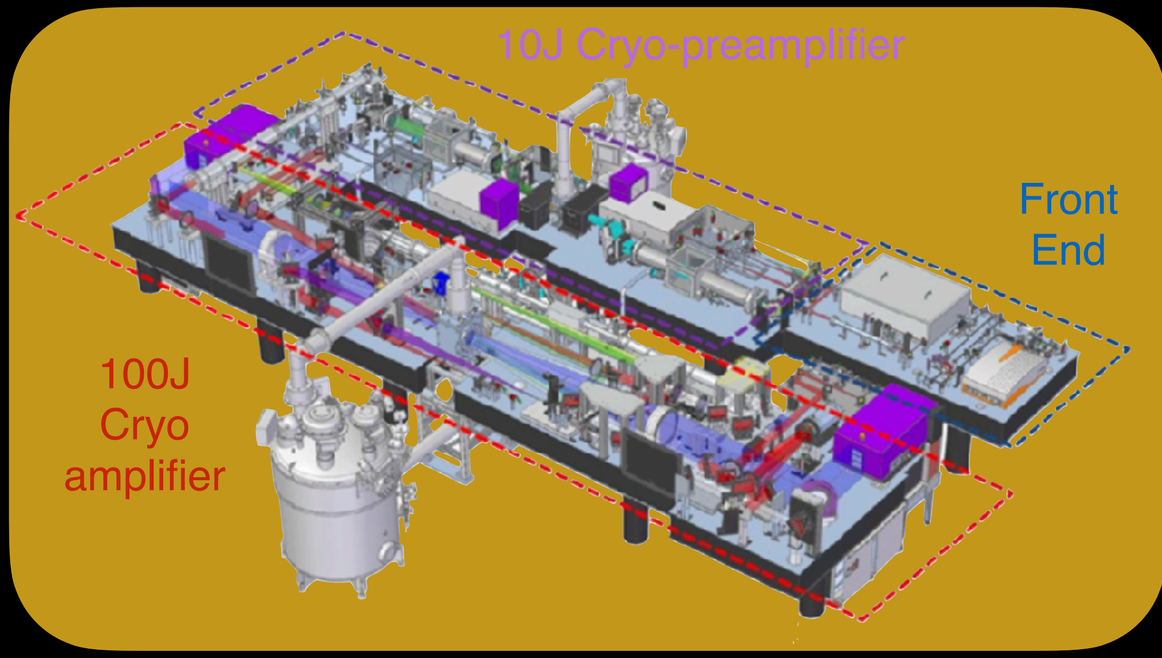

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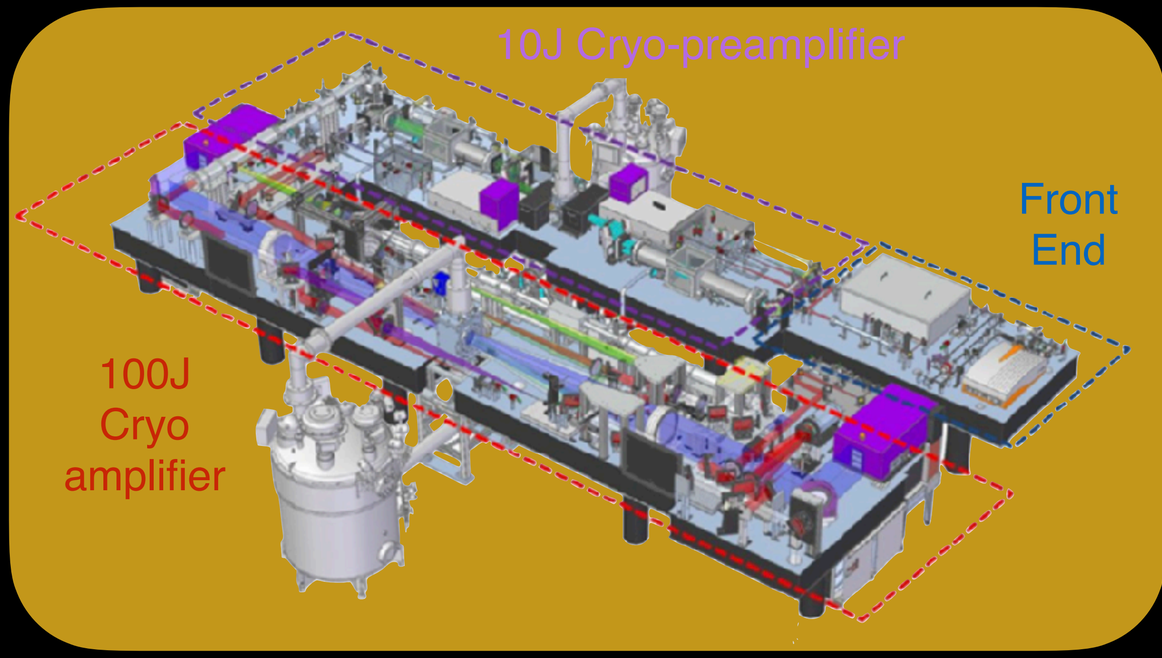

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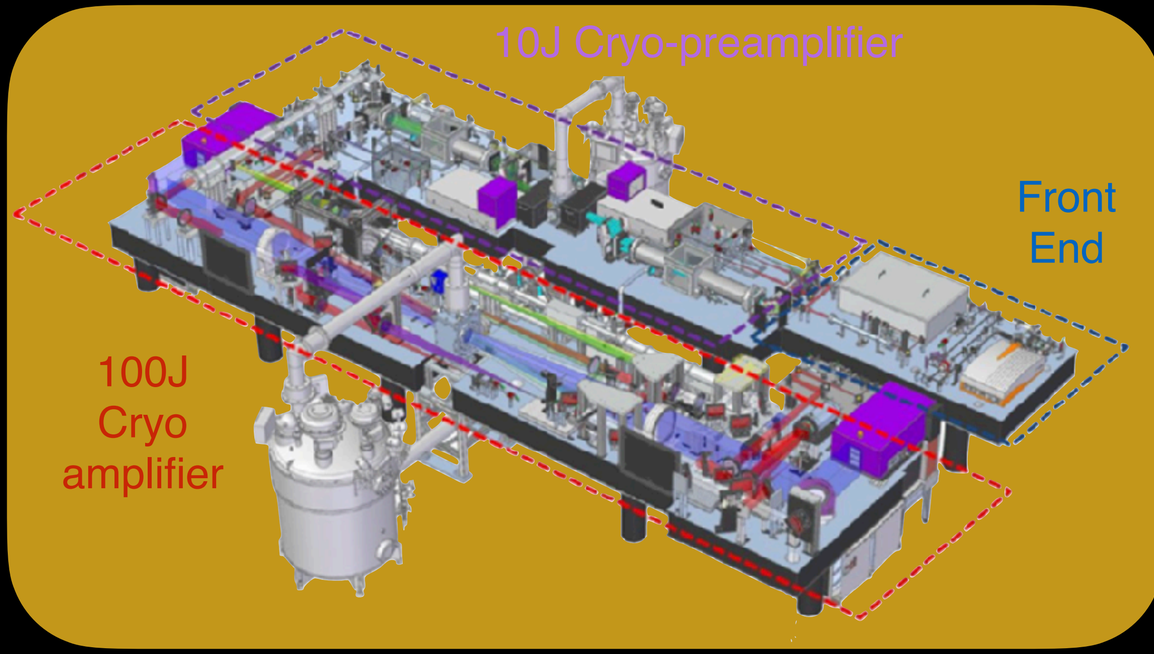

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UK Project:
Laser Inertial Fusion
Technology for Energy

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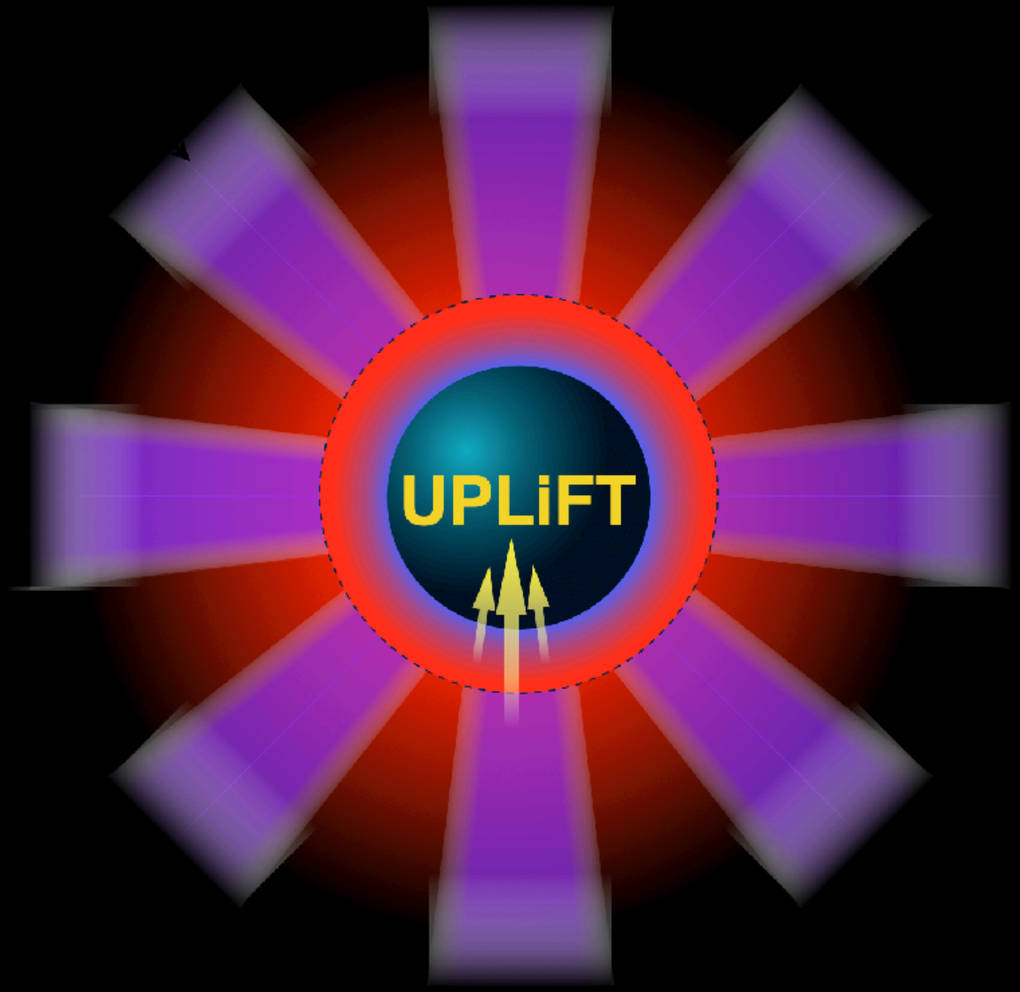

UPLiFT: Develop and Integrate Technologies for Laser Fusion Energy

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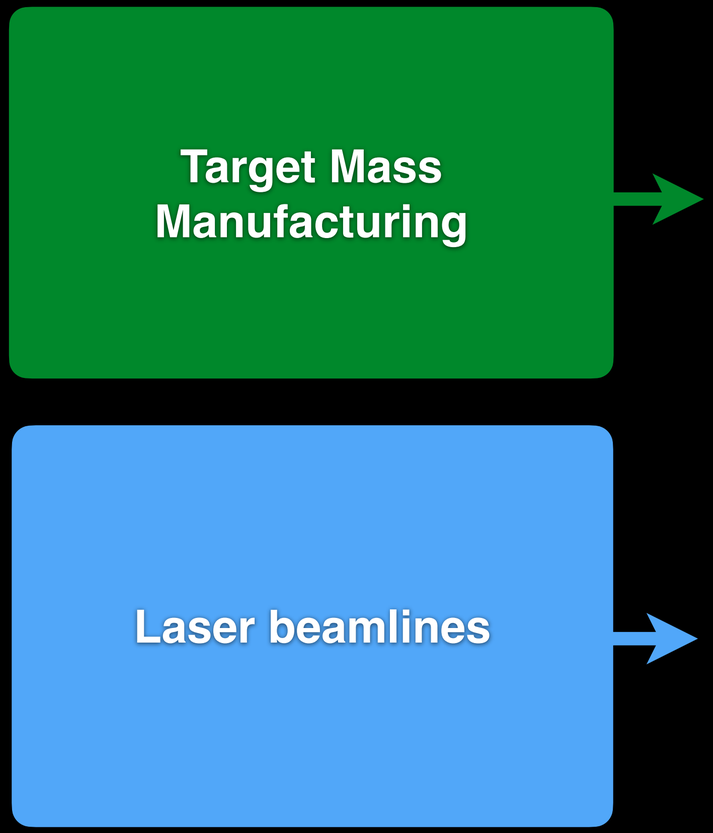

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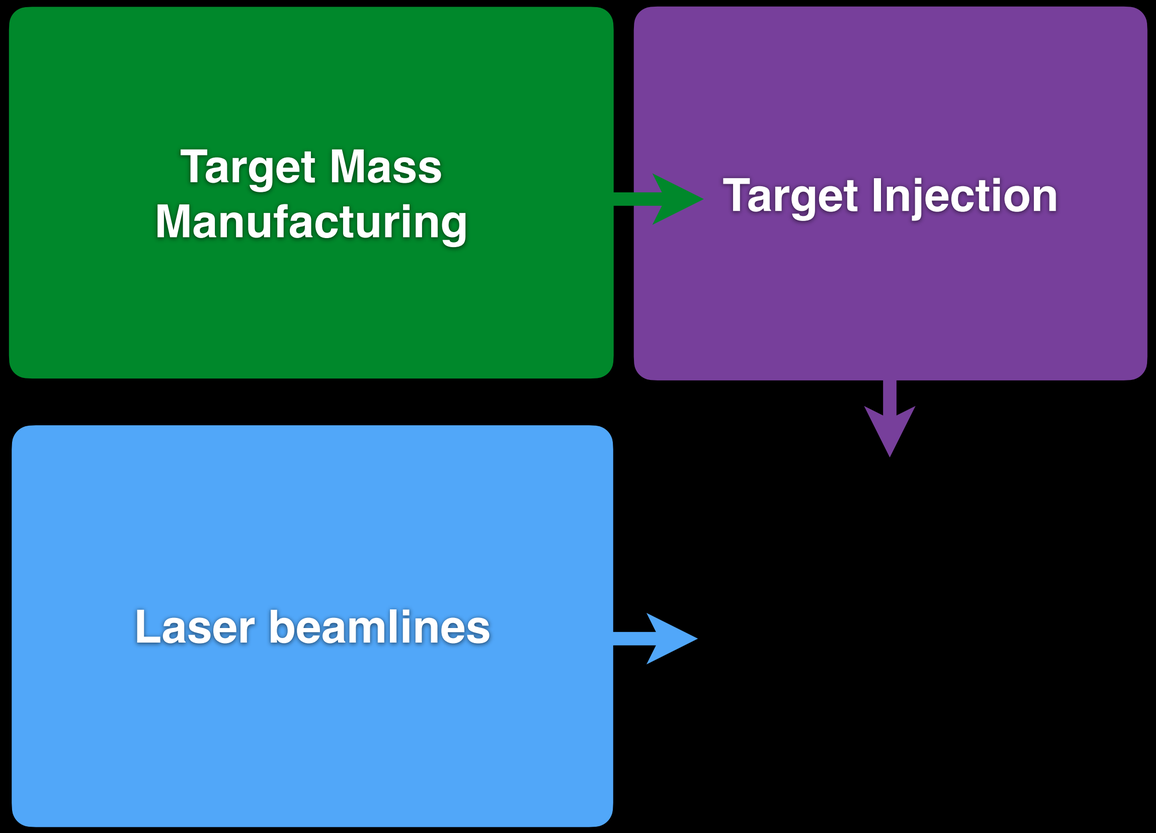
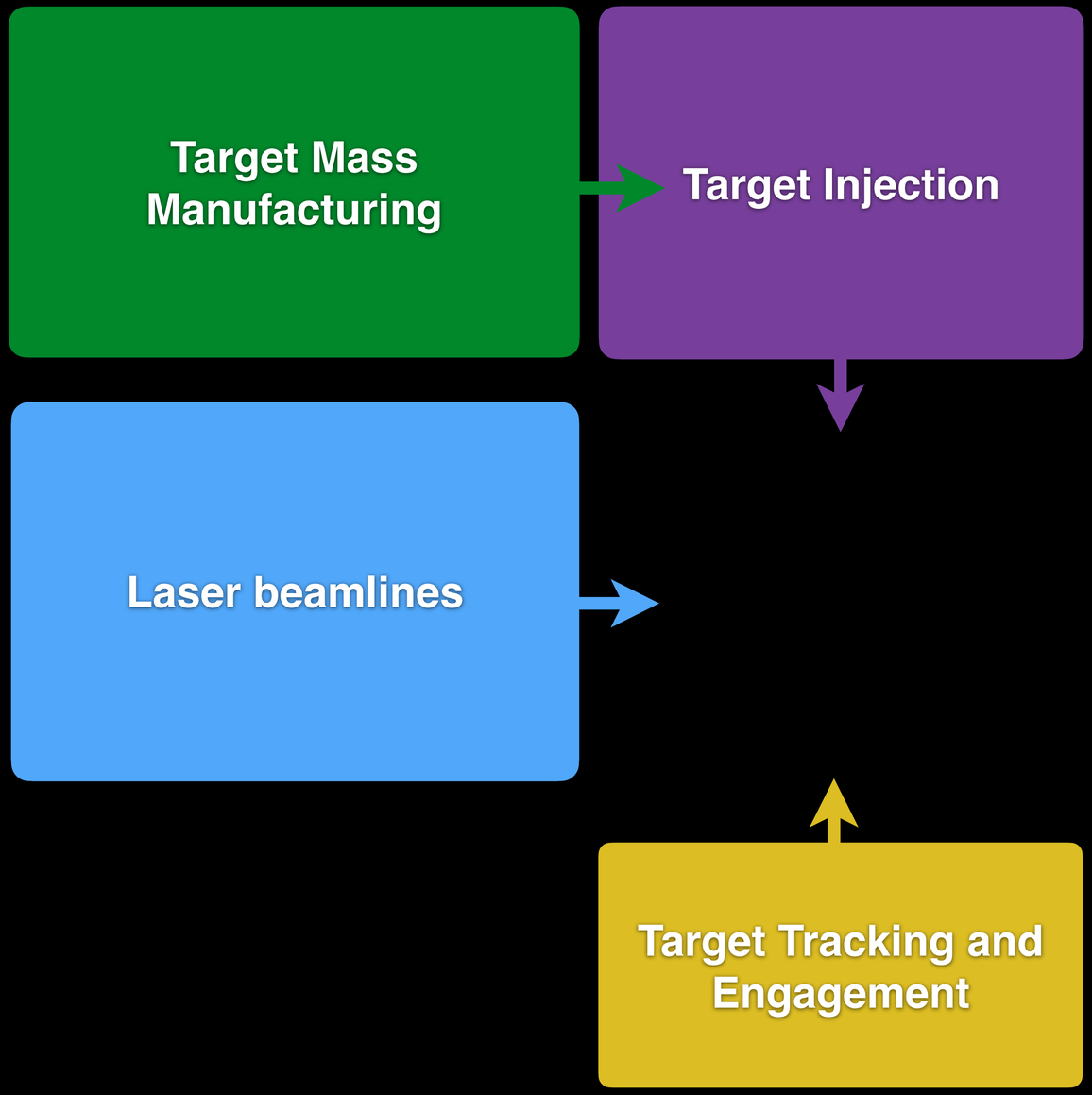


UPLiFT: Develop and Integrate Technologies for Laser Fusion Energy



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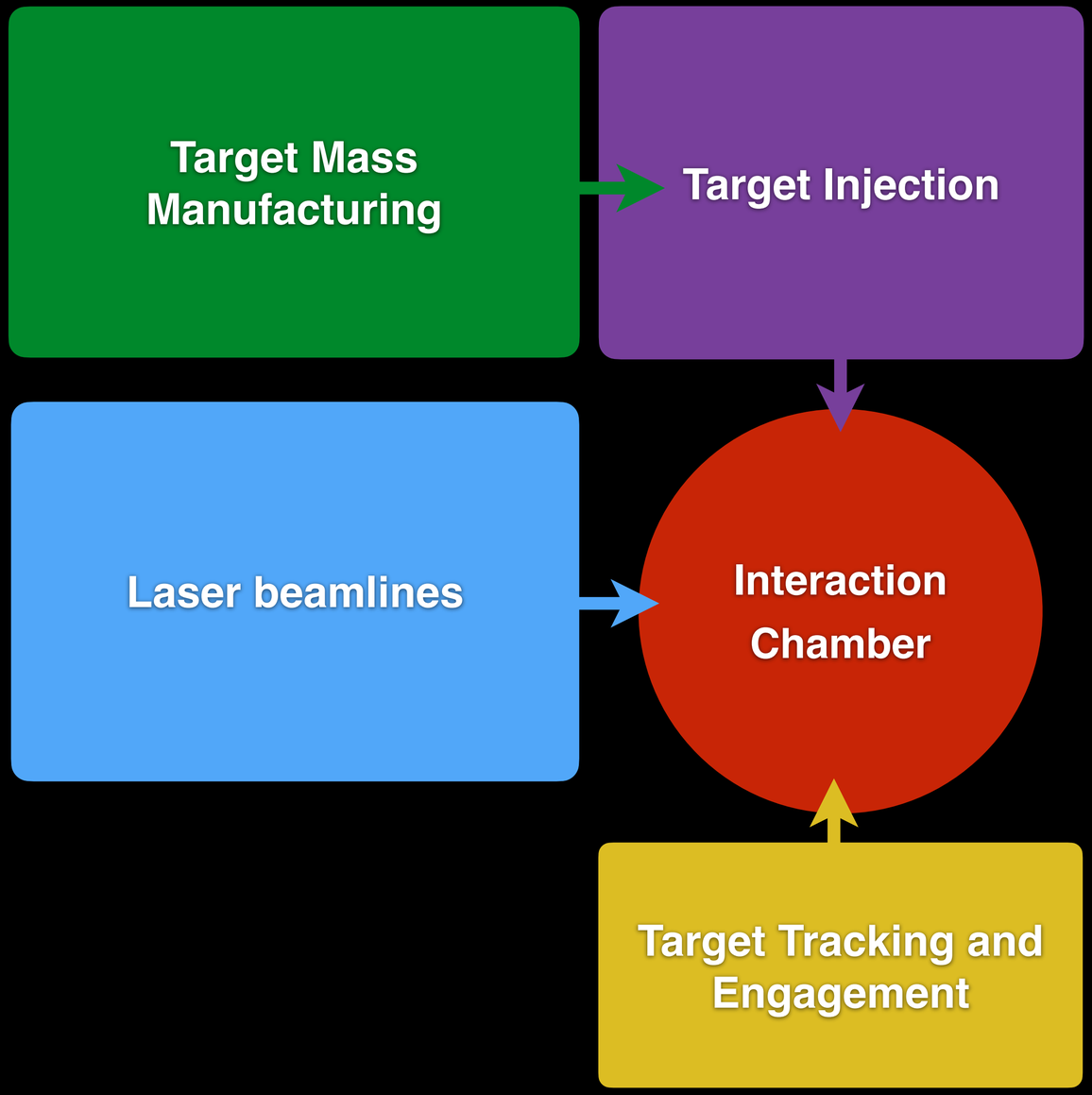

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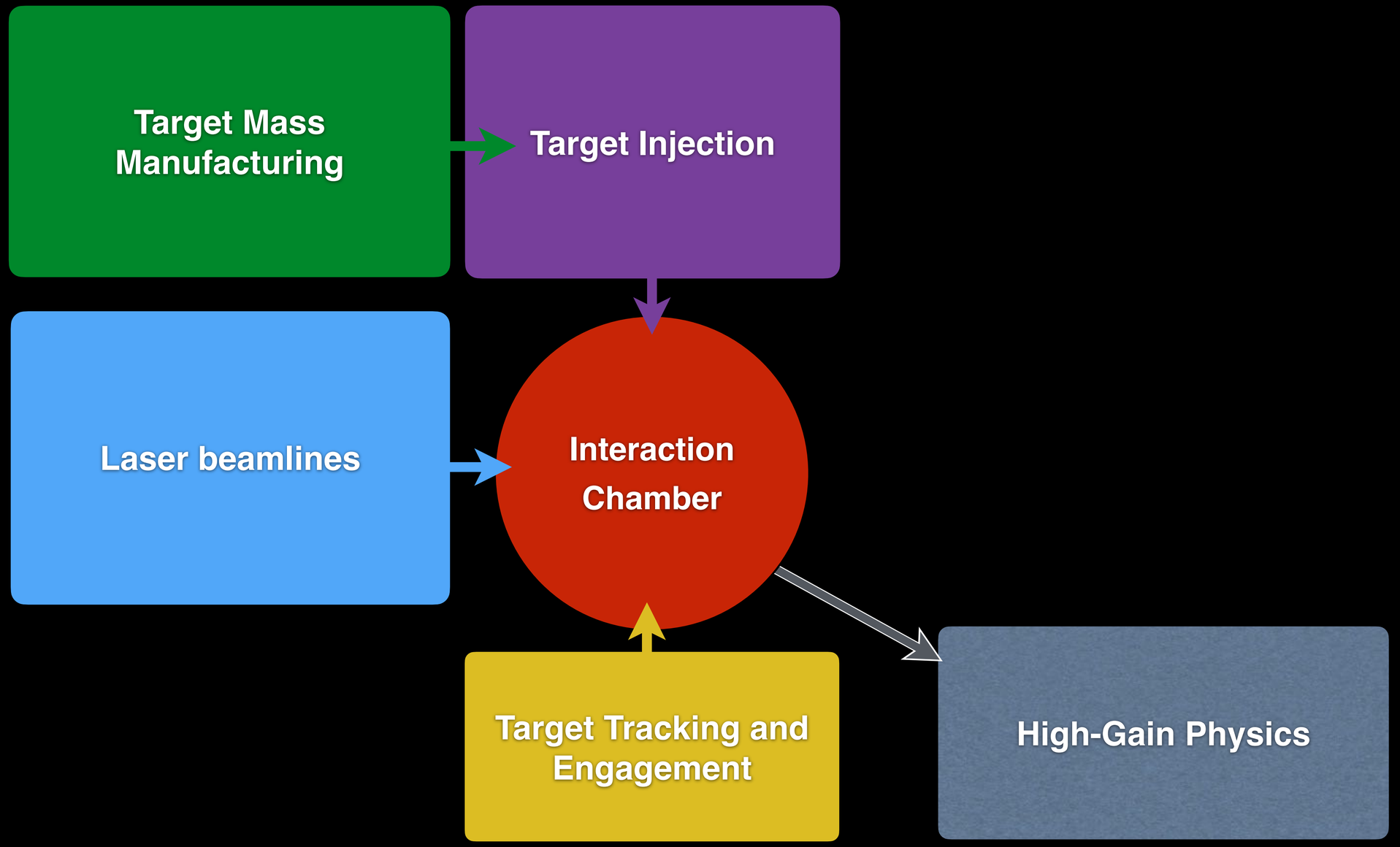

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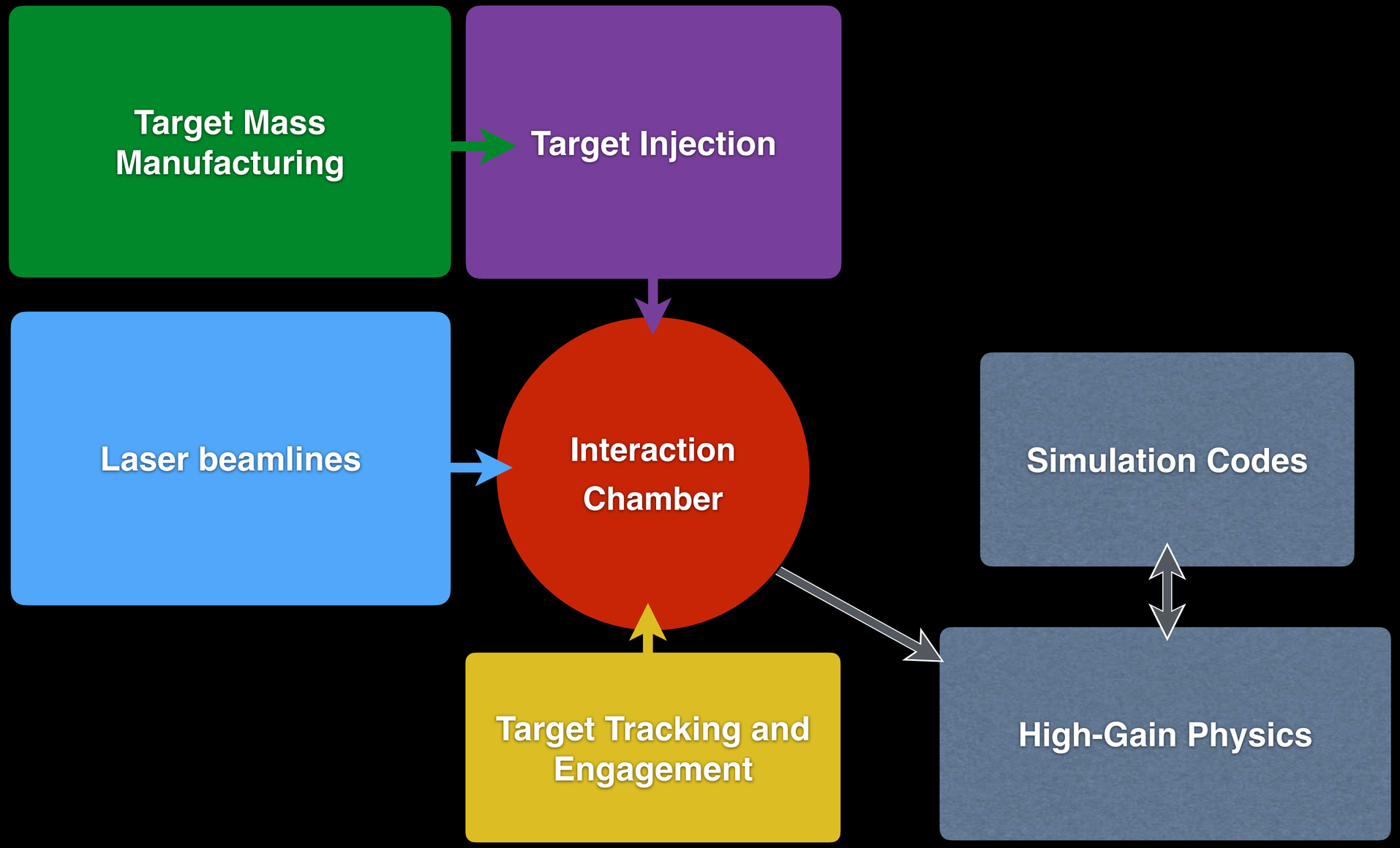

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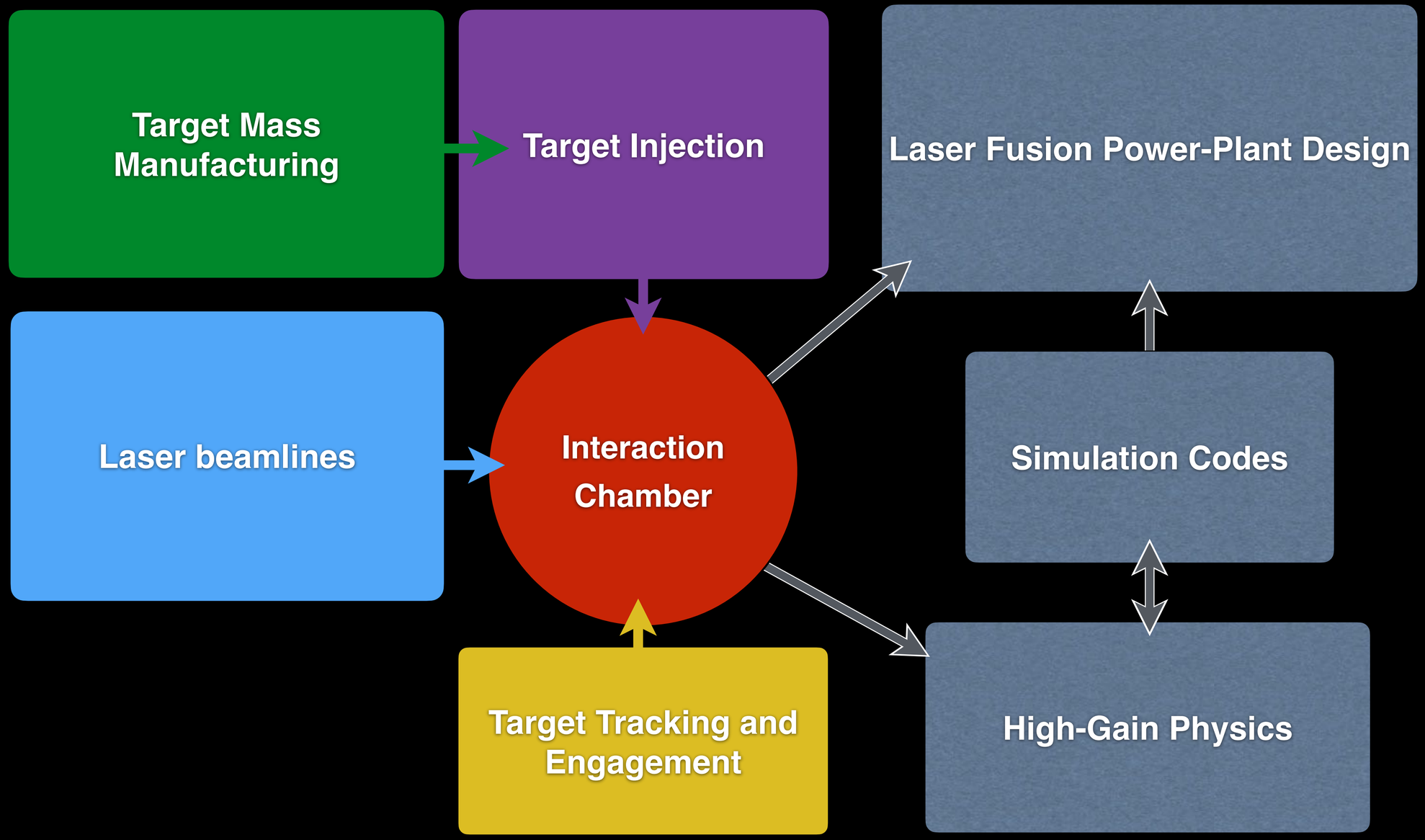

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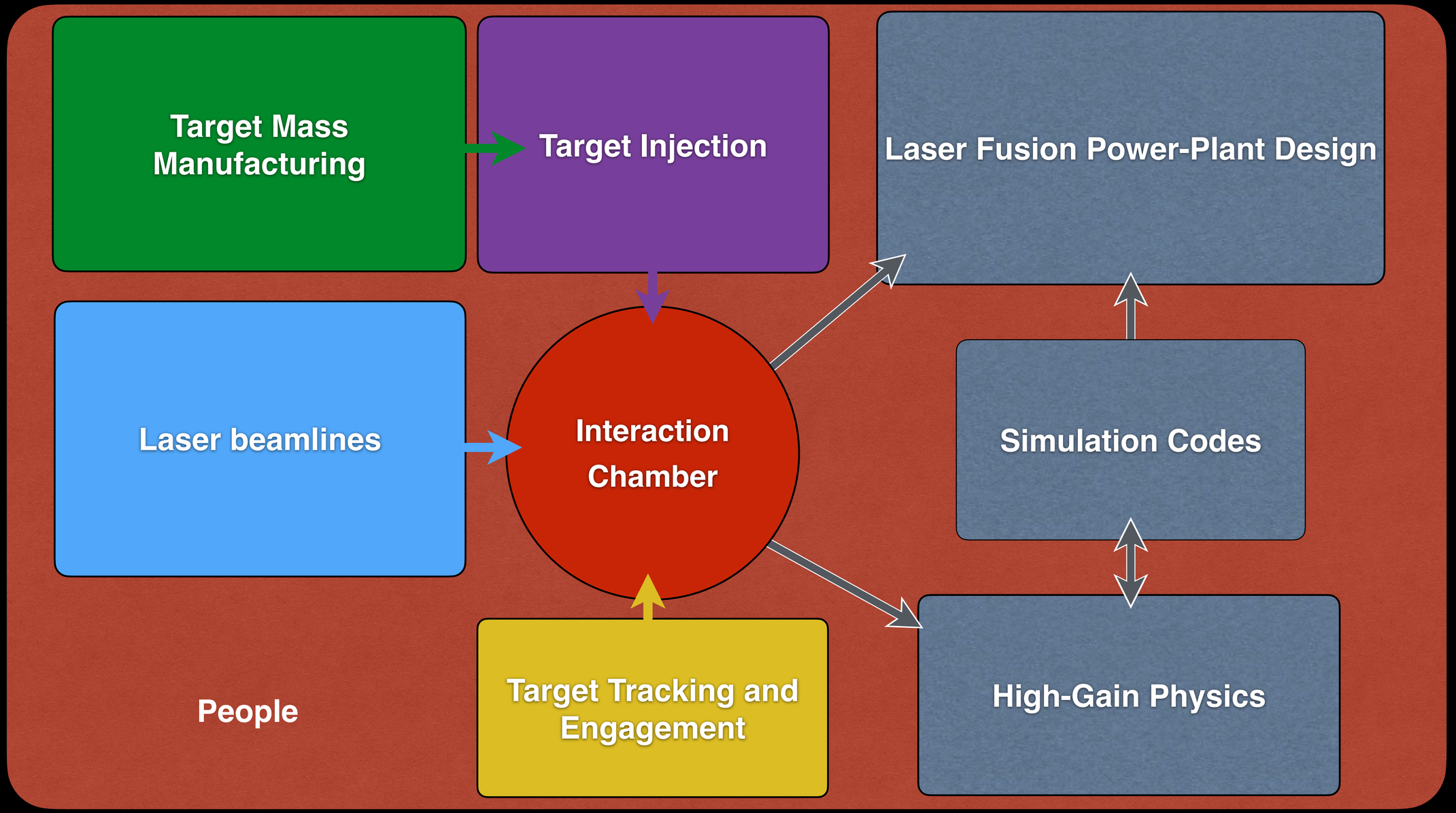
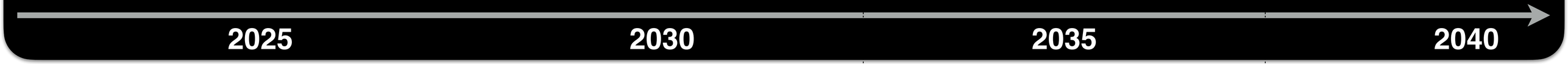


Laser
Fusion
Timeline



Laser
Fusion
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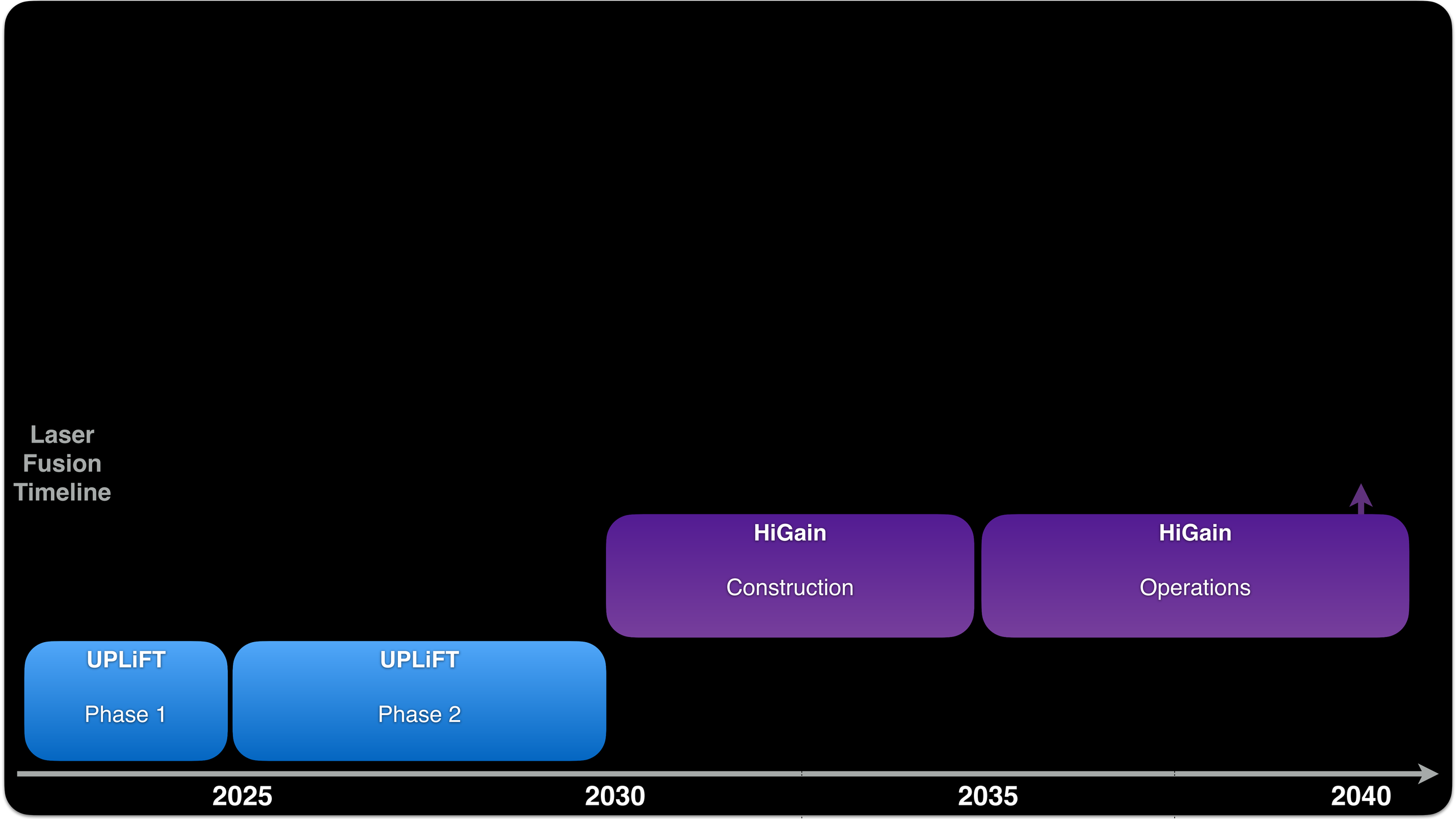
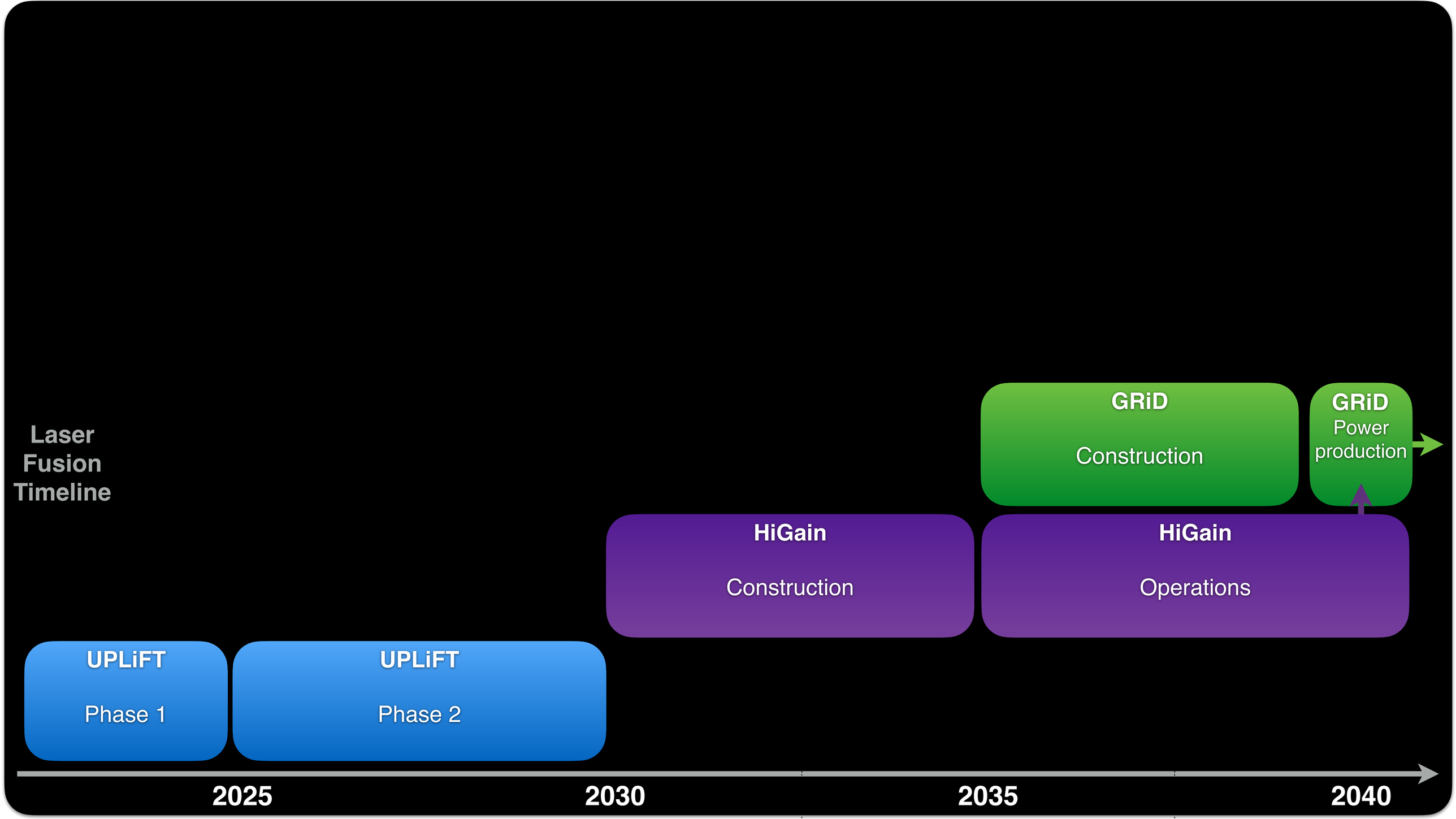
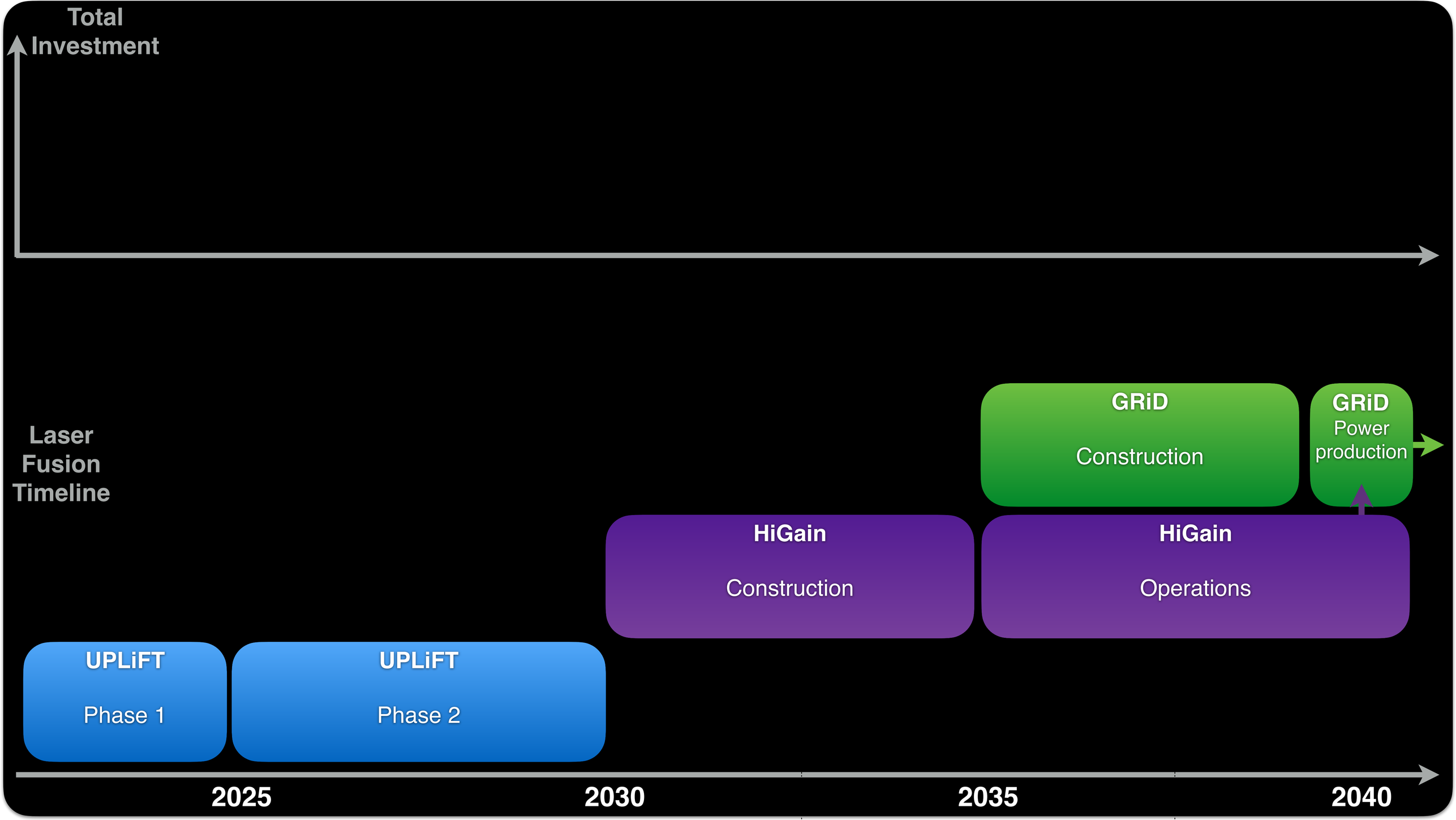

Laser
Fusion
Timeline
HiGain
Construction
HiGain
Operations
UPLiFT
Phase 1
UPLiFT
Phase 2
2025
2030
2035
2040


Laser Fusion Timeline
UPLiFT
Phase 1
UPLiFT
Phase 2
HiGain
Construction
HiGain
Operations
GRiD
Construction
GRiD
Power production
2025
2030
2035
2040


Total Investment
Laser Fusion Timeline
GRiD
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GRiD
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UPLiFT
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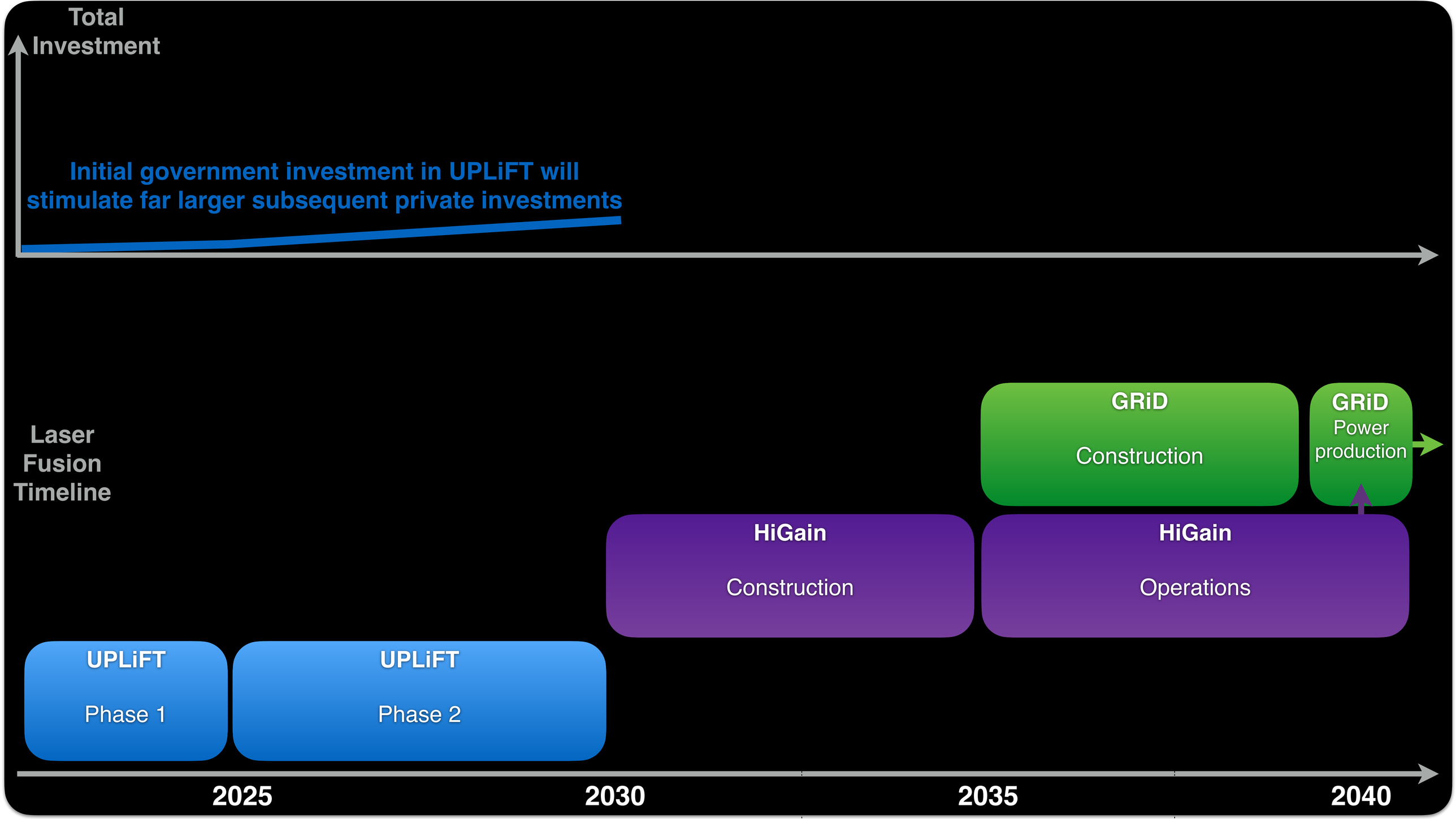
Total Investment
Initial government investment in UPLiFT will stimulate far larger subsequent private investments
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GRiD
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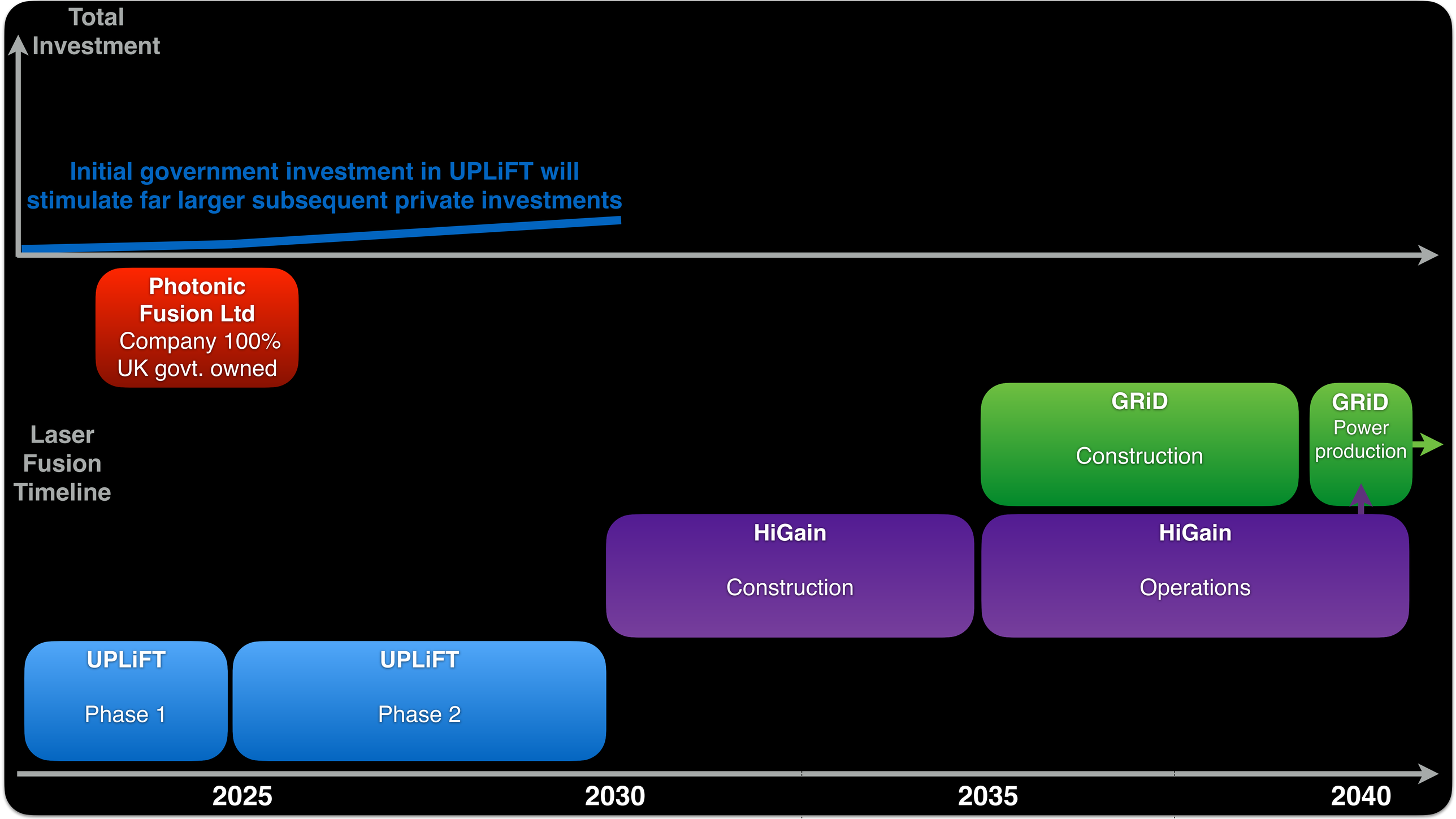
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Photonic Fusion Ltd
Company 100%
UK govt. owned
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GRiD
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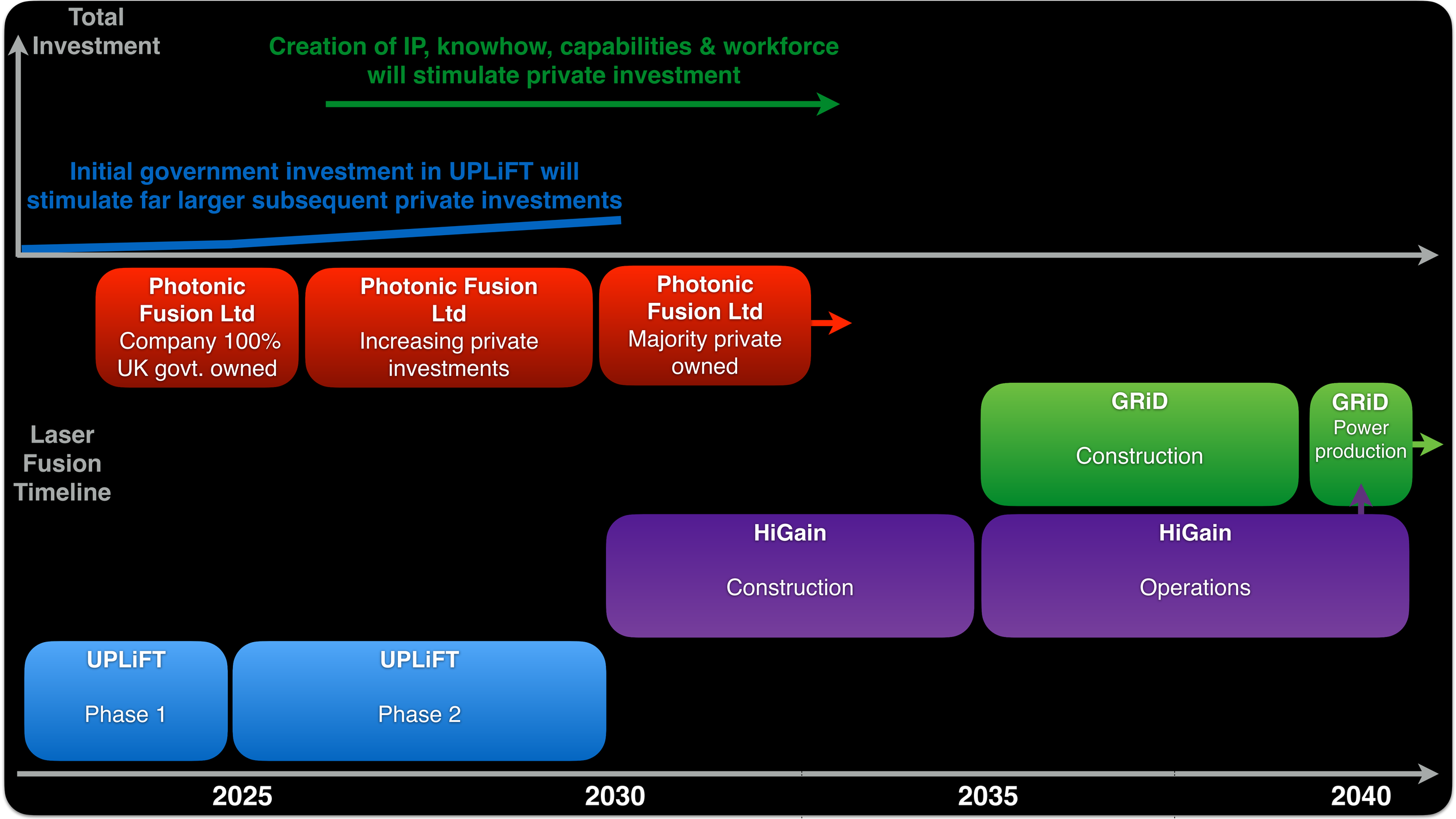
Total Investment
Creation of IP, knowhow, capabilities & workforce will stimulate private investment
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Photonic Fusion Ltd
Increasing private investments
Photonic Fusion Ltd
Majority private owned
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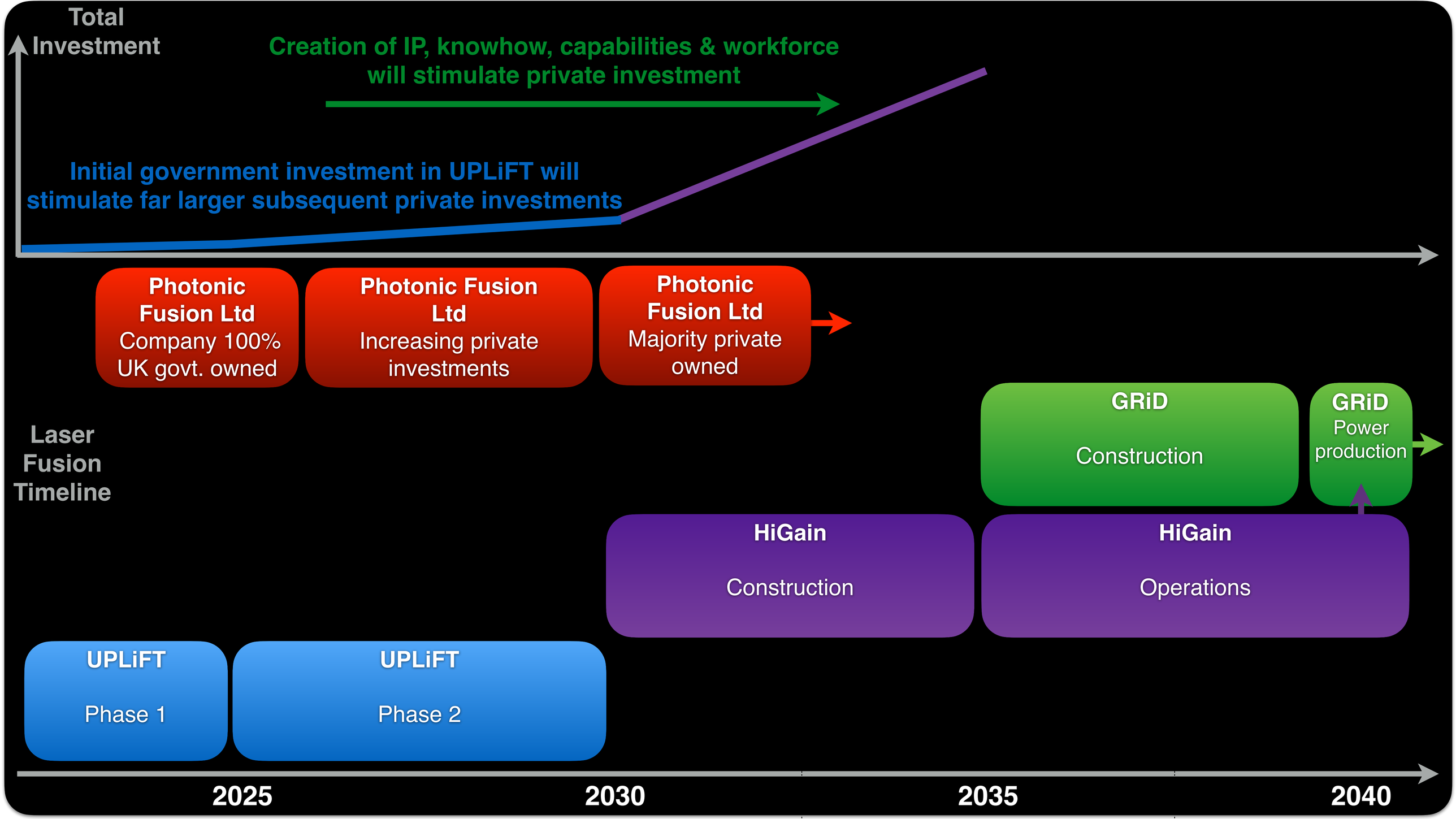
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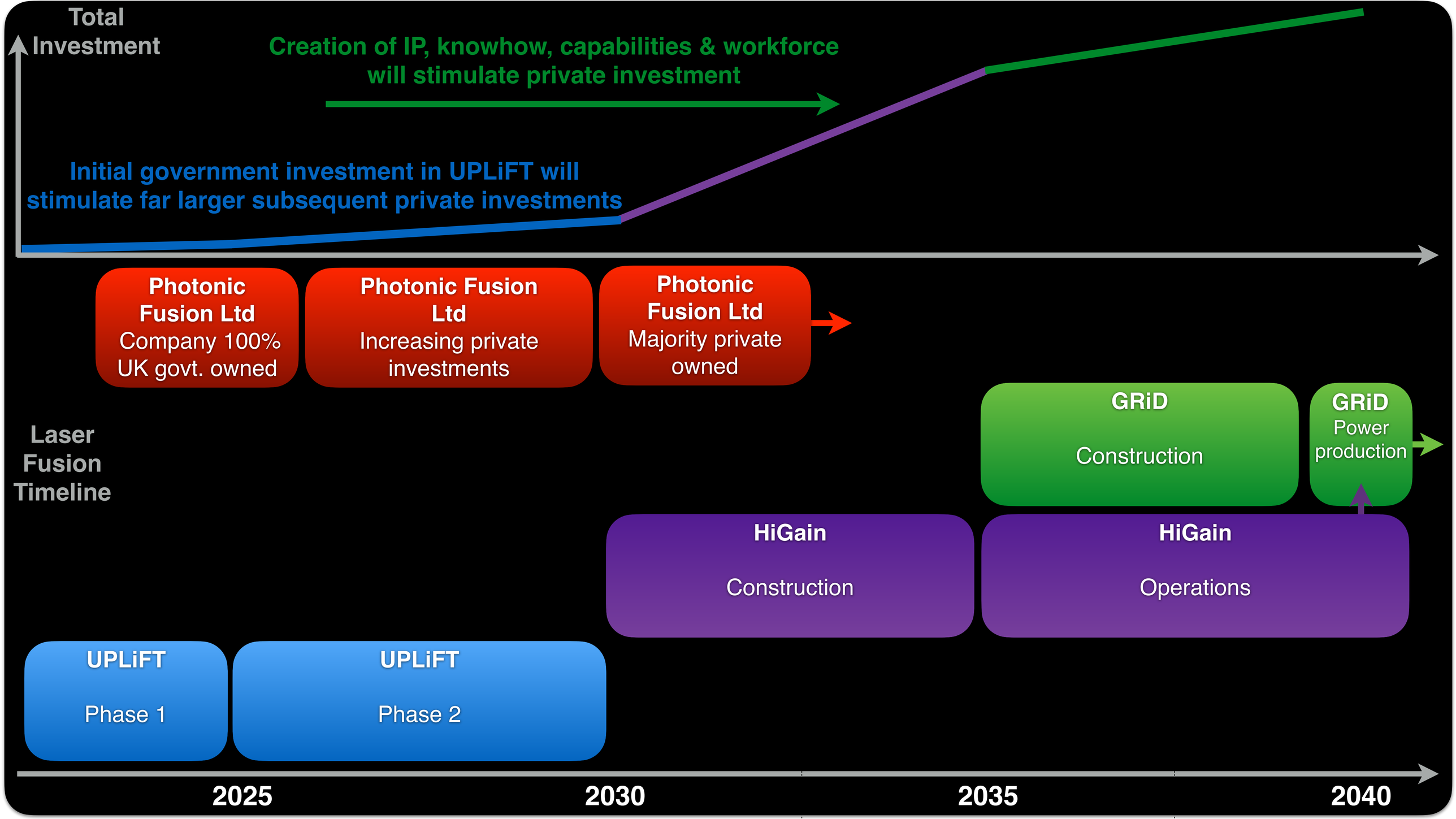
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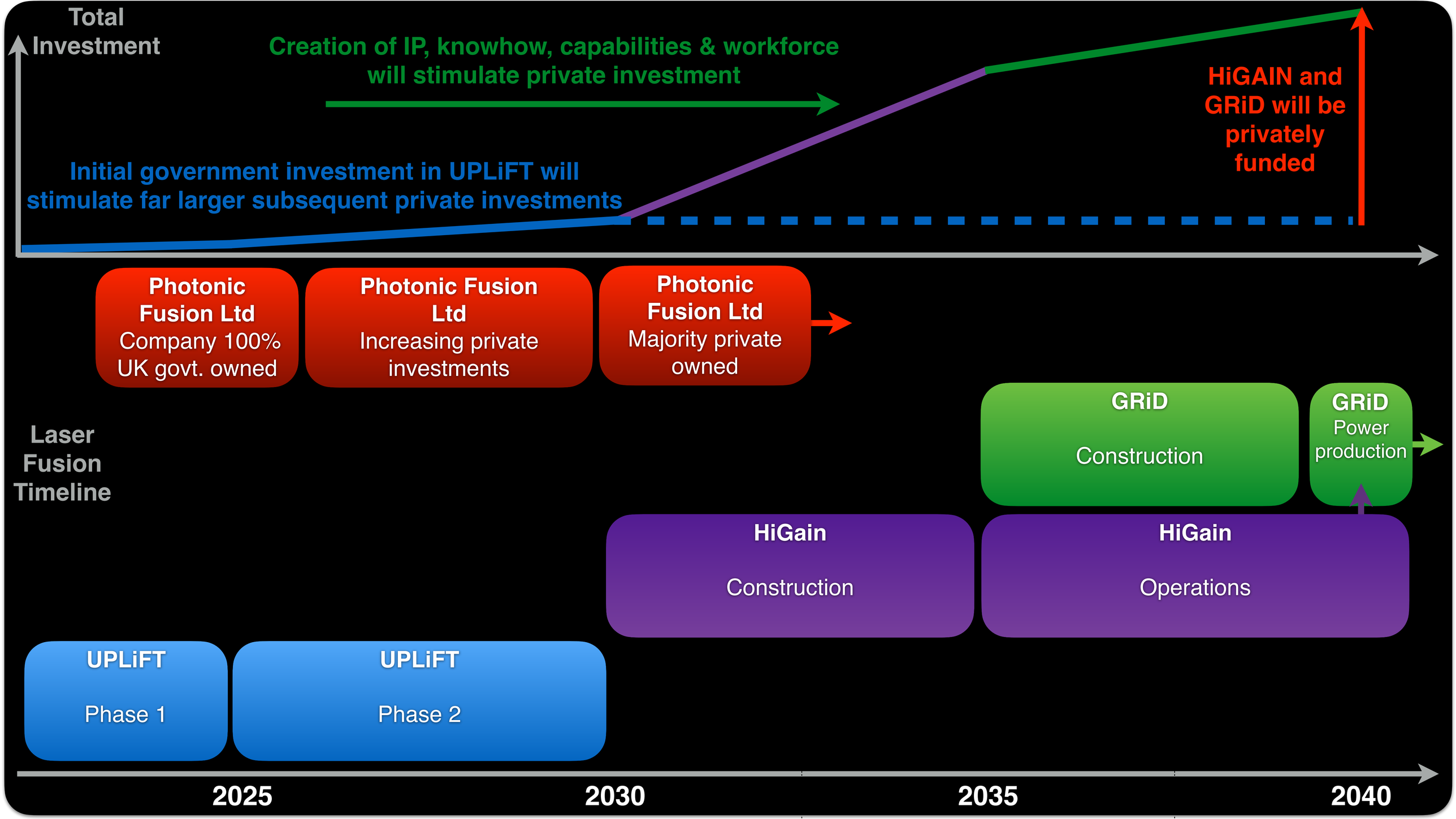
Total Investment
Creation of IP, knowhow, capabilities & workforce will stimulate private investment
HiGAIN and GRiD will be privately funded
Initial government investment in UPLiFT will stimulate far larger subsequent private investments
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Photonic Fusion Ltd
Increasing private investments
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Summary

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  - Leverage world leading UK capabilities
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    - Capitalise on the $40Tn fusion energy market