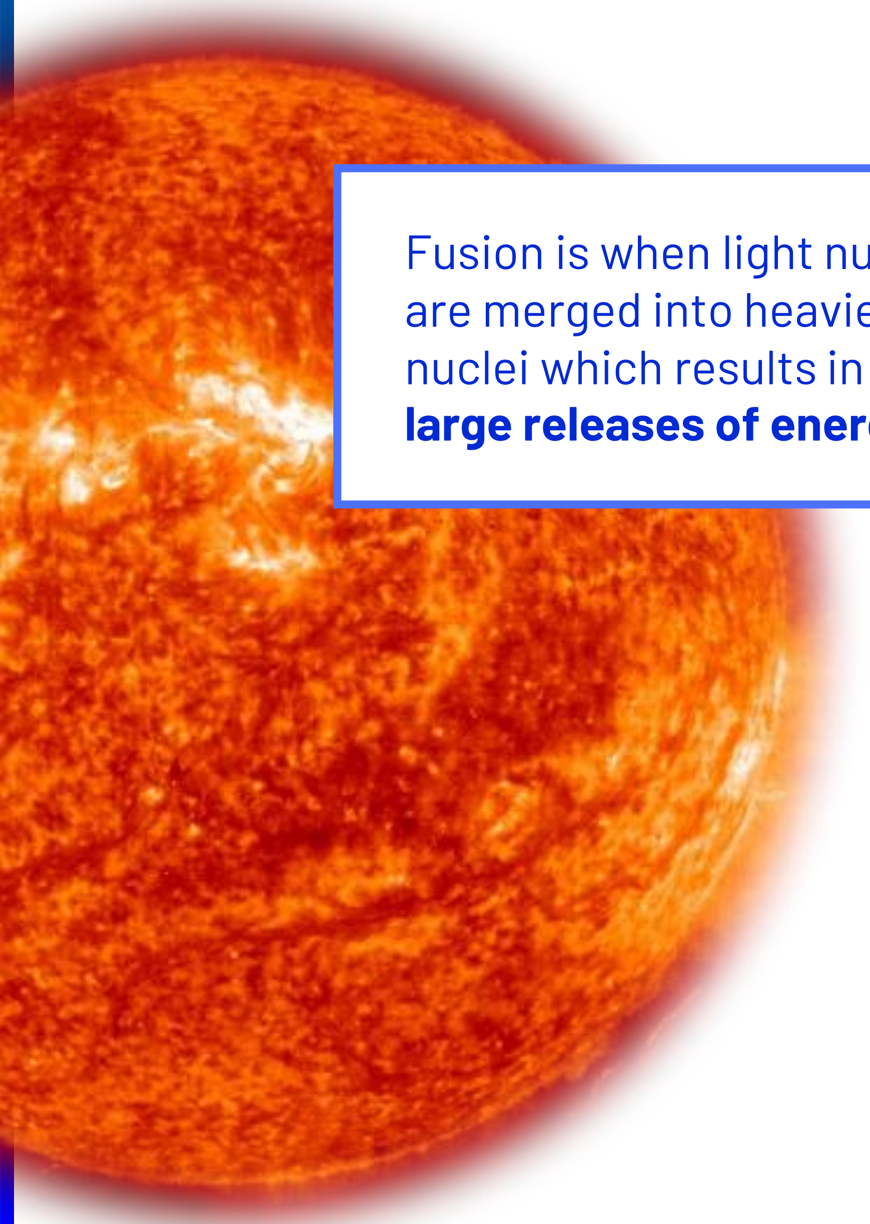
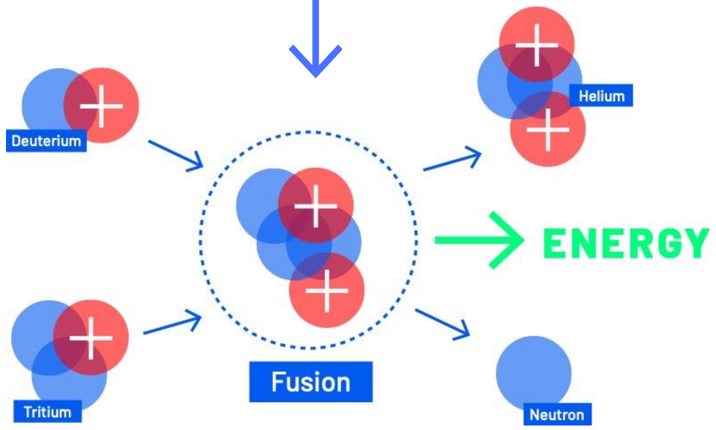
FOCUSED ENERGY

We create affordable, clean energy on demand

Focused Energy harnesses the power of the stars



Fusion is when light nuclei are merged into heavier nuclei which results in **large releases of energy**.



Electricity

Industrial Heat

Hydrogen

This clean energy can then be used in a variety of **commercial applications.**

Fusion vs. Fission - NOT the same

FUSION

- Combines two light atoms to a heavier one
- Hard to start the reaction, but terminates automatically if conditions change
- No nuclear waste from fuel; small, short-lived amount of waste from reactor
- Energy production able to load-follow
- Generates even more energy than fission; 0.6t hydrogen matches 30t of Uranium

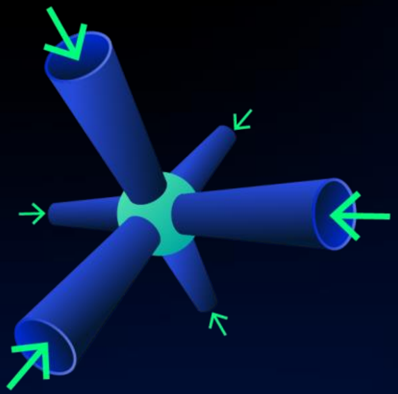
FISSION

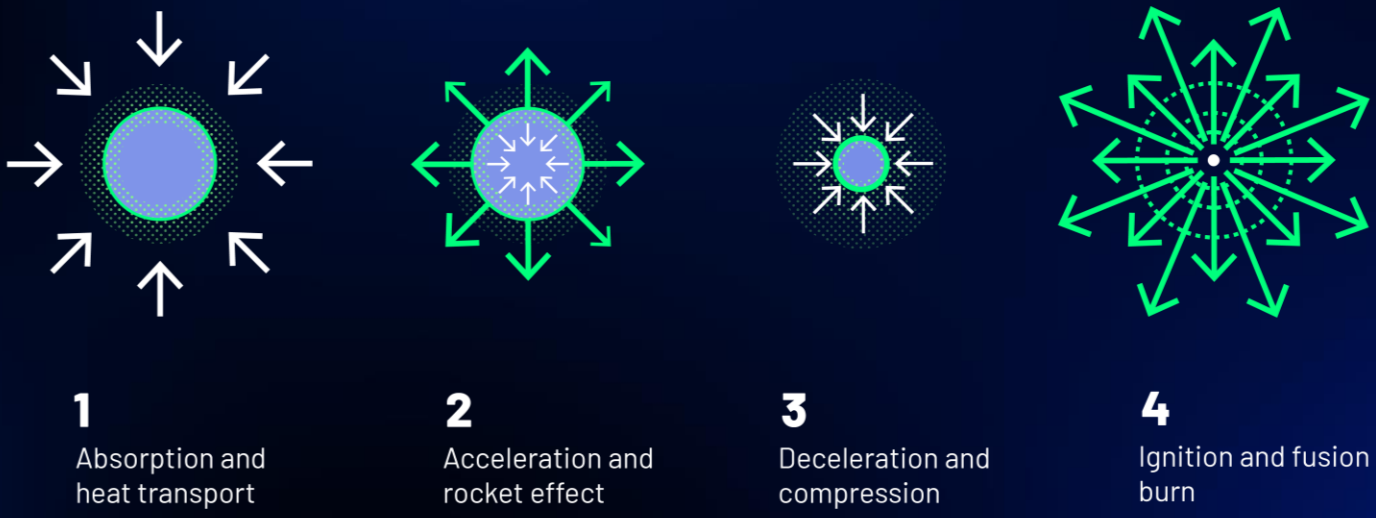
- Splits a heavy atom into smaller ones
- Chain reaction easy to start, but difficult to control
- Highly radioactive waste from fuel; long lifetime requires repository
- Plants need to operate on a base load; little load-follow capability
- 30 tons of uranium matches 2 Mio. tons of coal

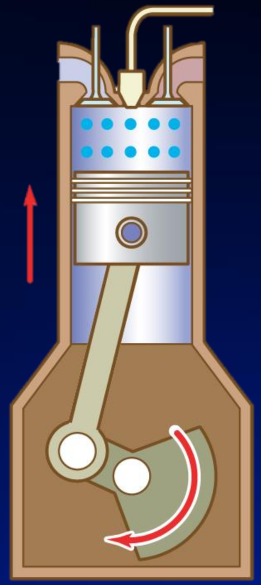
The INERTIAL FUSION energy concept

is a promising, clean, safe and independent energy solution

DIRECT DRIVE

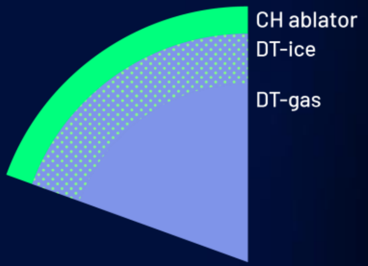






DIESEL ENGINE COMPRESSION PRINCIPLE

CROSS-SECTIONAL TARGET

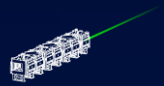


As the name implies in direct drive the laser hits the target directly. But when the target is not homogeneously covered by it or if the surface has imperfections the target isn't uniformly compressed but rather bulges like a balloon that you try to compress between your fingers.

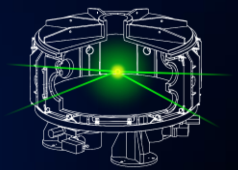
Focused Energy will deliver scalable commercial fusion

Lower capex and abundant fuel lead to LCOE < $40 / MWh

Hardware Development → **Target Compression** → **Ignition Science** → **Target Ignition** → **Commercial Fusion**

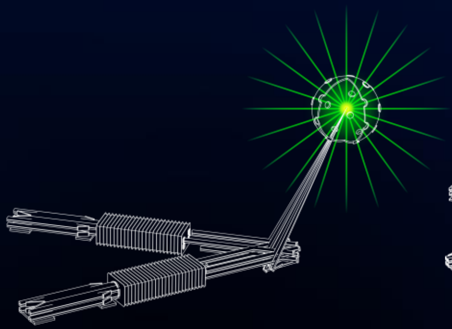


L4-LASER



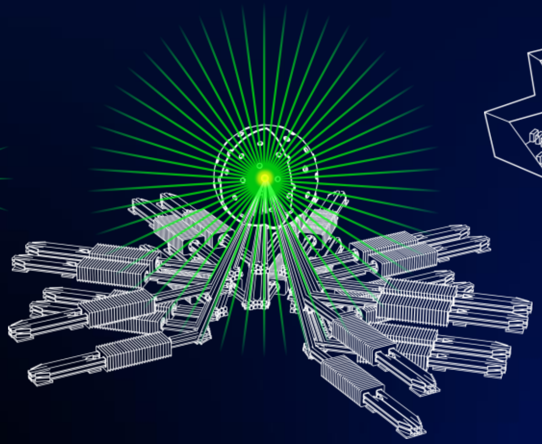
T-STAR

4 laser lines



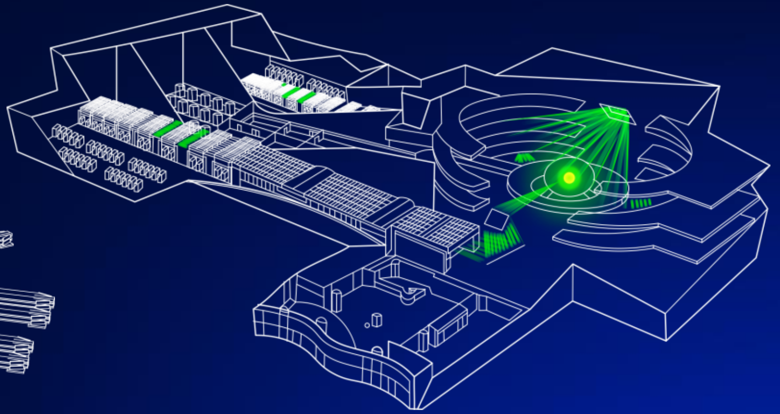
SUPER-NOVETTE

20 laser lines



SUPER-NOVA

200 laser lines

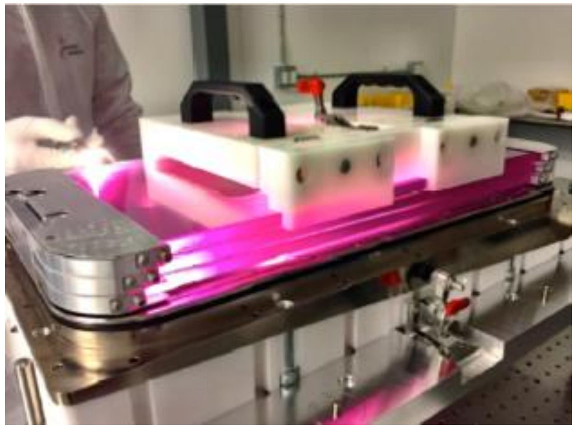


QUASAR

632 laser lines

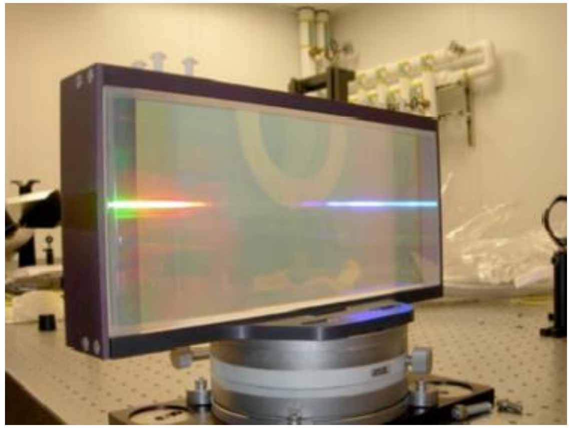
1H 2023 | 2H 2023 | 2024 | 2025 | 2035

We have identified some supply chain areas which will likely need investment to build capability



Laser amplifier glass

- Large slabs need for amplifiers
- 6000 – 10,000 slabs needed for SUPER NOVA alone (~$200M)
- Principal supplier is Schott (Germany) but they have reduced capacity since LLNL



Diffraction gratings

- Large aperture needed to compress multi-PW pulses
- 100 – 200 gratings needed for SUPER NOVA (~$50M)
- Principal supplier has been LLNL; some supply from PGL (USA) or Horiba (France)

Laser Diodes

- 5 GW peak diode power needed to pump QUASAR
- At $0.10/watt are huge cost in power plant (~$500M)
- A number of suppliers in US and Germany, but none have mass production capability (with cost now ~$0.50/watt)

Integrated laser mass manufacturing

- 200 – 400 compact, rugid, manufacturable systems needed for QUASAR
- Will require manufacturing cost at <$1M/kJ laser energy
- Custom laser companies exist in US, France and Germany

Why now?

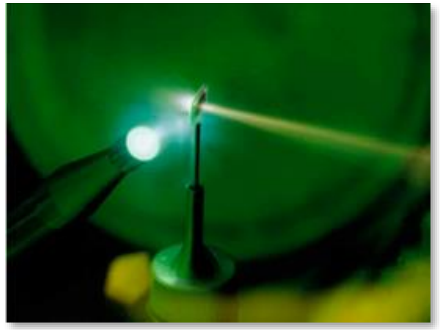
Progress in recent years make commercial development of laser-driven IFE timely

ADVANCES IN ICF PHYSICS & TECHNOLOGY UNDERSTANDING

The National Ignition Facility has made considerable progress in understanding hot-spot ICF

NIF has produced >1.3 MJ of fusion yield on a shot – 70% conversion of laser energy to fusion energy

Very high efficiency in laser driven proton sources has been experimentally observed

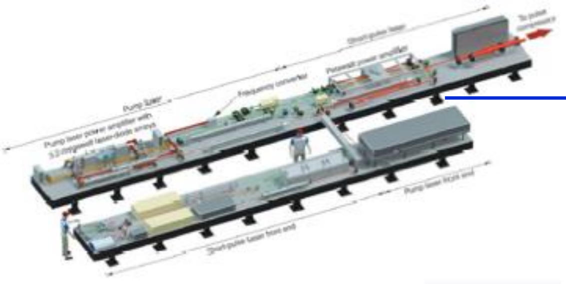


More than 10% of picosecond laser pulse energy has been converted to a proton burst

New techniques for fabricating cone-in-shell PFI targets

ADVANCES IN HIGH ENERGY LASER TECHNOLOGY

Lasers with many hundreds of Joules of energy operating at 10 Hz can now be constructed



100 J pulsed laser operating at 10 Hz have been fielded

Multi-PW lasers have now been built and can be commercially obtained

Rep. rated kJ class sub-picosecond 10 PW laser has been deployed at ELI in Prague

COMPANIES

LABORATORIES

UNIVERSITIES

FOCUSED ENERGY

We partner

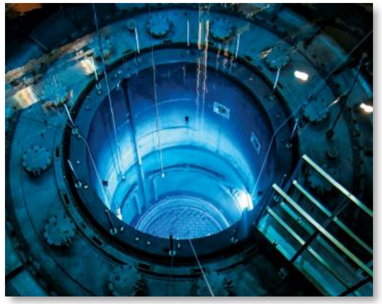
with the most important companies, experts and national labs

ON OUR PATH TO FUSION ENERGY

we will deliver foundational technologies that enable additional markets to commercialize our LDRS technology and drive demand for component supply

Lack of material detection capability limits several industries

Structural integrity of old bridges, smuggling of illicit materials, landmines and bombs of past wars, proliferation of nuclear materials, storage of nuclear waste





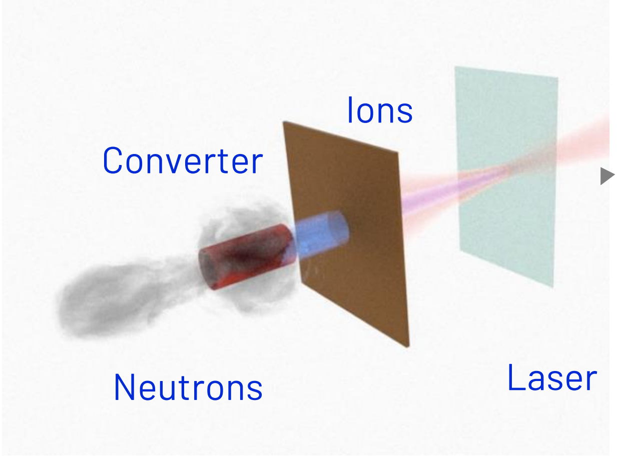
First product in 2024 with the potential for $5M/year and growth to over **$100M/year by 2027**

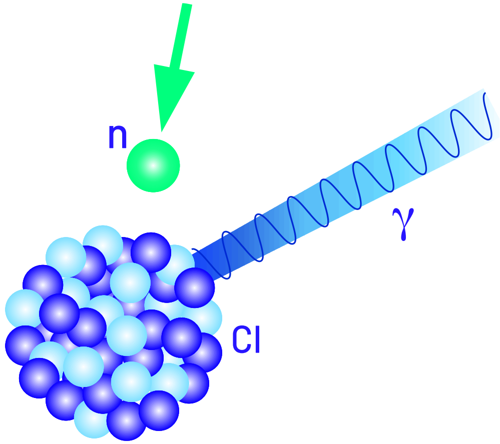
- → Safety of Gen IV reactors
- → Hidden weaponry
- → Smuggling of dangerous materials
- → Collapsing bridges

Markets

Focused Energy Solution

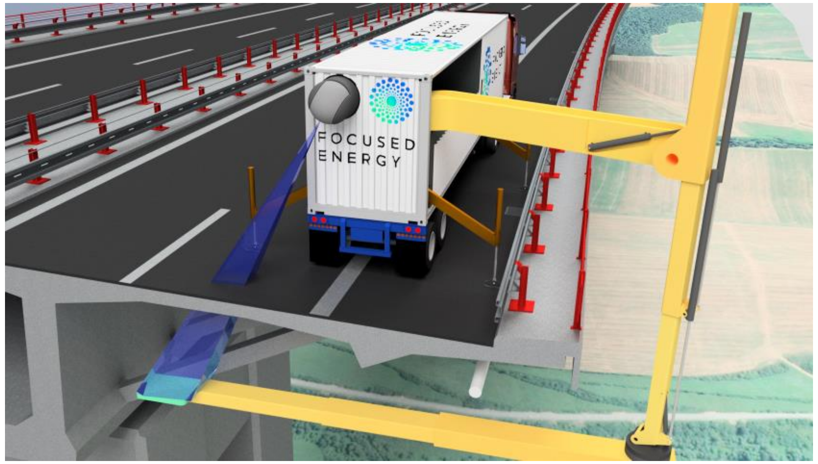
- Non-destructive testing to inspect concrete structures non-invasively.
- A new path to inspect the salt concentration in concrete (concrete cancer) without drilling holes into bridges.

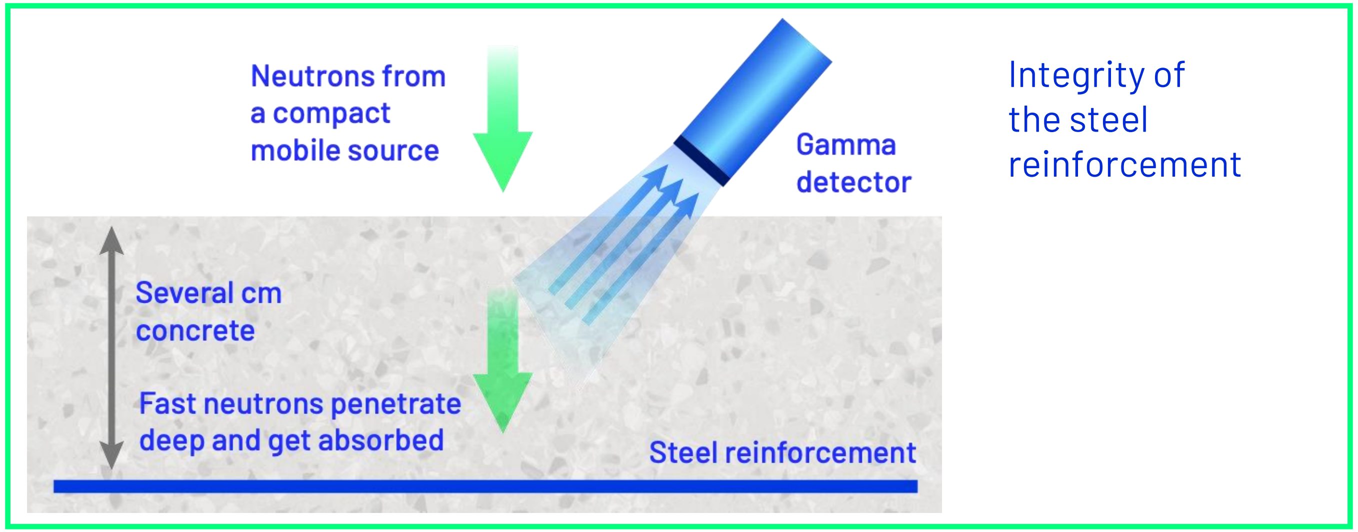




100 Bln USD market

Mobile laser source on a truck





Wir haben das beste IFE-Team der Welt zusammengestellt

FOCUSED ENERGY

Chief Executive Officer
Thomas Forner
- 20+ Jahre Erfahrung als CEO/CFO
- Expertise in der Entwicklung und Führung von globalen High-Tech-Unternehmen

Chief Science Officer
Prof. Dr. Markus Roth
- Professor TU Darmstadt, GER
- Gründer des IC für nukleare Photonik
- 20+ Jahre in der Fusionsforschung
- Erfinder der Protonenschnellzündung

Chief Technology Officer
Prof. Dr. Todd Ditmire
- Professor UT Austin, TX
- Gründer von National Energetics
- > über 20 Jahre Erfahrung mit Hochleistungslasern
- Entwicklung von 10 PW-Lasern für ELI

BOARD

Dr. William Goldstein
- Lawrence Livermore National Laboratory
- Director Emertius

Dr. Carly Anderson
- Prime Movers Lab Partner
- Deep Science Expert

STAC

Prof. Riccardo Betti
- University of Rochester
- Experte für direct-drive fusion

Dr. Juan Carlos Fernandez
- Los Alamos National Laboratory (im Ruhestand)
- Experte Trägheitsfusion und Ioenbeschleunigung

Dr. Kurt Schoenberg
- Los Alamos Neutron Science Center
- Director Emertius

Prof. Vladimir Tikhonchuk
- University of Bordeaux, France und ELI Beamlines, Czech Republic
- Experte für Laser- und Plasmaphysik

>1850 VERÖFFENTLICHTE ARBEITEN

IFE EXPERTEN

Teammitglieder und leitende Mitglieder anderer Labore schließen sich an

Dr. Pravesh Patel
- NIF ICF Program Element Lead und Leiter Fast Ignition Program

Wolfgang Theobald
- Weltweit führender Experte für Trägheitsfusionsexperimente

Dr. Charlie Jarrott
- Computerphysiker und Experte für integrierte Schnellzündungs-experimente

Dr. Cris W. Barnes
- Leiter des LANL-Physikprogramms und Kern-/Plasmaexperte

Leading Theorists, Authors, and Simulation Experts for IFE

Prof. Dr. Stefano Atzeni
- Professor an der LaSapienza University, Rome, Italy und weltweit führend in der ICF-Theorie

Dr. Debbie Callahan
- 35 years at LLNL
  Group leader Target design
  Co-leader of ignition campaign
  2012 Dawson Price

Prof. Dr. Paul Gibbon
- Professor und Direktor der Theoriegruppen des Jülicher Nationallabors

Prof. Dr. Javier Honrubia
- Professor an der Politechnica Madrid, Spanien und weltweit führender Theoretiker