

Possibilities of using energy provided from nuclear fusion in the near future

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National Technological University- Paraná Regional School(UTN FRP)

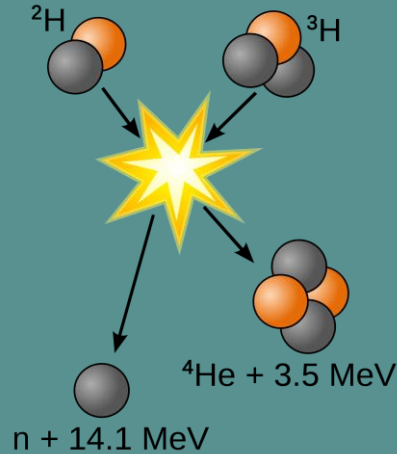
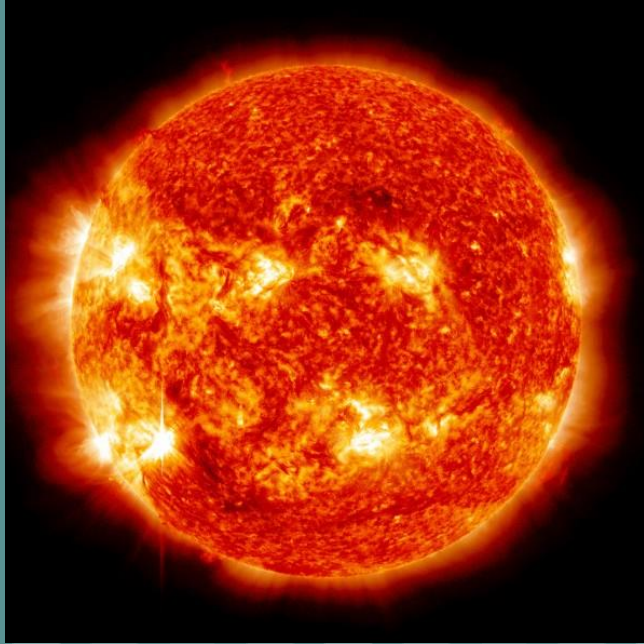
Civil Engineering

2020



Nuclear Fusion energy

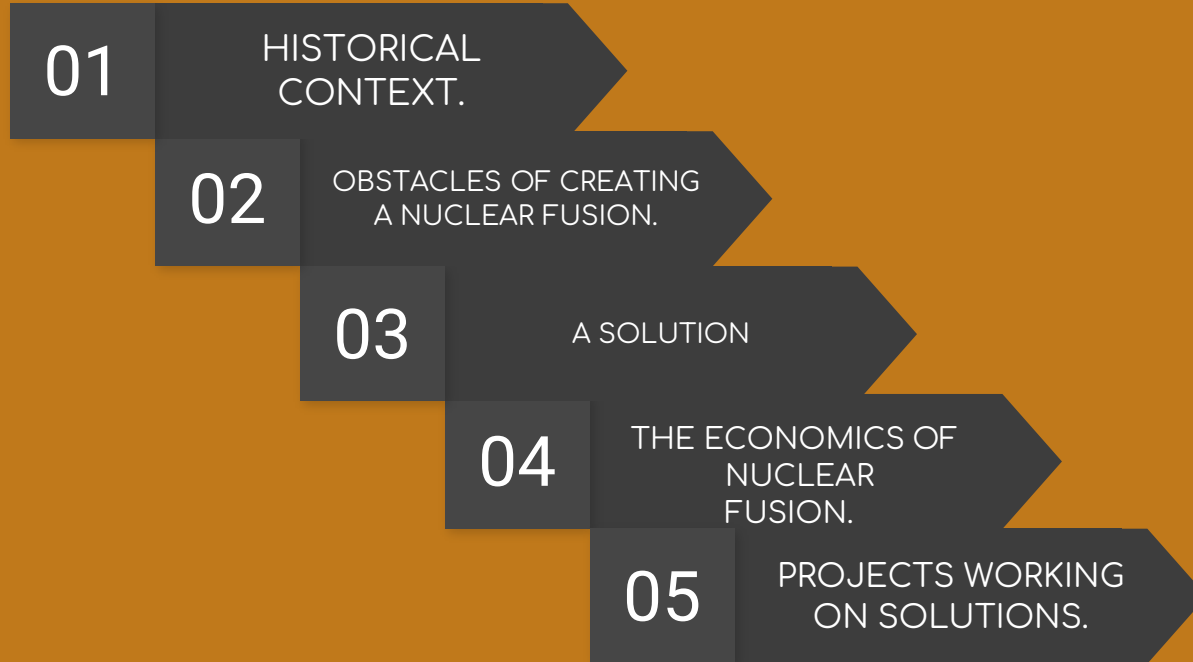
"Our own sun"



Nuclear reactor



Presentation Map



01 - Historical context

AN ATHLETIC DAY
WEDNESDAY—For the
 third year at the 100,
 looking ahead to
THURSDAY—More
 Full Report on Page 30

The Boston Daily Globe

BOSTON, WEDNESDAY MORNING, FEBRUARY 1, 1950

GUIDE TO FEATURES
 A-10 to A-11: Boston
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 A-30 to A-31: News

TRUMAN H-BOMB ORDER

Bishop Wright Appointed to Worcester

2 Young Girls Die as Sled, Truck Crash

Lynn Boy Victim in Similar Mishap; Mother a Witness

Two young girls were killed in the collision of their borrowed sled and a five-ton truck on Longfellow St. East Boston, yesterday while the mother of one stood helplessly on the sidewalk after observing a warning to them.

The tragedy occurred at the intersection of Bremer at 4:25 p. m. just as a 14-year-old boy named Timothy, found in an accident sled-truck collision on Sunday, Lynn, witnessed by his mother from their home.

Victims of the East Boston accident were Carol Erin, 10, and Lynn, 8, of 301 Bremer St. They were transported and arrived at East Boston Police Station.

Lynn's mother, Bernard S. Ziviani, 64, of 301 Bremer St., said she saw the sled and other children on Longfellow street, and tried to reach her side as he lay stretched on the street with his head on the curb.

The East Boston physician, who saw Carol and Lynn on the way, said they were both dying on the sled and in the truck.

According to police, Joseph Ziviani, 64, of 141 Longfellow St., East Boston, the operator of the truck loaded with paper bags and iron, said he did not see the sled as he was coming to Longfellow on Bremer St.

See COASTING, Page 3



WHERE CHILD IN COASTING ACCIDENT



KILLED IN COASTING ACCIDENTS—Carol Erin (left) and Lynn Ziviani, whose sled was hit by a truck in East Boston (above at top).

Plan Aerial Guard to Protect Coast of New England

WASHINGTON, Jan. 31 (AP)—The Air Force moved today to set up an aerial guard zone around all the nation's major atomic plants.

Strategic protection were announced for a long stretch of coast from the Atlantic seaboard to the Gulf of Mexico.

The Atomic Energy Commission announced that 100 miles of the Atlantic coast from Portsmouth, New Mexico and Washington State were to be guarded.

Planes violating the rules will be intercepted and return either the pilot will be taken over Civil Administration Bureau.

See GUARD, Page 3

Heads New Diocese of the County

Msgr. Weldon of New York Named to Springfield See

Bishop John T. Wright, auxiliary bishop of Boston, was named to head a newly-created Catholic diocese of Worcester yesterday.

In a named change involving Massachusetts, Msgr. Christopher J. Weldon, director of Catholic Charities in New York, was appointed Bishop of Springfield.

The surprise announcement was made in Worcester by Most Rev. Daniel Claggett, Auxiliary Bishop of the Diocese of Springfield.

The change was made by Pope Pius XII.

Other Italian-born appointments announced last night were: Msgr. Albert J. Smith, auxiliary bishop of the Diocese of Springfield; Msgr. John J. O'Connell, auxiliary bishop of the Diocese of Springfield; and Msgr. John J. O'Connell, auxiliary bishop of the Diocese of Springfield.

See BISHOP, Page 3

Driving Tough Today; More Snow on Way

The season's first major snowstorm moved out to sea last night after depositing up to six inches of snow throughout New England in the depths of midnight.

Two East Boston girls and a 14-year-old boy were killed in an accident and Francis A. McLean, 44, of 25 Centre St., Dorchester, collapsed and died in a heart attack induced by the snow while waiting along the Greenway, Dorchester.

Heavy-falling temperatures are expected throughout the area today and tomorrow.

Court Told Fear of Cancer Drove

Warmer Boston to Jananese

WASHINGTON, Jan. 31 (AP)—

Military, Scientists, Politicians Praise Act

AEC Indicates Hydrogen Project Already Started

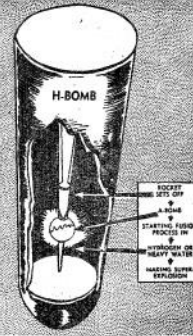
By CARL LEVIN
 WASHINGTON, Jan. 31—President Truman today ordered the Atomic Energy Commission to proceed with work on the hydrogen experiment, the device was announced in a 127-word statement issued at the White House. It was greeted with immediate and almost unanimous approval by both Republicans and Democrats in Congress.

Similar approval was voiced at once by leading atomic scientists, by government citizens, by the head of the Army's warlike energy project and by Senator McCarver, who labored to pass within the United States an anti-Soviet-American agreement on international control of atomic weapons.

In announcing the directive the President made clear he will see to it that work on all forms of atomic weapons will continue until satisfactory international control is achieved.

The statement began: "It is part of my responsibility as Commander-in-Chief of the armed forces to see to it that our country is able to defend itself against any possible aggression."

"Accordingly, I have directed the Atomic Energy Commission to continue its work in all forms of atomic weapons, including the so-called hydrogen or super-bomb, like all other work in the field of atomic energy, it is being and will be carried forward on a basis of complete and full cooperation with the scientific and engineering personnel of our country. The price and security of this work will be maintained at the highest level."



ARTIST'S CONCEPTION OF how the hydrogen bomb might work, using atomic bomb as a mere "trigger" to generate enough heat to set off the H-bomb's "thermonuclear fusion" process.

3 Brink's Employees Called in New Quiz

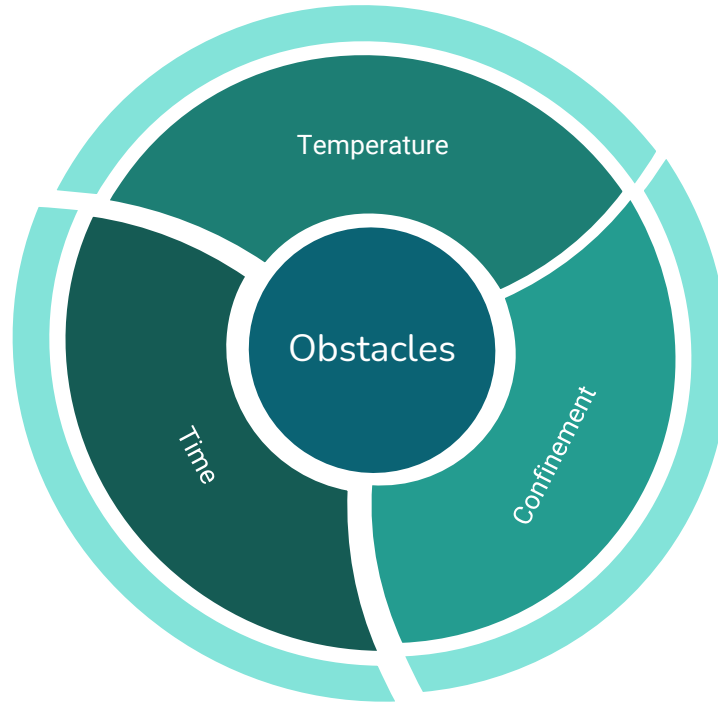
In a surprise move in the Brink's investigation, three of the five employees who were present in the office at the time of the hold-up were brought to Police Headquarters early this morning for re-questioning.

Police refused to disclose a reason for the sudden re-arrest.

Another disclosure last night was that investigators probing the robber's biggest cash holding are contemplating using the information to aid them in their investigation of witnesses and suspects.

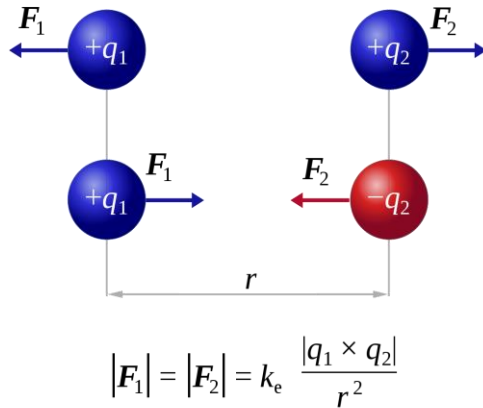
The police and security forces will be at the polygraph-lab...

02 - Obstacles of creating a nuclear fusion





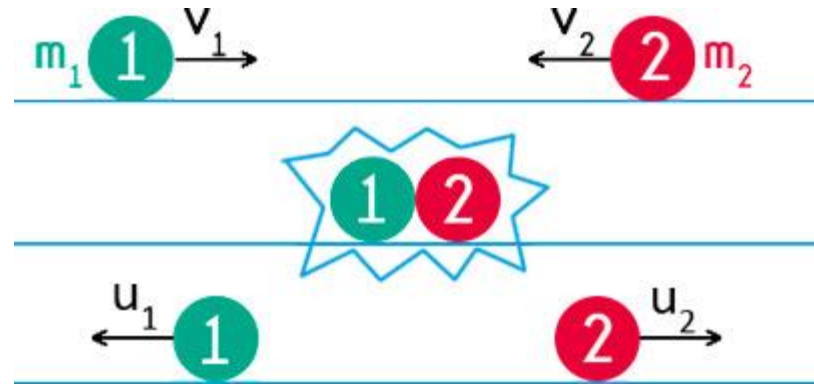
The Coulomb Force and Elastic Collisions



“Ignition temperature”

“Thermonuclear fusion or Holt melt”

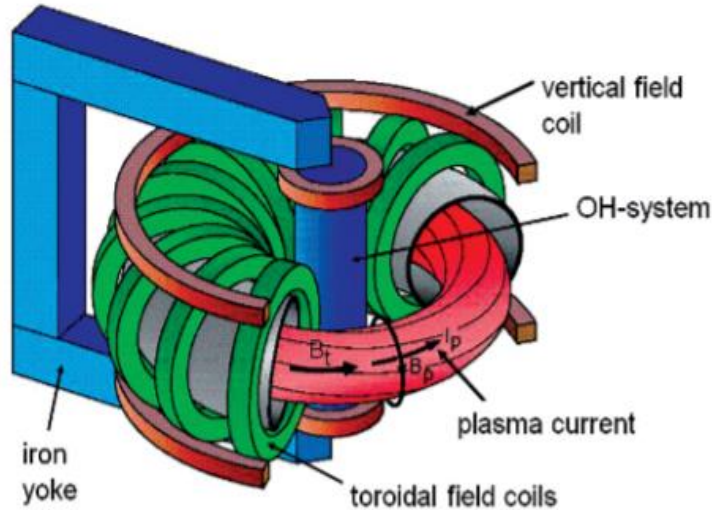
The need for an efficient confinement system



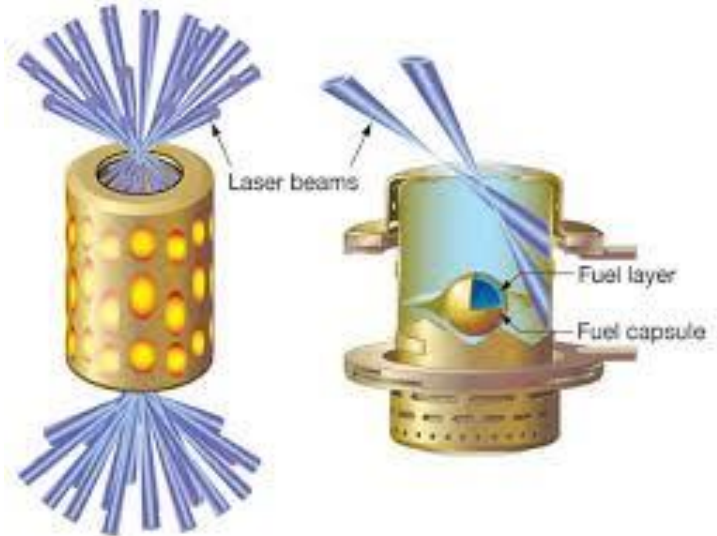
Confinement System

03 - A solution: confinement methods

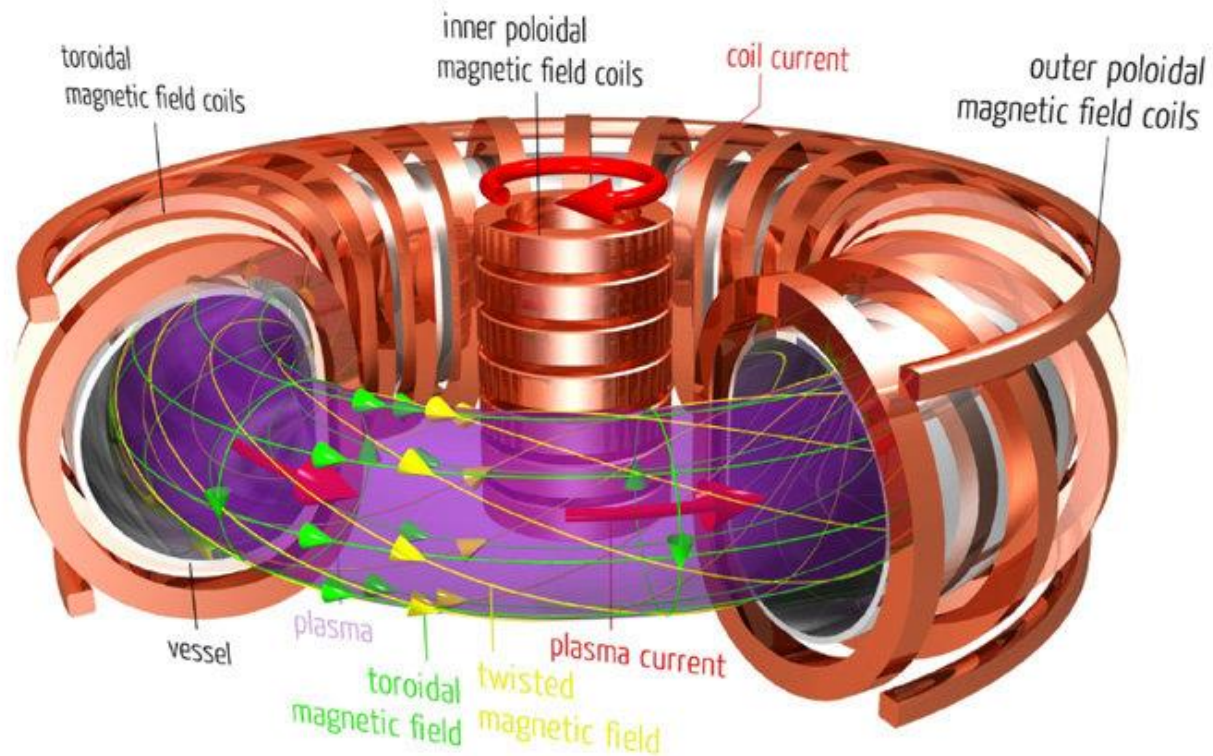
Magnetic Confinement



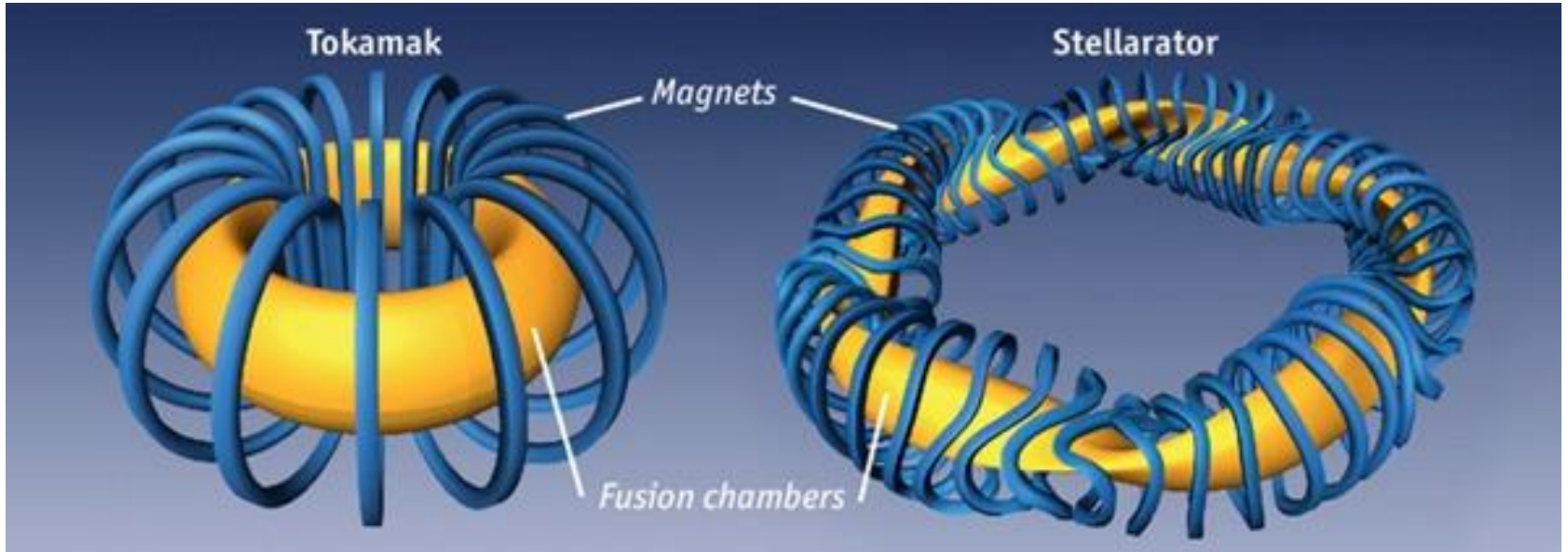
Inertial Confinement



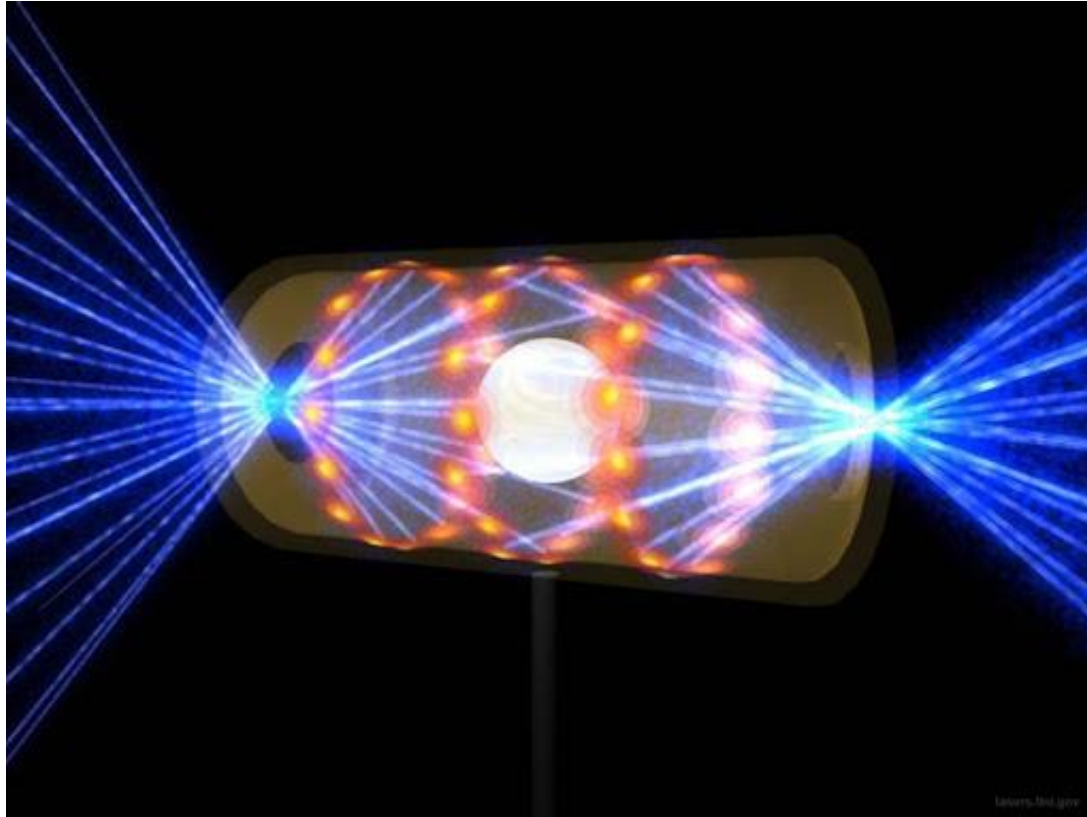
MAGNETIC CONFINEMENT



Tokamak vs Stellarator.



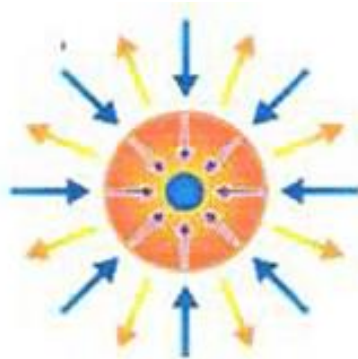
INERTIAL CONFINEMENT



Nuclear fusion process.



a. Laser pulse



b. Compression

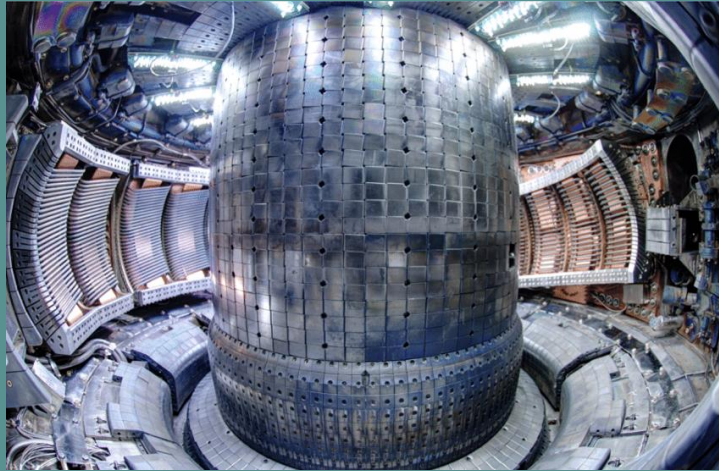


c. Implosion

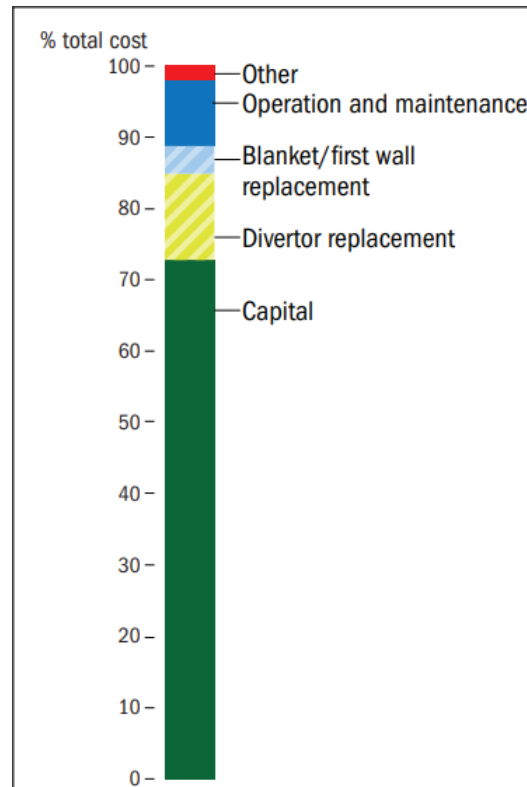
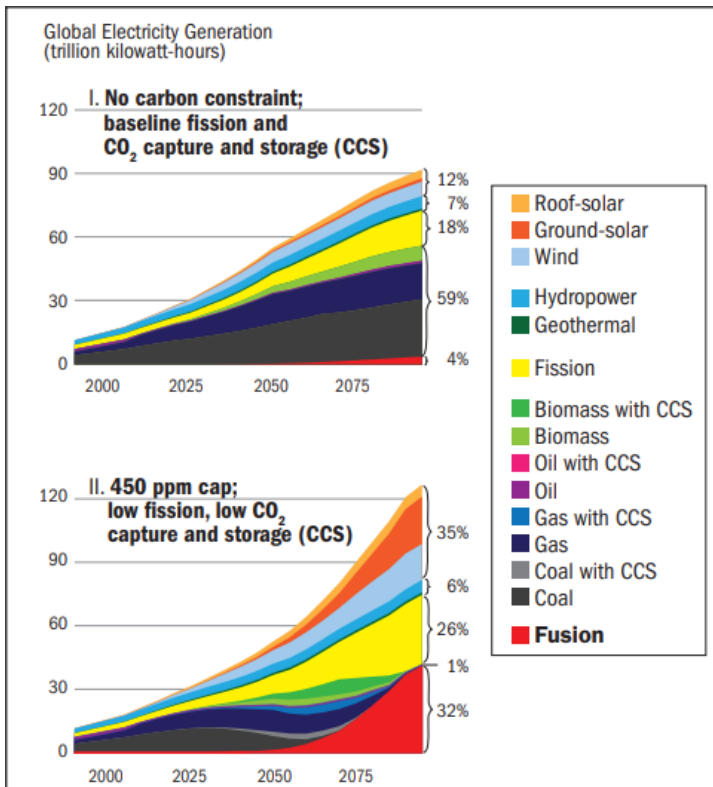


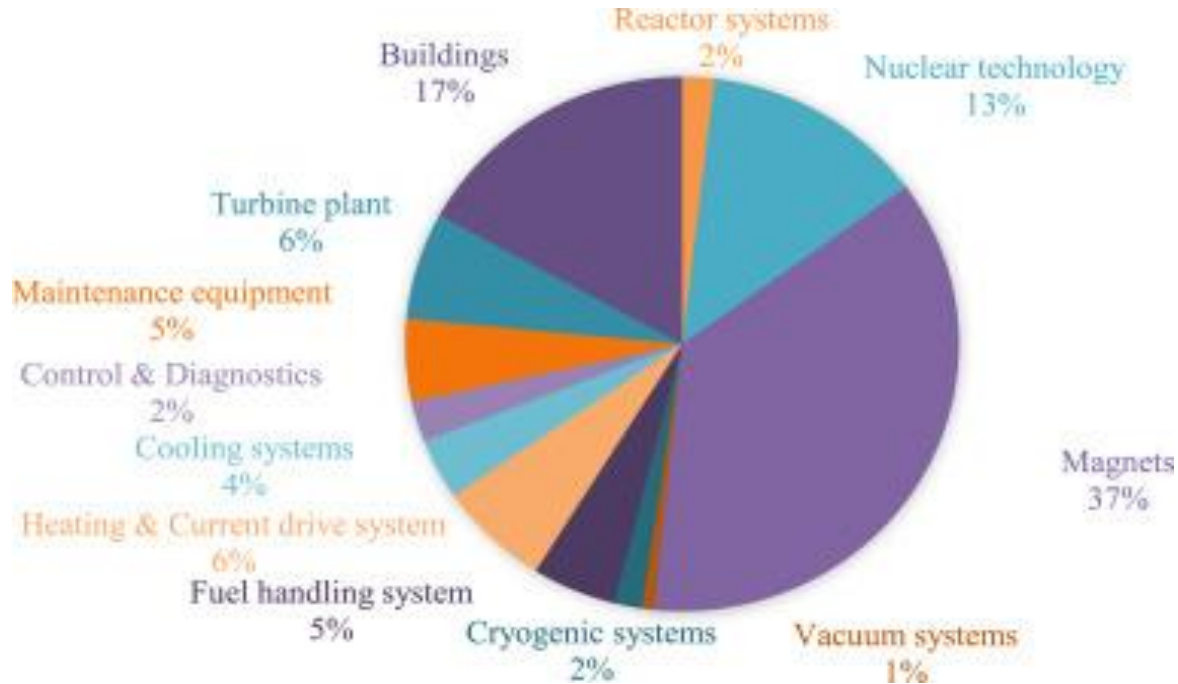
d. Fusion

04 - The economics of nuclear fusion



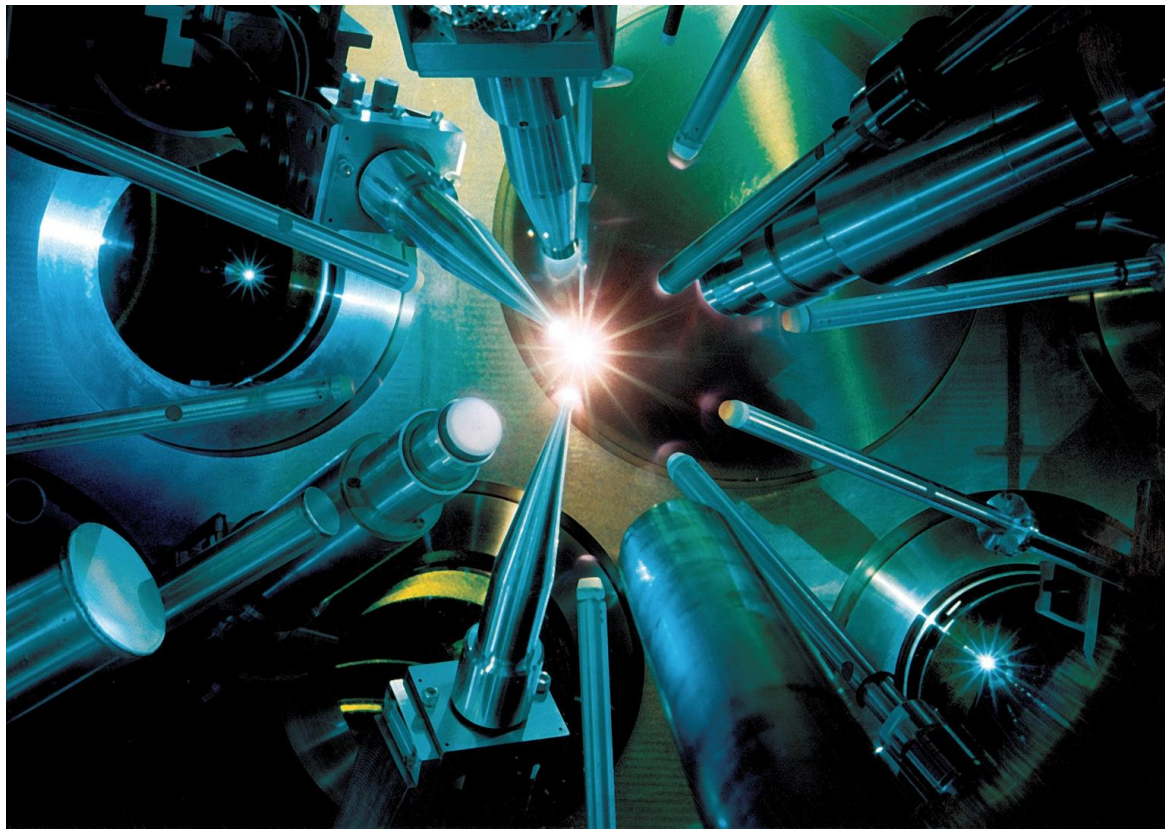
MAGNETIC FUSION ENERGY ECONOMICS

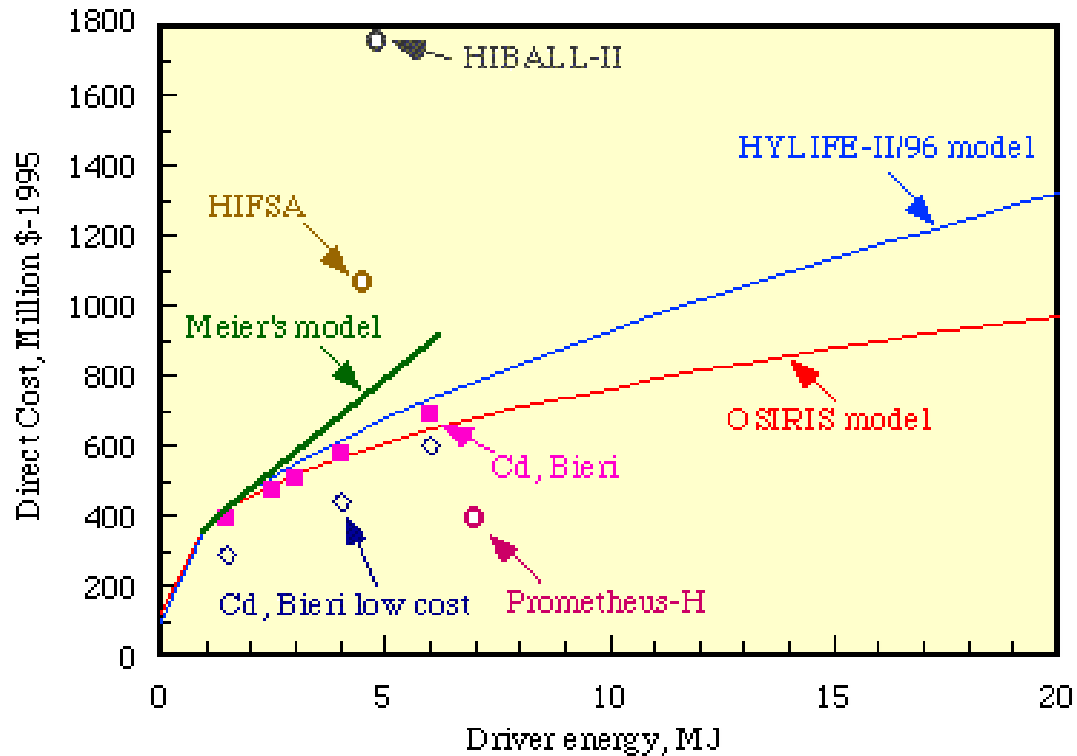




An example of the structure of the direct costs of a nuclear fusion plant (DEMO2 reference model, in this case)

INERTIAL FUSION ENERGY ECONOMICS





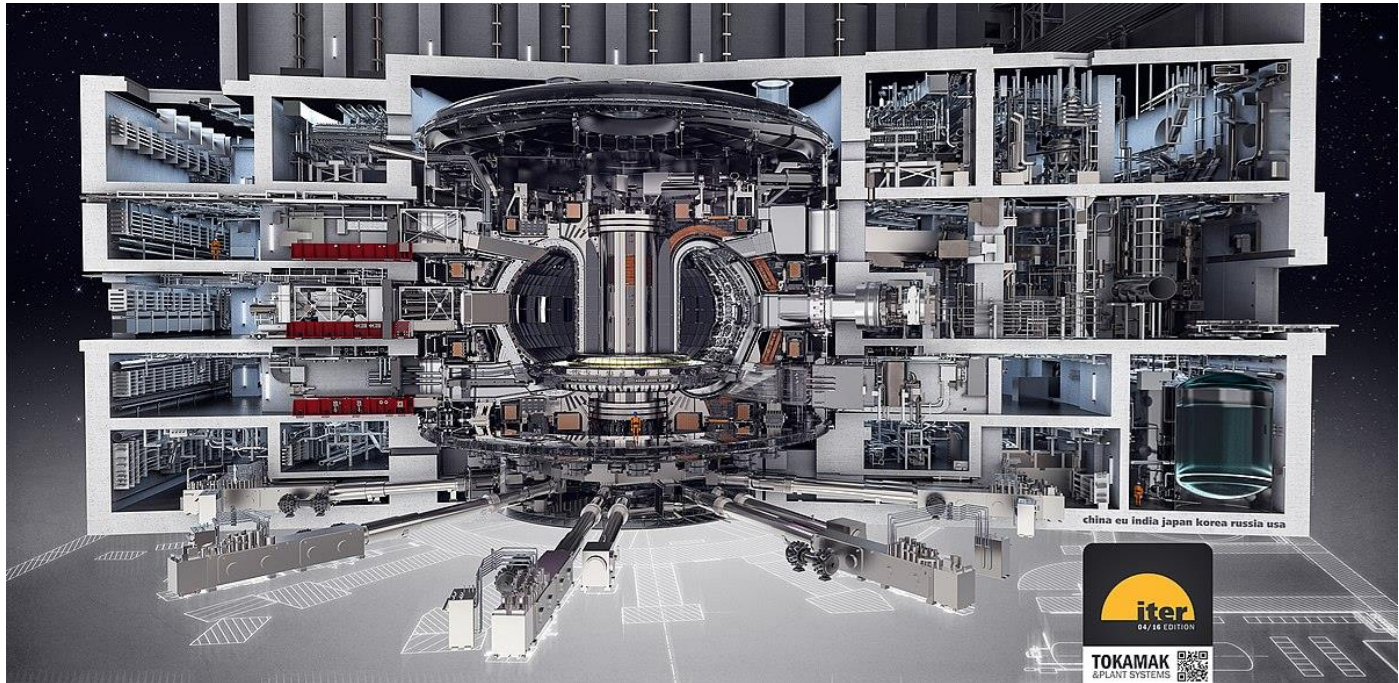
Energy-cost relation of drivers from many nuclear fusion projects.

05 - Projects working on solutions





ITER

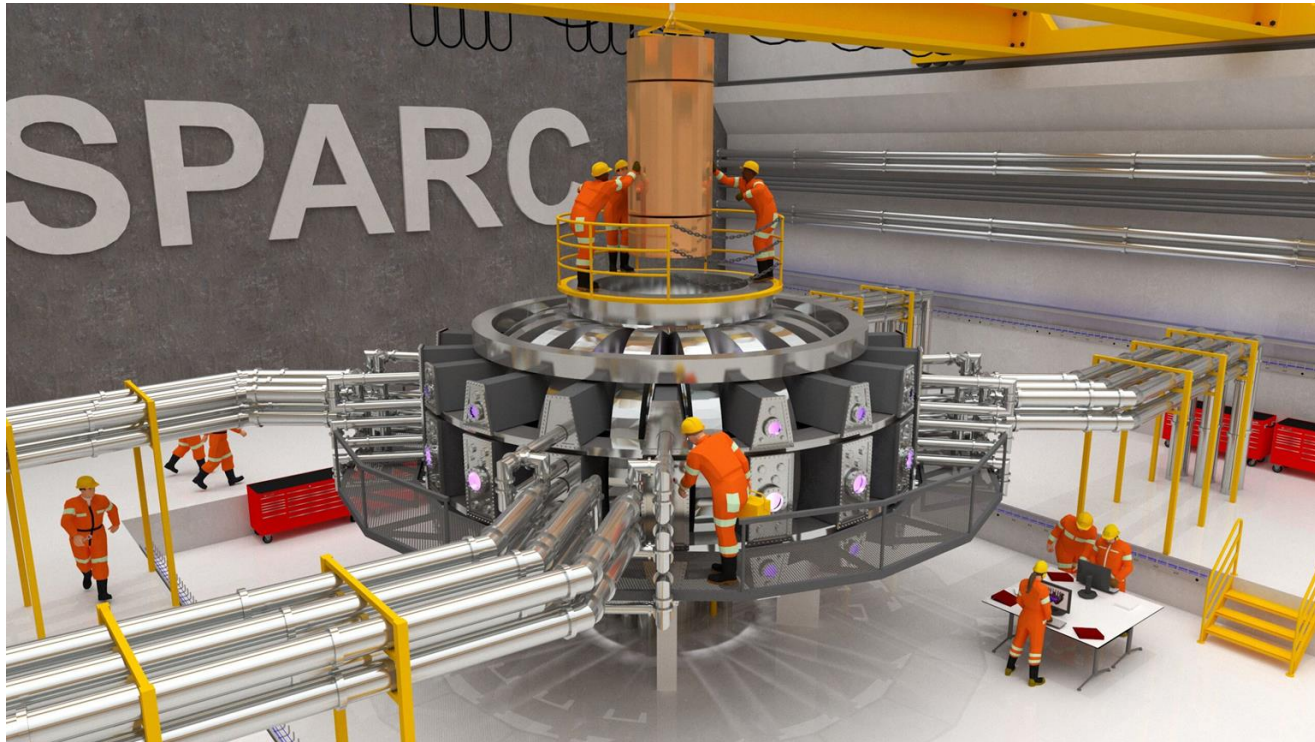


Assembling the machine.

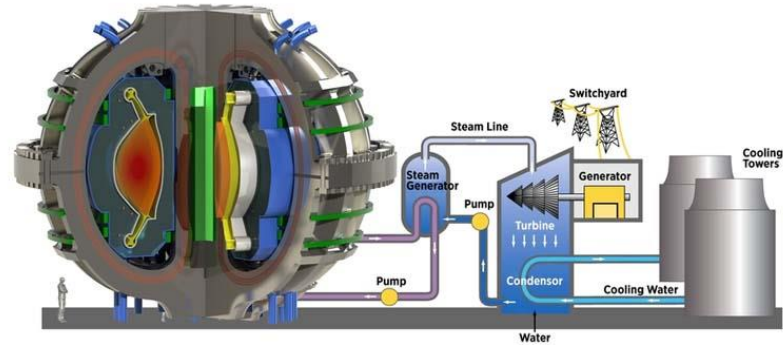
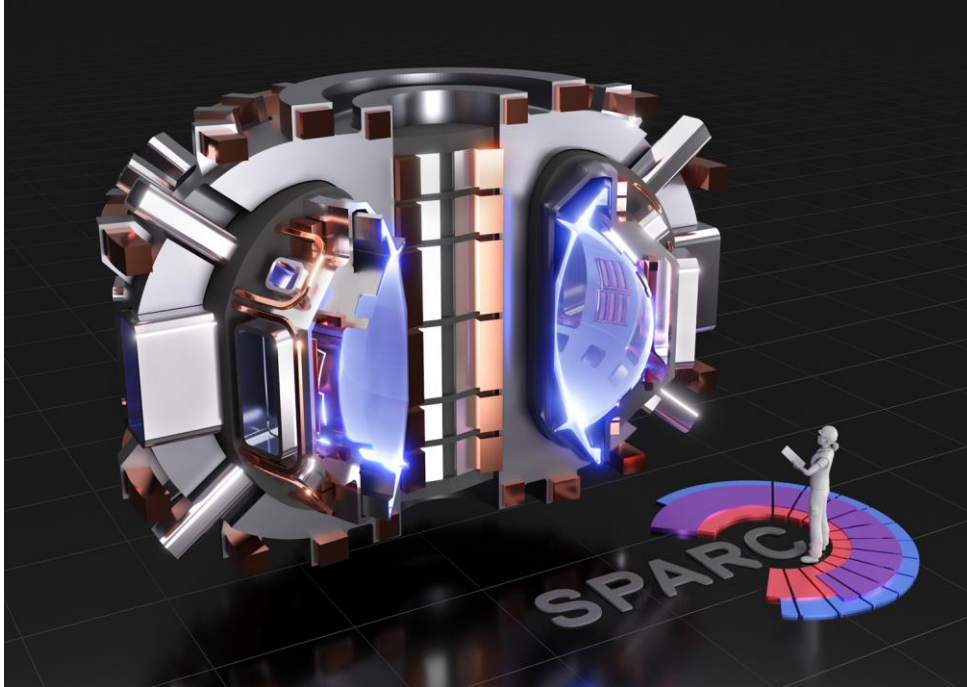




SPARC



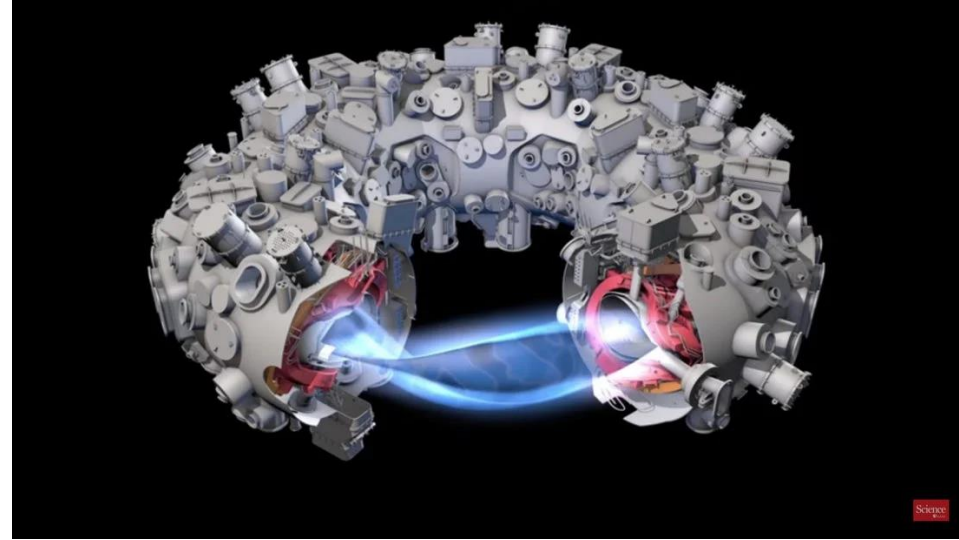
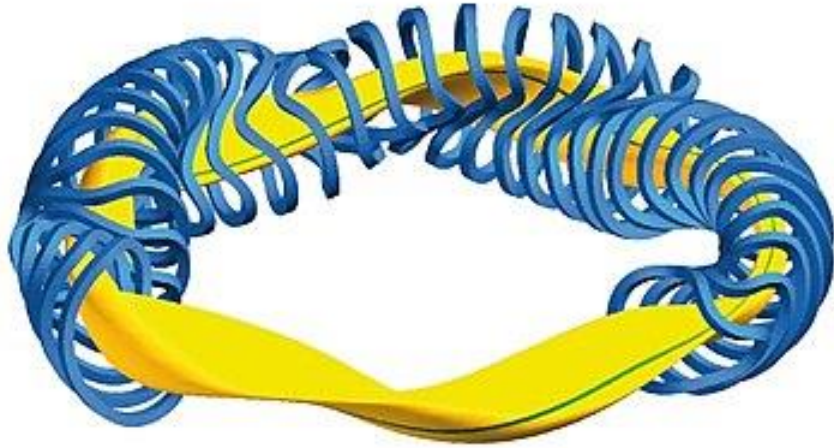
SPARC Tokamak's design.



Weldenstein X-7



Wendstein X-7 stellarator's design.

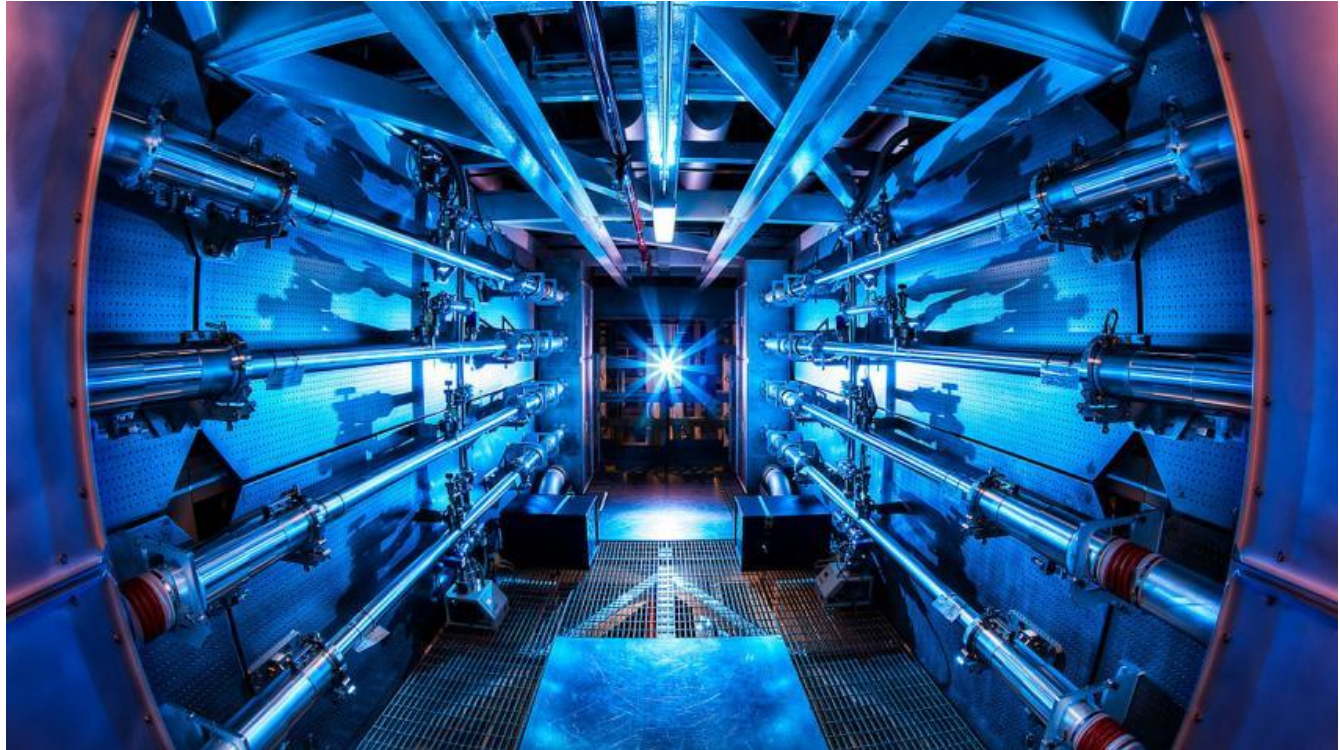


W-7X – Max Planck IPP, Greifswald.





NIF





FIREX-1



FIREX-1 project has been started to demonstrate $T_i = 5$ keV.



ILE, Osaka





06 - CONCLUSIONS

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Possibilities of using energy provided from nuclear fusion in the near future

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Civil Engineering

2020

