



Reactor Achieves Breakthrough in Nuclear Fusion Milestone

Description

On Tuesday, French scientists [announced](#) a significant achievement in the pursuit of nuclear fusion, successfully maintaining a highly energetic plasma for an unprecedented duration of 22 minutes. This milestone is considered crucial in the multifaceted journey toward realizing fusion as a viable energy source.

Nuclear fusion is lauded for its potential to provide a sustainable, safe, and virtually limitless energy supply, yet the pursuit has remained an arduous challenge for decades. The process aims to replicate the natural reactions occurring in the cores of stars, where two atomic nuclei are fused—a stark contrast to fission, utilized in conventional nuclear power plants, which involves splitting atomic nuclei.

To achieve this, tremendous temperatures exceeding 100 million degrees Celsius are required to generate and sustain plasma. This superheated, ionized gas is inherently unstable, which poses risks of energy loss and significantly hampers the efficiency of future fusion reactors.

According to France's Atomic Energy Commission (CEA), the WEST tokamak facility in southern France successfully maintained plasma for 1,337 seconds on February 12, breaking the previous record set in China by 25%. Anne-Isabelle Etievre, the CEA's head of fundamental research, emphasized that sustaining plasma for such an extended period demonstrates significant advancements in both its production and maintenance.

Nevertheless, numerous technological hurdles remain before thermonuclear fusion can yield more energy than it consumes. In the coming month, the WEST team plans to extend plasma durations further—potentially enduring several hours—and achieve higher temperatures, as they strive to replicate conditions anticipated in fusion plasmas. Additionally, the scientists will investigate the impact of this "intense plasma" on the internal structure of the tokamak.

This research is instrumental in setting the stage for the International Thermonuclear Experimental Reactor (ITER), a collaborative project involving multiple nations, including China, the European Union, India, Japan, South Korea, Russia, and the United States, which began development in 1985. Originally slated to become operational this year, ongoing challenges and escalating costs have delayed its timeline until at least 2033.

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Vocabulary List:

1. **Achievement** /ə'tʃi:v.mənt/ (noun): A thing that has been done successfully typically by effort courage or skill.
2. **Pursuit** /pə'su:t/ (noun): The action of pursuing someone or something.
3. **Milestone** /'maɪlstəʊn/ (noun): A significant event or stage in the development of something.



4. **Sustainable** /sə'steɪ.nə.bəl/ (adjective): Able to be maintained at a certain rate or level; conserving an ecological balance by avoiding depletion of natural resources.
5. **Challenges** /'tʃæl.ɪn.dʒɪz/ (noun): A call to someone to participate in a competitive situation or an invitation to engage in a contest.
6. **Collaborative** /kə'læb.ər.ə.tɪv/ (adjective): Produced or conducted by two or more parties working together.

Comprehension Questions

Multiple Choice

1. What significant achievement was announced by French scientists in the pursuit of nuclear fusion?
Option: Maintaining plasma for 22 minutes
Option: Achieving a record temperature of 100 million degrees Celsius
Option: Successfully starting a fusion reactor
Option: Creating a sustainable energy supply
2. Which process involves replicating the natural reactions in the cores of stars?
Option: Fission
Option: Nuclear fusion
Option: Ionization
Option: Plasma generation
3. What is the main challenge hindering the efficiency of future fusion reactors?
Option: Temperature fluctuations
Option: Energy loss risks
Option: Plasma instability
Option: Lack of funding
4. Which facility in southern France broke the previous record for plasma duration?
Option: China Nuclear Center
Option: Tokamak Research Institute
Option: WEST tokamak
Option: CEA Fusion Lab
5. What collaborative project involves multiple nations working on thermonuclear fusion?
Option: STELLAR
Option: SUNRISE Initiative



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- Option: ITER
 - Option: Fusion Alliance

6. What is the goal of extending plasma durations and achieving higher temperatures?
- Option: Replicating fusion plasmas
 - Option: Enhancing internal structure of reactors
 - Option: Increasing energy consumption
 - Option: Boosting funding for ITER

True-False

- 7. Thermonuclear fusion is considered a simple process to achieve.
- 8. The WEST team plans to investigate the impact of intense plasma on external structures.
- 9. ITER was initially planned to be operational in 2021.
- 10. Nuclear fusion reactors aim to split atomic nuclei.
- 11. Energy loss risks pose significant challenges to future fusion reactors.
- 12. The WEST tokamak broke the plasma duration record set in Russia.

Gap-Fill

- 13. The WEST team plans to extend plasma durations further, potentially enduring several _____.
- 14. ITER is a collaborative project involving multiple nations, including China, the European Union, India, Japan, South Korea, Russia, and the _____.
- 15. The pursuit of nuclear fusion has remained an arduous challenge for _____.
- 16. The International Thermonuclear Experimental Reactor (ITER) began development in _____.
- 17. One of the main goals of thermonuclear fusion is to yield _____ energy than it



consumes.

18. Anne-Isabelle Etievre is the head of fundamental research at _____.

Answer

Multiple Choice: 1. Maintaining plasma for 22 minutes 2. Nuclear fusion 3. Energy loss risks 4. WEST tokamak 5. ITER 6. Replicating fusion plasmas

True-False: 7. False 8. False 9. False 10. False 11. True 12. False

Gap-Fill: 13. hours 14. United States 15. decades 16. 1985 17. more 18. CEA

CATEGORY

1. Sci/Tech - LEVEL5

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