



Physicists believe they have solved proton size mystery

Description

Recent studies have focused on the measurement of the proton's radius, which has caused confusion in the scientific community. Several experiments have produced different results over the years. In 2010, an international team reported a value of 0.84 femtometers. This measurement led to a discrepancy in the understanding of the proton's size, which is important in physics.

In 2013, the same team confirmed their finding through muon-based experiments, producing a similar measurement. Researchers later conducted a 2016 experiment with a heavier hydrogen isotope, which also supported the 2010 result. However, studies in 2017 and 2018 using regular hydrogen showed mixed results. The 2017 study matched the 2010 value, while the 2018 measurement suggested a larger size.

In 2019, scientists from York University aimed to clarify the conflicting results. They measured the proton's radius using electrons and found a value of 0.833 femtometers, again aligning with the earlier finding.

Most recently, two studies used advanced techniques in vacuum chambers with lasers to examine hydrogen atoms. These studies confirmed that the proton has a radius of about 0.84 femtometers, consistent with the original 2010 measurement. As physicist Juan Rojo noted, the proton radius should be a universal property, and these papers provide different methods to reach the same conclusion.

Vocabulary List:

1. **measurement** //ˈmeɪʒərmənt// (noun): a number that shows size or amount
2. **discrepancy** //dɪ'skreɪpənsi// (noun): a difference between two things that should match
3. **isotope** //ˈaɪsə,təʊp// (noun): a type of atom with extra or fewer neutrons
4. **muon** //ˈmju:ən// (noun): a tiny particle similar to an electron
5. **vacuum** //ˈvækjuəm// (noun): a space with no air inside
6. **techniques** //tek'ni:ks// (noun): special ways to do something correctly

Comprehension Questions

Multiple Choice

1. What value of the proton's radius did the international team report in 2010?



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- Option: 0.84 femtometers
Option: 0.833 femtometers
Option: 0.85 femtometers
Option: 0.8 femtometers
2. In what year did researchers conduct an experiment with a heavier hydrogen isotope?
- Option: 2010
Option: 2013
Option: 2016
Option: 2018
3. What was the result of the 2018 measurement regarding the proton's radius?
- Option: It matched the 2010 value
Option: It suggested a larger size
Option: It was inconclusive
Option: It confirmed the 2016 finding
4. Which university conducted research in 2019 to clarify conflicting results about the proton's radius?
- Option: Harvard University
Option: Oxford University
Option: York University
Option: Stanford University
5. According to recent studies, what is the proton's radius confirmed to be?
- Option: 0.84 femtometers
Option: 0.85 femtometers
Option: 0.82 femtometers
Option: 0.83 femtometers
6. What measurement technique did the most recent two studies use to examine hydrogen atoms?
- Option: Microscopy
Option: Vacuum chambers with lasers
Option: Ultrasound
Option: Magnetic resonance

True-False

7. The 2010 measurement of the proton's radius was later adjusted in subsequent years.



8. The measurements from 2017 and 2018 were consistent with each other.
9. All experiments conducted from 2010 to 2019 produced different results.
10. The measurement of 0.833 femtometers was reported by scientists from York University.
11. Juan Rojo stated that the proton radius should be a variable property.
12. The proton radius measurements have shown an overall agreement with the original findings.

Gap-Fill

13. In 2010, an international team reported a proton radius value of _____ femtometers.
14. The 2016 experiment used a heavier hydrogen isotope to support the _____ result.
15. The 2018 measurement suggested a _____ size compared to the earlier findings.
16. The 2019 measurements from York University aligned with the earlier finding of _____ femtometers.
17. The recent studies used advanced techniques in vacuum chambers with _____ to confirm the proton's radius.
18. Most measurements confirmed that the proton has a radius of about _____ femtometers.

Answer

Multiple Choice: 1. 0.84 femtometers 2. 2016 3. It suggested a larger size 4. York University 6. Vacuum chambers with lasers

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

Gap-Fill: 13. 0.84 14. 2010 15. larger 16. 0.833 17. lasers

CATEGORY

1. Sci/Tech - LEVEL3



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