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[\[Physics\]\[International Cooperation\] The Proton Shrinks in Size! Shocking Findings to Which Taiwan Scholars Have Made Contributions Reported by 《Nature》](#)

[Physics][International Cooperation] The Proton Shrinks in Size! Shocking Findings to Which Taiwan Scholars Have Made Contributions Reported by 《Nature》 ([Chinese Version](#))

CNA News, HiNet News (2010/07/13) & udn.com (2010/07/13) The 466th Issue of Nature on July 8 reported a shocking news to modern physics as its cover story. An international team in which the team led by Professor Yi-Wei LIU, Physics Department, National Tsing Hua University, participated in, has discovered that the size of the proton seems to be 0.000000000000003 millimetres, namely, about 4% in radius and 12% in size smaller than researchers previously thought.

President of National Tsing Hua University Lih J. CHEN pointed out, the findings may rewrite quantum electro-dynamics and topple the so-called “the most accurate physical constant”-- Rydberg constant, while the physics textbooks may all need rewritten.

The proton, the neutron and the electron are the three major particle elements making up an atom. The atomic nucleus consists of the proton and the neutron, while the electron circulates externally to the nucleus. According to Yi-Wei LIU, the hydrogen atom is simple, consisting of a proton in the nucleus and an electron; hence, it is a very suitable study object for quantum physics.

Yi-Wei LIU joined in the international cooperation team of 32 scientists from twelve research institutes, six countries or areas, in 2001. They use “muon” (an elementary particle similar to the electron, with a negative electric charge and a mean lifetime about 2 μ s) to replace hydrogen's electron making it an “exotic hydrogen atom” as the investigation target. Because the muon can get 200 times closer to the proton than the electron so that it can be more “sensitive” to the size of the proton. With the method, the team discovered that the radius of the proton is 0.84184 femtometres (1 femtometre = 10^{-15} metres), with an error range of 0.0074 femtometres, ten times more accurate than the previous testings.

Yi-Wei LIU pointed out, although the difference between the new and the previous measurement result is only four percent, its impact to physics is gigantic. Of course this cannot be the final determination of the proton size, he said, but, as he estimated, the measurement result will not be toppled within five years. He said, the findings imply that the development of atomic physics during the last century would need re-examined, which was believed to be the most trendy issue in the following years.

Related Website:

Nature News <http://www.nature.com/news/2010/100707/full/news.2010.337.html>

Further Information:

[CNA News 2010/07/13](#) (Chinese)

[HiNet News 2010/07/12](#) (Chinese)

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