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[\[Physics\] Physicists in Taiwan Innovate Technique for Probing Neutrino Magnetic Effects](#)[Physics] Physicists in Taiwan Innovate Technique for Probing Neutrino Magnetic Effects ([Chinese Version](#))

Academia Sinica Newsletter (2010/08/10) A research team in Taiwan has recently identified a new detection channel on atomic ionization to study possible neutrino electromagnetic interaction, a discovery that will enhance the experimental sensitivity by more than a hundred times. Research Fellow Henry Tsz-king WONG, Postdoctoral Fellows Hau-Bin LI and Shin-Ted LIN from the Institute of Physics at Academia Sinica have achieved best sensitivities on the studies of neutrino magnetic moments by using reactor neutrino data. The research was published in the journal Physical Review Letters on August 2, 2010 (US Eastern Time).

Neutrinos are electrically neutral particles that travel nearly as fast as the speed of light. They are produced in certain types of radioactive decay or nuclear reactions, such as those at the Sun or nuclear reactors. It is therefore extremely challenging to detect and measure a neutrino. However, investigations during the past decade have succeeded in showing compelling evidence that neutrinos have mass, which will naturally lead to anomalous neutrino interactions and properties. New physics incorporating massive neutrinos generically allows finite neutrino magnetic couplings with matter via its spin, experimentally manifested as the measurable neutrino magnetic moments.

Previous research on neutrino magnetic moments focused mostly on the comparison of electron recoil energy in neutrino-electron interaction with the predictions from the Standard Model of particle physics. In this study, the researchers proposed an alternative mechanism of atomic ionization for the detection of neutrino magnetic moments and demonstrated great enhancement in sensitivities. Using data made available from the Kuo-Sheng Reactor Neutrino Laboratory, they derived the most stringent upper limit in neutrino magnetic moments and explored the potential limiting sensitivities future experiments might encounter.

This study is conducted within the Taiwan Experiment On Neutrino (TEXONO) research program funded jointly by the National Science Council and Academia Sinica. The theme of the program is on the study of neutrino and dark matter physics as well as the development of low-energy, low-background detector techniques. The core facility is the Kuo-Sheng Neutrino Laboratory located at a distance of 28 m from the reactor core of Taiwan's Second Nuclear Power Station.

The full article titled "Enhanced Sensitivities for the Searches of Neutrino Magnetic Moments through Atomic Ionization" is available at the Physical Review Letters website : <http://prl.aps.org/abstract/PRL/v105/i6/e061801>

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[National Science Council International Cooperation Sci-Tech Newsbrief](#)

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