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Physics Student's Research Wins Top Honor

April 7, 2017

BLOOMINGTON, Ill.— Illinois Wesleyan University [physics](#) major Zhenghao (Andy) Ding has been honored with an outstanding undergraduate research award by the American Physical Society (APS) at its annual March Meeting.

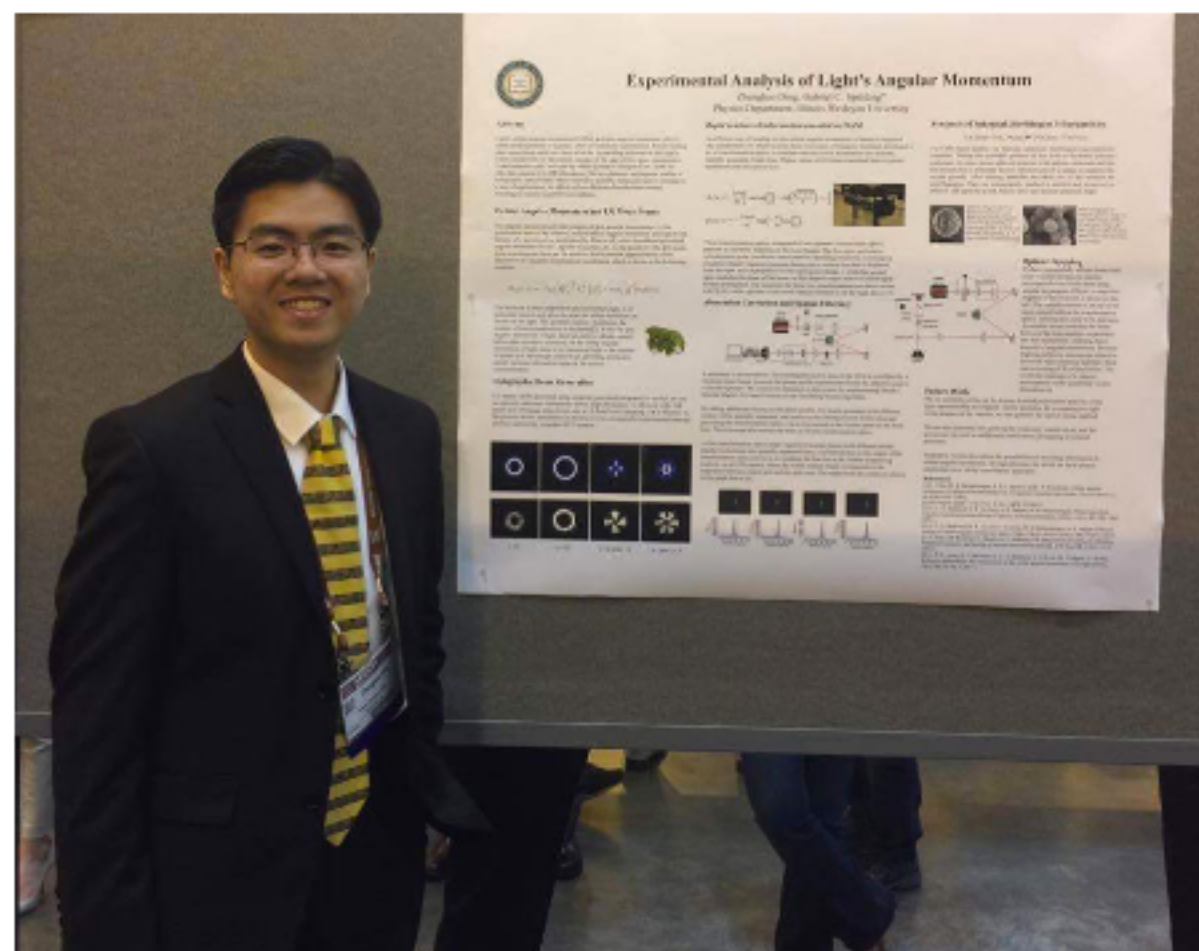
The APS March Meeting is the largest such meeting in the world – over 10,000 physicists gather for group's annual event. "The APS March Meeting is, for us, 'the big league,'" said Ding, who was notified of the award this week. He was one of only 17 undergraduates from across the country to receive the Future of Physics Days Outstanding Undergraduate Research Presentation Award.

Ding's research poster was entitled "Experimental Analysis of Light's Angular Momentum." Ding studies laser beams, which have been encoded with information in helical wavefronts. "The number of intertwined helical twists in the beam determine the orbital angular momentum of the light," Ding explained. "If this kind of beam hits one of the micron-scale spherical particles that I synthesized with the help of Professor of Chemistry Tim Rettich, the so-called 'angular momentum' of light can be transferred to these small objects and really will make them move in rotation. Most of what I've done has to do with optical communications, which is what powers the backbone of the internet."

In the physics lab at Illinois Wesleyan, Ding and colleagues have cleanly encoded information in the form of superpositions of quantized angular momentum in the beam. "We were also able to rapidly read out this information, using a special set of optics that perform a 'conformal mapping,'" Ding explained. "The hope is that this research can help guide the way toward significantly boosting the information capacity of optical fibers."

At the APS March Meeting, Ding presented a poster highlighting his work in a session lasting three hours. "I introduced my research to over 60 people during that time," he said.

A native of Zhengzhou, China, Ding will graduate in May after completing his IWU coursework in three years. He has just finished his honors thesis (123 pages) under the supervision of Ames Professor of Physics Gabe Spalding. The thesis includes his research on light's angular momentum and also includes his work on developing 'lab-on-a-chip' technologies and on quantum optics. Spalding's special topics course this semester meant Ding could bring other physics majors into the lab, where they conducted hands-on experiments with single-photon quantum mechanics. "I've enjoyed that, and part of my thesis will, I hope, be used by future IWU students every year, for some time to come," Ding said. "That's pretty cool to think about."



Andy Ding's research poster was entitled "Experimental Analysis of Light's Angular Momentum."