# Dr. Ponn Maheswaranathan Professor of Physics

Department of Chemistry, Physics, and Geology

Winthrop University, Rock Hill, SC 29733

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EDUCATIONAL DEGREES

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| Institution | Degree | Year | Field of Study |
| Purdue University West Lafayette, IN 47907 | Ph.D. | 1985 | Experimental Solid State Physics |
| Purdue University West Lafayette, IN 47907 | M.S | 1982 | Physics |
| University of Peradeniya Peradeniya, Sri Lanka | B.Sc  First Class Honors | 1978 | Major: Physics Minor: Mathematics |

FIELD OF SPECIALIZATION Experimental Solid State Physics

Investigation of the elastic, structural, electrical, and magnetic properties of diluted magnetic semiconductors, II-VI semiconductor alloys, ceramics, superconductors, and ferrofluids. Experimental techniques include ultrasonic velocity and attenuation measurements, transport measurements, and materials preparation & characterization.

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EMPLOYMENT EXPERIENCE

Professor of Physics (May 2003 ‑ present)   
Associate Professor of Physics (May 1992 – May 2003)  
Assistant Professor of Physics (August 1985 ‑May 1992)  
Department of Chemistry, Physics, Geology, Winthrop University, Rock Hill, SC 29733

Faculty Research Participation (May 1998 – August 1998)

Solid State Division, Superconductivity, Oak Ridge National Lab, Oak Ridge, TN 37831

Visiting Scholar (May 1989 – August 1989)  
Department of Physics, Purdue University, West Lafayette, IN 47907

CONSULTATIONS

College Board (AP Course Audit): Senior Reviewer for Physics C-Mechanics, Reviewer for Physics C- Electricity and Magnetism, and AP Physics Reader (2006-2009 & 2015).

ACT: Test Development and Science Content Panel (Review and Critique).

PUBLICATIONS

1. Research Summaries testing unit on the topic, Impedance Plethysmography, consisting of a stimulus and twelve items based on that stimulus, reviewed by the ACT Test Development Team. Work sample was accepted on February 12, 2013. Completed unit was accepted on March 23, 2015.
2. Research Summaries test unit on the topic, Inductor, consisting of a stimulus and twelve items based on that stimulus, reviewed by the ACT Test Development Team. Work sample was accepted on September 25, 2013. Completed unit was accepted on November 20, 2013.
3. Research Summaries test unit on the topic, Oil-Drop Experiment, consisting of a stimulus and twelve items based on that stimulus, reviewed by the ACT Test Development Team. Work sample was accepted on March 25, 2013. Completed unit was accepted on May 29, 2013.
4. Research Summaries test unit on the topic, Motional EMF, consisting of a stimulus and twelve items based on that stimulus, reviewed by the ACT Test Development Team. Work sample was accepted on September 11, 2012. Completed unit was accepted on November 15, 2012.
5. Research Summaries test unit on the topic, “Spring Loaded Launchers”, consisting of a stimulus and twelve items based on that stimulus, reviewed by the ACT Test Development Team. Work sample was accepted on April 9, 2012. Completed unit was accepted on May 30, 2012.
6. End of Course Physics testing unit, consists of 20 items, reviewed by the ACT Test Development Team. Completed unit was accepted on May 16, 2012.
7. Research Summaries test unit on the topic, “Cathode Ray Tube”, consisting of a stimulus and twelve items based on that stimulus, reviewed by the ACT Test Development Team. Work sample was accepted on May 10, 2011. Completed unit was accepted on June 29, 2011.
8. Developed five ACT End of Course Physics testing units, each consists of 20 items. Units were accepted as follows: 43040 (August 31, 2011), 43041 (October 19, 2011), 43642 (November 15, 2011), 43643 (December 5, 2011), and 44636 (April 24, 2012).
9. “A High-Temperature Superconducting Thin-Film Meander as a Superconducting Switch”, as an essay in the Essential Study Partner CD to accompany Physical Science, fifth edition, 2002, Bill W. Tillery, McGraw-Hill publishing.
10. “Revisiting Visualizing the Thin-Lens Formula”, letter to the editor, The Physics Teacher, 39 (452), November 2001.
11. "Effective charge and bond stretching and bond bending force constants in Cd1‑xMnxTe, with 0  x  0.52, and Cd0.52Zn0.48Te and ZnTe,” Physics Essays, **6(2)**, 217 (1993).
12. "Pressure dependences of the elastic constants and structural stability of Zn1‑xMnxSe with x = 0.37 and 0.53", Physical Review B**41**, 12076 (1990).
13. "Pressure dependences of the elastic moduli and the diffuse ferroelectric phase transition in PbMg1/3Nb2/3O3", Physical Review B **35**, 3369 (1987).
14. "Elastic anomalies near the magnetic transition in Cd1‑xMnxTe,” Journal of Magnetism and Magnetic Materials **54‑57**, 1225 (1986).
15. "Ultrasonic attenuation and velocity in Cd1‑xMnxTe with x.5,” Journal De Physique, **12**, C 10‑513 (1985).
16. "Elastic constants and their pressure dependences in Cd1‑xMnxTe with 0 ≤ x ≤ 0.52 and in Cd0.52Zn0.48Te,” Physical Review B **31**, 5212 (1985).
17. "Ultrasonic determination of electromechanical coupling and ionization energies in Cd1‑xMnxTe with 0 ≤ x ≤ 0.52 and in Cd0.52Zn0.48Te,” Physical Review B **31**, 7910 (1985).

PRESENTATIONS

1. Presented a poster (w/Cormac Kelly), “CHARGE CHARACTERISTICS OF RECHARGEABLE BATTERIES”, at the annual April meeting of the American Physical Society, Savannah, GA, April 5-8, 2014. Abstract is published in the Bulletin of the American Physical Society, Volume 59 (5), T1 39, p179.
2. Presented a poster (w/Justin Talbert), “SYNTHESIZING AND SIZE-CHARACTERISTICS OF FERROFLUIDS”, at the 79th annual meeting of the southeastern section of the American Physical Society, Tallahassee, FL, November 14-17, 2012. Abstract is published in the Bulletin of the American Physical Society, Volume 57 (16), KA58, p498.
3. Presented a poster (w/Justin Talbert), “SYNTHESIZING AND CHARACTERISTICS OF FERROFLUIDS”, at the Big SURS conference, Winthrop University, April 13-14, 2012.
4. Presented a paper, ‘Summer Institute for High School Teachers’, at the April meeting of the American Physical Society, St. Loius, Missouri, April 11-15, 2008. Abstract is published in the Bulletin of the American Physical Society, Volume 53 (5), K1 5, p148.
5. Presented a paper, ‘Summer Institute for Physical Science Teachers’, at the April meeting of the American Physical Society, Jacksonville, Florida, April 14-17, 2007. Abstract is published in the Bulletin of the American Physical Society, Volume 52 (3), R7 9, p147.
6. Presented a paper, ‘Motion sensors in introductory physics laboratory and beyond’, at the March meeting of the American Physical Society, Baltimore, MD, March 13-17, 2006. Abstract is published in the Bulletin of the American Physical Society, Q1.00176.
7. Presented a paper, ‘Measuring the resistivities of metal wires using a digital multimeter’, at the April meeting of the American Physical Society, Denver, Colorado, May 1-4, 2004. Abstract is published in the Bulletin of the American Physical Society, K1-16, 49(2), page 89, 2004.
8. Presented a paper, ‘An Experiment to Determine the Discharge Characteristics of Common Batteries’, at the April meeting of the American Physical Society, Philadelphia, Pennsylvania, April 5-8, 2003. Abstract is published in the Bulletin of the American Physical Society, D1-25, 48(2), page 73, 2003.
9. Presented a paper, ‘Heat Build-up in Parked Cars’, at the Research Colloquium of the South Carolina Governor’s School for Science and Mathematics, February 9, 2002.

GRANTS RECEIVED

1. Obtained a 2013-14 Research Council award ($2500) for Curriculum Enhancement/Instructional Improvement, “Developing Effective Practices for online delivery of Everyday physics, PHYS 101”.
2. Obtained extramural grants totaling $178,886 from the SC department of education to conduct summer institutes for physical science teachers at Winthrop University: $51,712(2006), $49,264 (2007), $38,398 (2008), and $39,512 (2009).
3. Obtained a 2007-08 Curriculum Enhancement and Instructional Improvement grant, ($2550) from Winthrop Research Council, “Modified laboratory activities in physics (PHYS 201L-202L) to facilitate deep learning”.
4. Obtained a 2007-08 Research Council award ($2800) (w/Dr. McIntosh) for Research with a student as co-investigator, ‘Development of Chemical Sensors Based on Conductive Polypyrrole Films’.

TEACHING EXPERIENCE

Courses taught: Calculus and algebra based introductory physics courses with laboratory, circuit analysis, advanced experimental physics course, physical science courses, investigative physical science course, musical acoustics, materials science, and engineering mechanics.

Developed experiments, demonstrations, and laboratory manuals for introductory physics, investigative physical science, circuit analysis, and electronics.

RESEARCH EXPERIENCE

Investigated elastic, structural, electromechanical, and electrical properties of II-VI semiconductors and discovered enhancement of the electromechanical coupling factor in Cd1‑xMnxTe and weakening of the crystal structure in Cd1‑xMnxTe and Zn1‑xMnxSe.

Supervised undergraduate student research in materials science for chemistry majors at Winthrop

and student research under the Summer Mentor Program of the Governor’s school for Science and Math, SC.