

# Annual Report

*Department of Physics*

2017 - 2018

# Department of Physics

2017 – 2018

## FACULTY

**Chairperson:** Andrei Slavin

**Professors emeriti:** Abraham R. Liboff, Ralph C. Mobley, Norman Tepley, Paul A. Tipler, W.D. Wallace

**Distinguished professors:** Michael Chopp, Andrei Slavin, Gopalan Srinivasan, Yang Xia

**Professors:** Ken Elder, David Garfinkle, Bradley J. Roth,

**Associate professors:** Kapila Clara Castoldi, Evgeniy Khain, Alberto Rojo, Yuejian Wang

**Assistant professors:** Eugene Surdutovich, Wei Zhang

**Visiting Assistant professor:** Steffan Puwal

**Research associate professor:** Vasyl Tyberkevych

**Adjunct professors:** Jie Chen, Indrin J. Chetty, Xuanfeng Ding, James R. Ewing, Grant R. Gerhart, Carrie K. Glide-Hurst, Thomas Guerrero, Quan Jiang, Bryan Shumaker, Hamid Soltanian-Zadeh, Srinivasan Venkatesan, Uma Devi Venkateswaran, George Wilson, Di Yan, Hualiang Zhong

**Adjunct associate professors:** Rao Bidthanapally, Robert A. Knight, Jian Liang, Patrick N. McDermott

**Adjunct assistant professors:** Susan M. Bowyer, Benjamin Buller, Edward Castillo, Dan Ionascu, Kenneth Jenrow, Chunqi Qian

**Lecturers:** Rao Bidthanapally, Susan Bowyer, Sally K. Daniel, Jyothi Raman

**Chief adviser:** Eugene Surdutovich

## STAFF

Olga Babij, **Stockroom Assistant**

Rao Bidthanapally, **Instrumentation Specialist**

Dominic Crea, **Laboratory Technician**

Sally K. Daniel, **Laboratory Manager**

Carrie Inabnit, **Physics Stockroom Coordinator**

Jonathan Schemke, **Laboratory Technician**

Carol Searight, **Administrative Secretary**

**Courses Offered: May 2017- April 2018**

**Summer 2017, Part I**

<b><u>Course</u></b>	<b><u>Title</u></b>	<b><u>Enroll</u></b>
PHY 101	General Physics I	22
PHY 101	General Physics I	95
PHY 102	General Physics II	34
GEO 106	Earth Sci/Phy Geo	2
PHY 106	Earth Sci/Phy Geo	36
PHY 108	Principles of Physics I	7
PHY 108	Principles of Physics I	3
PHY 109	Principles of Phy. II	4
PHY 110	General Physics Lab I	71
PHY 110	General Physics Lab I	19
PHY 110	General Physics Lab I	25
PHY 110	General Physics Lab I	39
PHY 111	General Physics Lab II	14
PHY 111	General Physics Lab II	21
PHY 151	Intro. Physics I	32
PHY 161	Fundamentals of Phy I	57
PHY 690	Master of Sci. Res.	1

**Summer 2017, Part II**

<b><u>Course</u></b>	<b><u>Title</u></b>	<b><u>Enroll</u></b>
PHY 102	General Physics II	99
PHY 109	Principles of Phy. II	12
PHY 111	General Physics Lab II	36
PHY 111	General Physics Lab II	28
PHY 111	General Physics Lab II	15
PHY 111	General Physics Lab II	32
PHY 111	General Physics Lab II	32
PHY 152	Intro. Physics II	45
PHY 162	Fund. of Phy II	72
PHY 690	Master of Sci. Res.	1

**Fall 2017**

<b><u>Course</u></b>	<b><u>Title</u></b>	<b><u>Enroll</u></b>	<b><u>Course</u></b>	<b><u>Title</u></b>	<b><u>Enroll</u></b>
PHY 1010	General Physics I	95	PHY 1200	Phy. Everyday Life	18
PHY 1010	General Physics I	54	PHY 1510	Intro. Physics I	31
PHY 1010	General Physics I	96	PHY 1510	Intro. Physics I	27
PHY 1020	General Physics II	115	PHY 1520	Intro. Physics II	16
PHY 1040	Astronomy: Sol. Sys.	74	PHY 1610	Fund. Of Physics I	152
GEO 1060	Earth Sci/Phy Geo	3	PHY 1610	Fund. Of Physics I	78
PHY 1060	Earth Sci/Phy Geo	68	PHY 1620	Fund. Of Physics II	134
PHY 1080	Principles of Physics I	8	PHY 3070	Geophysics	8
PHY 1080	Principles of Physics I	4	PHY 3170	Modern Physics Lab	13
PHY 1080	Principles of Physics I	10	PHY 3250	Biological Physics	16
PHY 1090	Principles of Phy. II	14	PHY 3510	Int. Theoretical Phy.	8
PHY 1100	General Physics Lab I	18	PHY 3610	Mechanics I	12
PHY 1100	General Physics Lab I	65	PHY 3710	Modern Physics	18
PHY 1100	General Physics Lab I	25	PHY 4210	Thermodynamics	5
PHY 1100	General Physics Lab I	27	PHY 4970	Undergrad. Seminar	2
PHY 1100	General Physics Lab I	70	PHY 4995	Independent Research	4
PHY 1100	General Physics Lab I	32	PHY 5250	Radiation Biophysics	6
PHY 1100	General Physics Lab I	47	PHY 5520	Theoretical Physics	3
PHY 1100	General Physics Lab I	20	PHY 5530	Numerical Methods	2
PHY 1110	General Physics Lab II	30	PHY 6940	Seminar	1
PHY 1110	General Physics Lab II	25	PHY 8999	Doctoral Research	8
PHY 1110	General Physics Lab II	36	SCI 1000	Phy. Sci. in Life	17
PHY 1110	General Physics Lab II	30			
PHY 1110	General Physics Lab II	13			

## Winter 2018

<u>Course</u>	<u>Title</u>	<u>Enroll</u>	<u>Course</u>	<u>Title</u>	<u>Enroll</u>
PHY 1010	General Physics I	117	PHY 1110	General Physics Lab II	23
PHY 1010	General Physics I	56	PHY 1200	Phy. Everyday Life	25
PHY 1020	General Physics II	80	PHY 1510	Intro. Physics I	19
PHY 1020	General Physics II	145	PHY 1510	Intro. Physics I	10
PHY 1050	Astronomy: Stars	70	PHY 1520	Intro. Physics II	24
GEO 1060	Earth Sci/Phy Geo	3	PHY 1520	Intro. Physics II	27
PHY 1060	Earth Sci/Phy Geo	54	PHY 1610	Fund. Of Physics I	105
PHY 1080	Principles of Physics I	25	PHY 1610	Fund. Of Physics I	94
PHY 1080	Principles of Physics I	6	PHY 1620	Fund. Of Physics II	96
PHY 1090	Principles of Phy. II	12	PHY 1620	Fund. Of Physics II	111
PHY 1090	Principles of Phy. II	12	PHY 2995	Intro. to Research	1
PHY 1100	General Physics Lab I	44	PHY 3050	Astrophysics II	8
PHY 1100	General Physics Lab I	33	PHY 3260	Medical Physics	14
PHY 1100	General Physics Lab I	52	PHY 3310	Optics	14
PHY 1100	General Physics Lab I	43	PHY 3660	Vibrations & Waves	14
PHY 1100	General Physics Lab I	27	PHY 3810	Electricity/Mag. I	8
PHY 1110	General Physics Lab II	8	PHY 4180	Modern Optics Lab	10
PHY 1110	General Physics Lab II	33	PHY 4720	Quantum Mech. I	14
PHY 1110	General Physics Lab II	29	PHY 4970	Undergrad. Seminar	3
PHY 1110	General Physics Lab II	30	PHY 5220	Stats Thermodynamics	3
PHY 1110	General Physics Lab II	35	PHY 5350	Modeling Comp. Sys.	7
PHY 1110	General Physics Lab II	32	PHY 6940	Seminar	1
PHY 1110	General Physics Lab II	35	PHY 6996	Master of Sci. Res.	1
PHY 1110	General Physics Lab II	20	PHY 8999	Doctoral Research	7
PHY 1110	General Physics Lab II	36	SCI 1000	Phy. Sci. in Life	32

## **Graduates**

### **August 2017**

Marie Smirman, M.S., physics

### **April 2018**

Nathan Eric Benton Jr., B.A., physics

Jarrett Berry, M.S., physics

Timothy Alan Hasse, B.S., physics, *awarded departmental honors*

Christopher John Knill, B.S., physics, *awarded departmental honors*

Tyler Vincent Nardone, B.S., physics, *awarded departmental honors*

Kharananda Sharma, Ph.D., biomedical sciences: medical physics

James K Voorheis IV, B.S., physics, *awarded departmental honors*

## **Graduate Students Enrolled as of April 2018**

### **Ph.D. – Biomedical Sciences:Medical Physics**

Mohammed Alzahrani  
Farid Badar  
Syeda Batool  
Jasleen Kaur  
Hannah Mantebia  
Abdullah Metebi  
Hoda Sharifi  
Kharananda Sharma  
Amanveer Singh  
Yeonjeong Son  
Roshan Timilsina  
Kariyawasam Wijesinghe  
Afua Yorke

### **M.S. – Physics**

Jarrett Berry  
David Stiles  
Cody Trevillian

## Executive Summary

In the year 2017-2018, the Physics Department had the following enrollment figures:

- (i) **57** undergraduate physics majors;
- (ii) **3** students in the Master's program;
- (iii) **11** students in the Medical Physics Ph.D. program.

For spring, summer, fall 2017 and winter 2018:

**4,120 students enrolled in physics courses, a 2% decrease from previous year, but over a 20% increase from five years ago.**

**12,483 delivered credits: 10,303 (full-time faculty) and 2,180 (part-timers)**

NEW EXTERNAL GRANT FUNDING OBTAINED  
JULY 2017 – JUNE 2018

<b>Faculty</b>	<b>Grant Source</b>	<b>External Grant Total</b>
Garfinkle	NSF	153,397
Slavin	NSF	210,829
Zhang	Michigan Space Consortium	5,000
		<b>Grand Total: \$369,226</b>

## NOTES

**Bradley Roth:** Served as Acting Chair, summer, 2017. Serves as Director of the Center for Biomedical Research since January 5, 2009.

**Andrei Slavin:** Serves as Chair of the Department of Physics since August 15, 2003.

## HONORS AND AWARDS

**Michael Chopp:** H-index of 111. (H-index Overview . . . The h-index, or Hirsch index, measures the impact of a particular scientist rather than a journal. "It is defined as the highest number of publications of a scientist that received h or more citations each while the other publications have not more than h citations each." 1 For example, a scholar with an h-index of 5 had published 5 papers, each of which has been cited by others at least 5 times.)

**Ken Elder:** Order of the Plume recipient for teaching.

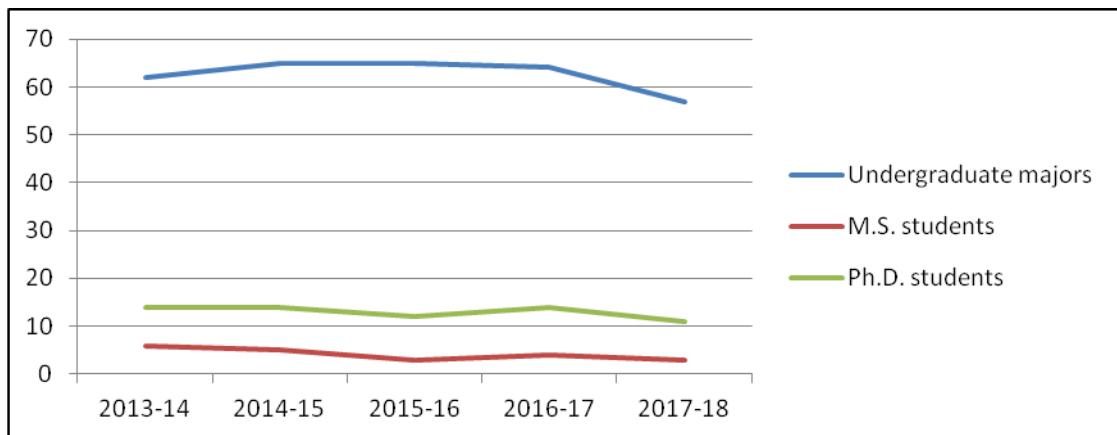
**Steffan Puwal:** Order of the Plume - Oakland University, April 25, 2018, Oakland University. Awarded by the Dean of the College of Arts & Sciences upon the nomination by a student for exceptional teaching and mentorship. This is the second year in a row he has received this honor.

**Yang Xia:** Fellow of the American Physical Society, October 4, 2017. The number of APS Fellows elected each year is limited to no more than one half of one percent of the membership. It is a prestigious recognition by your peers of your outstanding contributions to physics. The citation that will appear on his fellowship certificate is: For his contributions to nuclear magnetic resonance microscopy, and particularly for his use of this and other techniques to study the structure of articular cartilage, with applications to osteoarthritis.

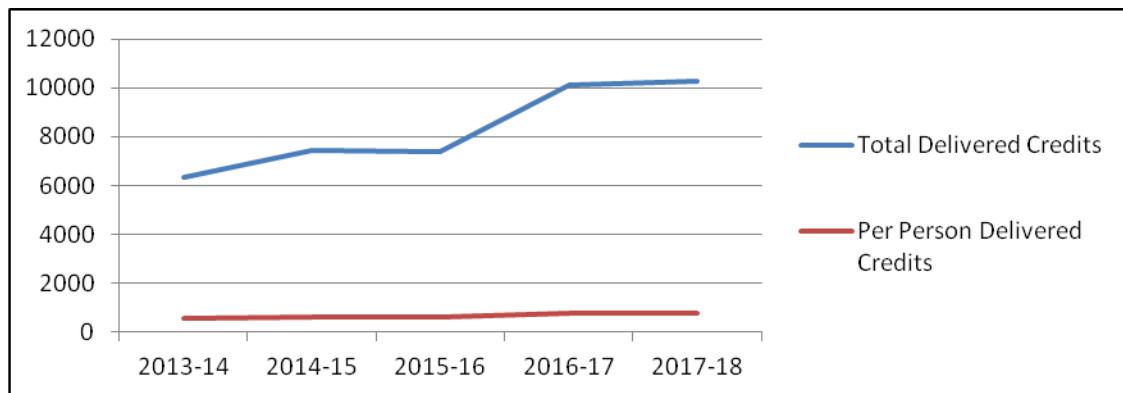
Fellow of the Fellow of the International Society for Magnetic Resonance in Medicine (ISMRM), January 1, 2018.

**Wei Zhang:** IOP outstanding reviewer 2017.

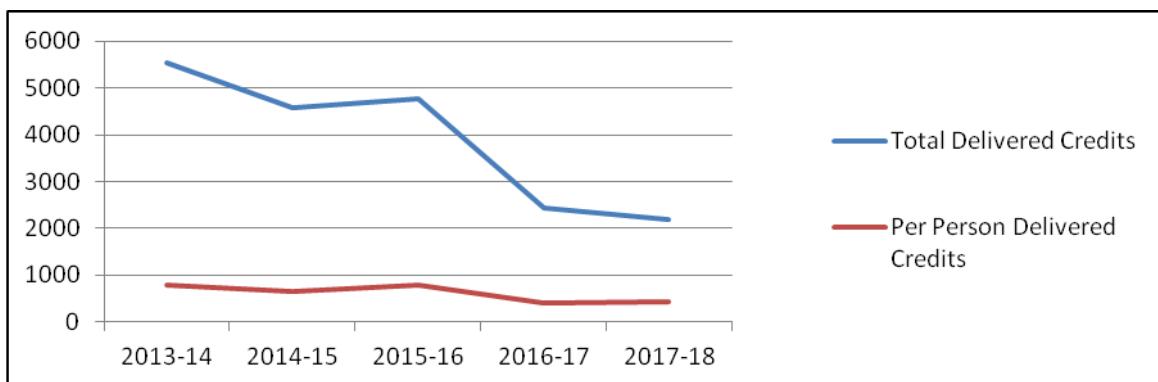
## Physics Student Enrollment, 2013-2018



## Full-time Faculty Delivered Credits, 2013-2018



## Part-time Instructor Delivered Credits, 2013-2018



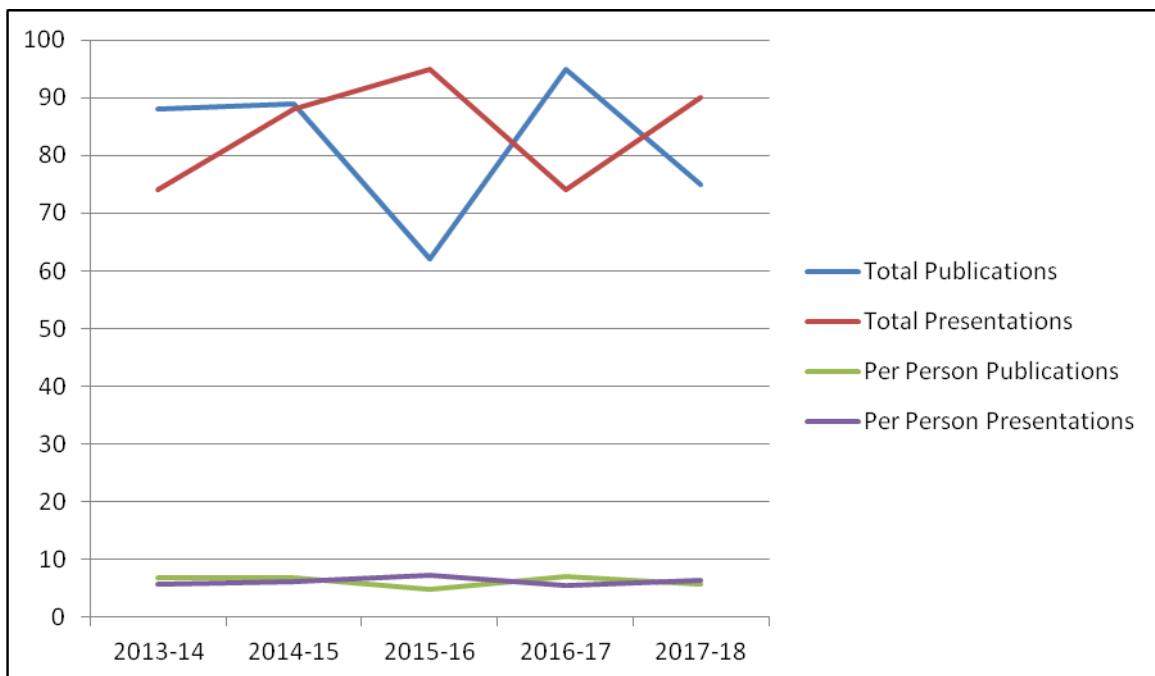
## Teaching: Full-time Faculty

Faculty	# of Courses	# of Delivered Credits	# of Supervised Undergraduates	# of Supervised Graduates
Castoldi	23	2173		(TA's)
Chopp				
Elder	3	616		1
Garfinkle	2	40	1	
Khain	4	1304	1	
Puwal - Visiting Prof. beginning FA16	8	2484	5	
Rojo	4	264		
Roth	2	120	4	4
Slavin	4	85		
Srinivasan	15	405		2+ (TA's)
Surdutovich	7	1308		
Tyberkevych – Research Prof.			2	1
Wang (on sabbatical WI18)	2	1020	1	
Xia	1	20	2	4
Zhang	2	440	2	
<b>Totals</b>	<b>77</b>	<b>10,279</b>	<b>18</b>	<b>12</b>

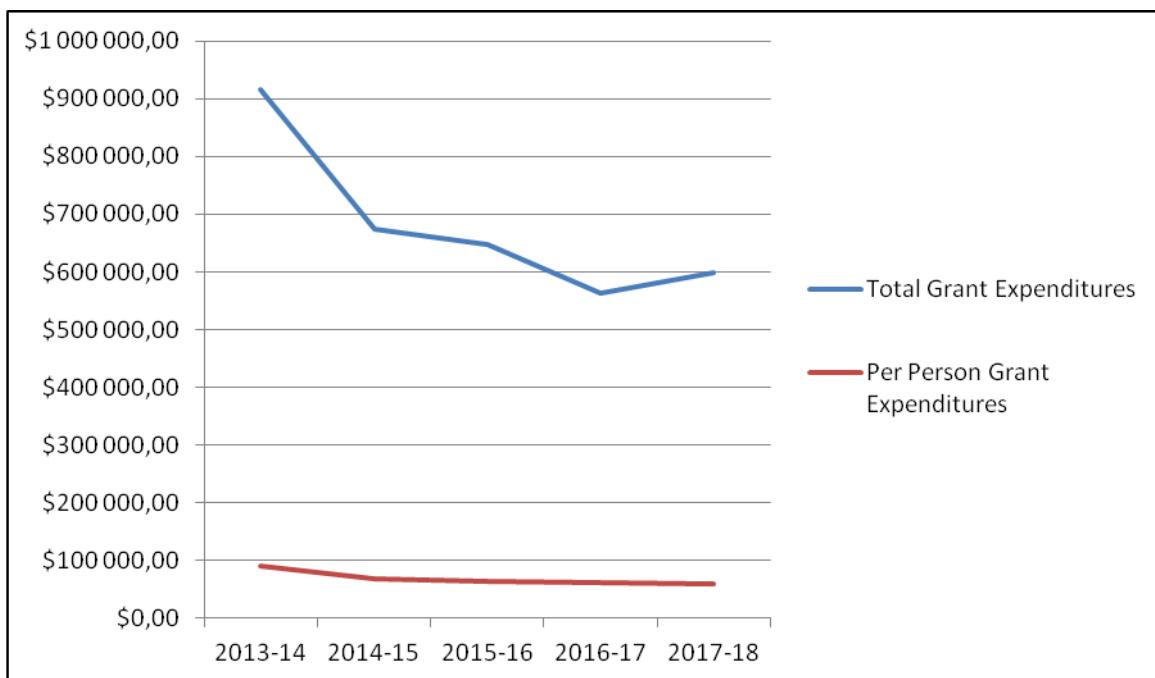
## Teaching: Part-time Lecturers

Instructor	# of Courses	# of Delivered Credits
Bidhanapally	6	187
Bowyer	1	392
Crea	3	89
Daniel	1	232
Raman	3	1280
<b>Totals</b>	<b>14</b>	<b>2,180</b>

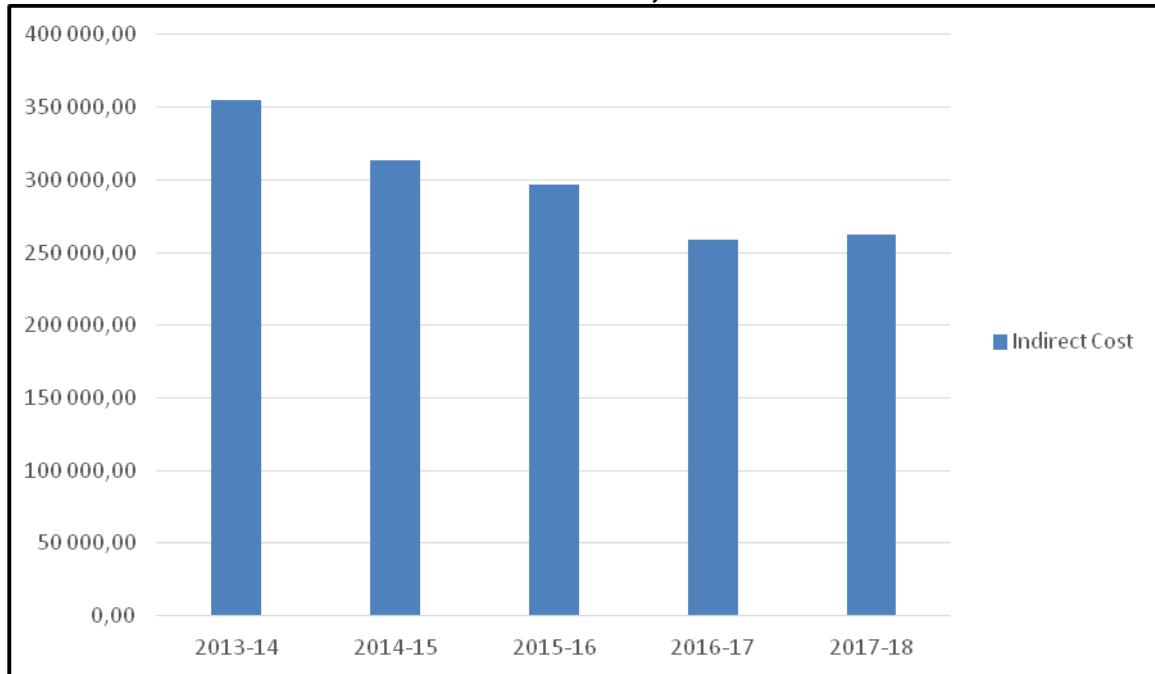
## Research Productivity, 2013-2018



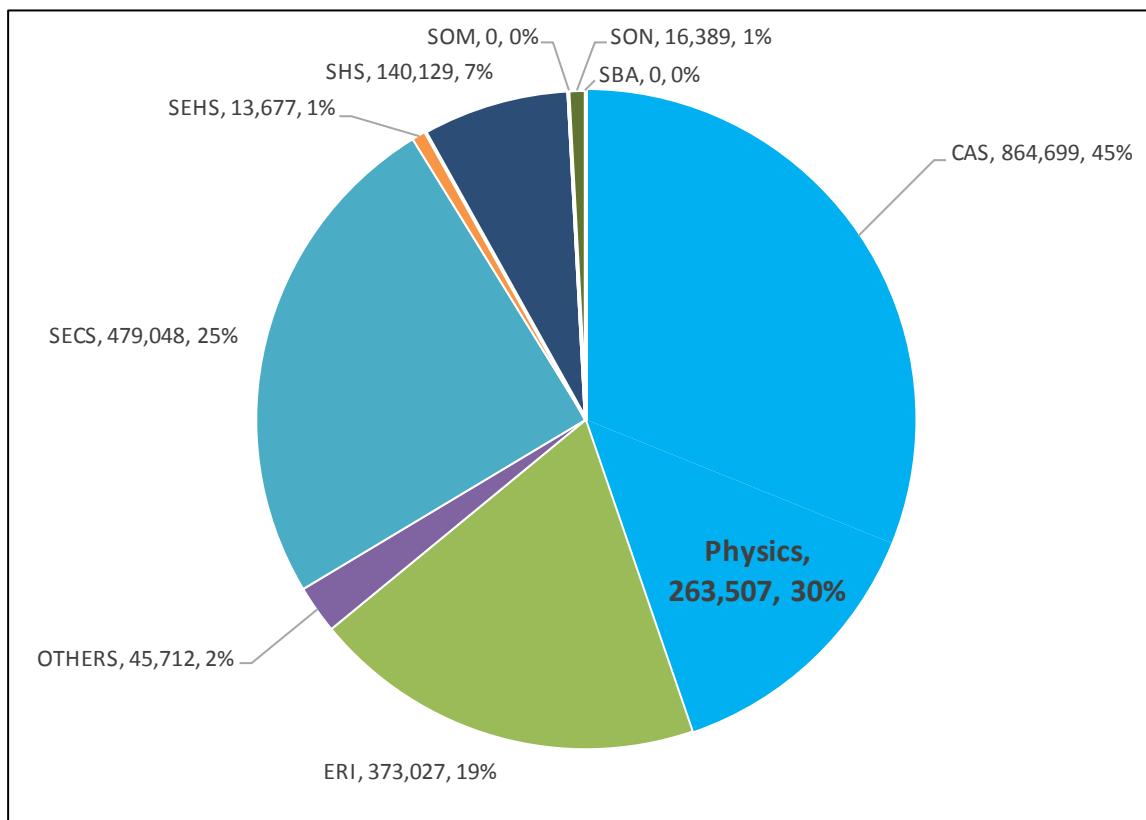
## Total External Grant Expenditures, 2013-2018



### Indirect Cost, 2013-2018



### OU Grants – Indirect Cost, July 1, 2017 – June 30, 2018



## Research Productivity

Faculty	External Grant Expenditures	Indirect Cost	# of Publications	# of Presentations
Castoldi-adjunct prof.				
Chopp			15	9
Elder	40,510.81	20,255.43	7	4
Garfinkle	32,995.72	16,332.89	5	7
Khain			1	3
Puwal - Visiting Prof.				1
Rojo			1	12
Roth	52,709.15	12,977.17	2	3
Slavin	79,102.55	39,362.21	11	27
Srinivasan	52,677.05	26,074.59	12	5
Surdutovich-adjunct prof.			3	2
Tyberkevych-research prof.	124,921.99	62,461.01	7	4
Wang – on sabbatical WI18	3,013.82		2	1
Xia	211,287.59	85,215.01	6	9
Zhang	875.20		3	3
<b>Totals</b>	<b>\$598,093.88</b>	<b>\$262,678.31</b>	<b>75</b>	<b>90</b>

The Department of Physics continued to excel in teaching, research, and service during the 2017-2018 academic year.

In teaching, our total of 12,450 delivered credits was at the same level as the previous year. Our new teaching laboratories that became an integral part of our undergraduate courses of Introductory Physics are functioning successfully under the constant supervision of Dr. Clara Castoldi and Prof. Gopalan Srinivasan. For the future development of these laboratories the Department urgently needs a full-time Laboratory Technician for the weekly setup of the labs and for the repair of damaged equipment.

In research, this year was quite challenging, because the funding situation in natural sciences in the USA was very competitive. However, in June 2017 David Garfinkle and Andrei Slavin received renewals of their NSF grants and Wei Zhang received a grant from the Michigan Space Consortium. The total grants expenditures were at the same level as last year – around \$600,000.

The Department continued to apply for external funding, published 75 papers in the most prestigious research journals, and made 90 presentations at International Conferences.

The research efforts in the Department were supported by Research Associate Prof. Vasyl Tyberkevych, an expert in spintronics, and Adjunct Professor Eugene Surdutovich, known for his work on ion-beam cancer therapy, as well as by many visitors and post-doctoral research associates from all over the world (China, Russia, Ukraine, Brazil, Germany, etc...).

The Institute of Spintronics and Microwave Technology continued to perform state-of-the-art research in collaboration with the Department of Electrical Engineering of the OU. One undergraduate student (James Voorheis), one Master's student (Cody Trevillian) and one PhD student (Steven Louis) were actively participating in the research efforts of the Institute (3 papers published).

The faculty search for the Assistant Professor position in Gravitational Physics was successful and resulted in the hiring of Professor Ilias Cholis.

The Physics Department was also active in service. Several members of the Department provided professional service as members of the Editorial Boards of the international research journals:

Prof. B. Roth: "Journal of Cardiovascular Electrophysiology and for Heart Rhythm".

Prof. D. Garfinkle: "Classical and Quantum Gravity" and "International Journal of Modern Physics D".

Prof. A. Slavin: "Scientific Reports (Nature)", and "IEEE Transactions on Magnetics".

Prof. Y. Wang: "Scientific Reports (Nature)".

Prof. M. Chopp: "Journal of Cerebral Blood Flow and Metabolism".

All members of the faculty continued to dedicate much of their time to reviewing grant proposals for agencies such as NSF and NIH, and refereeing articles for leading physics journals.