



# COLLABORATIVE RESEARCH

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**A NEW RESEARCH RELATIONSHIP WITH HIGH IMPACT**  
A COLLABORATION CASE STUDY SERIES

AUGUST 2015



## COMMITMENT TO COLLABORATION

As a pioneer consortium in higher education, 4-VA is committed to fostering collaboration across the Commonwealth.

We are also committed to measuring, learning from, and sharing the outcomes of our work. We believe in the importance of assessment and evaluation. When possible, we seek to measure our impact using verified research methods.

Case studies are a research design that involves an intensive study of one or more cases with multiple sources of evidence. Each 4-VA member institution selected a signature 4-VA project, not an entire initiative, for their case study. An analysis on collaborating across universities will be the unifying theme across cases.

The goal of these reports is to share what we have learned through our work across universities and to inform our stakeholders within the Commonwealth about 4-VA initiatives. This work will provide information to (1) promote enhanced processes; (2) share knowledge and best practices; and (3) advance collaboration.

4-VA was launched with leadership support from the Secretary of Education, the Governor, four university presidents, and an industry partner, Cisco Systems Inc. – the first collaborative of its kind in Virginia. The Collaborative is designed to help universities work together to achieve Virginia's goals for higher education.

**Kelsey Kirland**  
4-VA Assessment Coordinator



## EXECUTIVE SUMMARY

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This case features a series of success stories that started with a \$5,000 4-VA mini grant. The grant served as a catalyst to connect previously unknown faculty at James Madison University (JMU) and the University of Virginia (UVA). The small grant supported graduate and undergraduate student research and acted as a bridge to support faculty collaboration. Dr. Costel Constantin was able to address a weakness in his lab at JMU with the strengths of Dr. Patrick Hopkins' lab at UVA. The capabilities of Constantin's research were enhanced by the specialized equipment and training at

UVA. Hopkins welcomes the opportunity to work with and train undergraduate students in his lab. The mutually beneficial relationship has resulted in a series of continued projects and successful outcomes. A highlight of their collaboration is the pursuit of one JMU undergraduate researcher to continue work in Hopkins' lab and attend graduate school at UVA. In addition to this graduate student pipeline, Hopkins and Constantin were awarded larger external grants, additional 4-VA funds to pursue a new research focus, and a series of resulting publications.

**4-VA serves as a springboard for faculty to advance their research and create collaborations that result in many positive outcomes promoting scholarly impact.**

## ACHIEVING 4-VA GOALS

- 1 Define instructional models, including a clear definition of instructional costs;
- 2 Significantly expand access for all Virginians to programs, preparing them for rewarding careers;
- 3 Increase the research competitiveness of the partner universities; and
- 4 Increase opportunities and enhance the success of students in science, technology, engineering, and mathematics (STEM) courses and programs.

## REACHING AIMS WITH EXCELLENCE

### COLLABORATIVE RESEARCH



### RESEARCH INITIATIVE

- Aims to:
- Increase prevalence and intensity of research collaboration
  - Increase funding awarded to Virginia faculty and universities
  - Increase scholarly impact of Virginia faculty and universities
  - Increase student participation in original scholarship

### HOPKINS & COSTEL GRANT

- Reaching aims by:
- ✓ UVa and JMU research collaboration
  - ✓ Awarded two external grants as a result of initial and following collaborations
  - ✓ Faculty and student presentations and publications
  - ✓ Undergraduate and graduate students involved in writing, analyzing, and conducting research

## THE NUMBERS

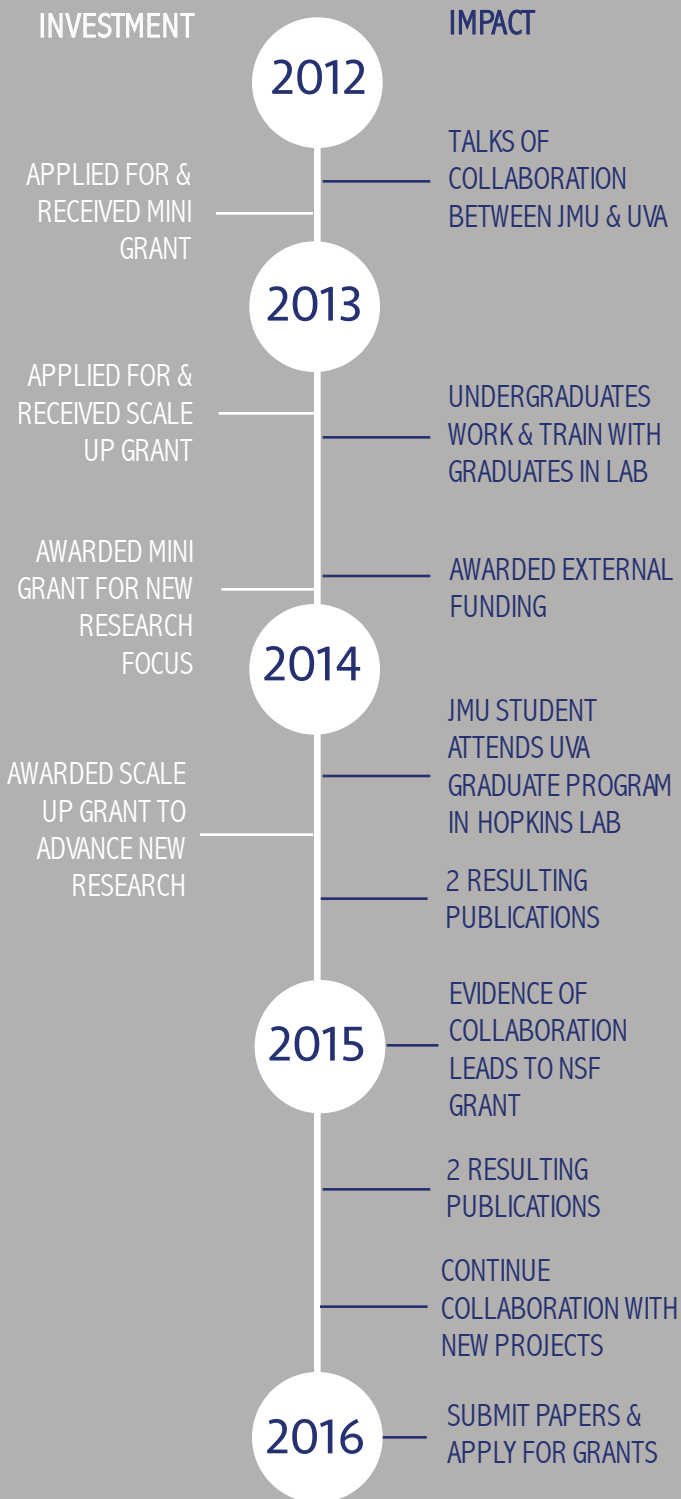
2 FACULTY

1 GRADUATE STUDENT RESEARCHER

2 UNDERGRADUATE STUDENT RESEARCHERS

\$5,000 4-VA FUNDS AWARDED AT EACH UNIVERSITY

# COLLABORATION TIMELINE



## MAKING CONNECTIONS

In 2012, both Dr. Constantin and Dr. Hopkins were new faculty at their respective institutions and were **looking for collaborators and opportunities for research funding**. With the information on Hopkins webpage, Constantin recognized their complementary skill sets and shared interests in physics.

### Constantin contacted Hopkins to discuss potential collaborations.

Hopkins expertise is in measurement within the field of physics which makes him an ideal partner for many researchers that benefit from the advanced tools and specialized equipment in his lab. "I'm always interested in collaborating," says Hopkins as he explains that he looks for professors who benefit from running experiments in his lab. Constantin was investigating a unique development of heat and electrical testing within the field of physics that was of interest to Hopkins.

After talking with Nick Swayne, 4-VA Director, Constantin became aware of the funding opportunities available through the 4-VA Collaborative.

In pursuit of a collaborative relationship, Constantin invited Hopkins to his lab in Harrisonburg, Virginia to **discuss a mutually beneficial research partnership**. They discussed how JMU's lab could provide some expertise to UVa's lab and vice versa.

With **complementary skills sets and shared research interests**, Constantin and Hopkins applied for a mini grant through 4-VA. The researchers welcomed the abbreviated grant proposal that was concise and appropriate for the funds requested.

**They were one of JMU's first 4-VA grant submissions in 2012.**

# FACULTY STORY



**Patrick Hopkins**

Assistant Professor of Mechanical and Aerospace Engineering at the University of Virginia

“ **4-VA was a springboard to lots of good work and collaboration.** ”

Hopkins was eager to collaborate with Constantin. He was interested in working with JMU because of their close proximity and the strong focus on undergraduate education at the university. He believed that his work with Constantin’s lab could be an excellent recruiting tool.

The outcomes of their initial collaboration resulted in publications, presentations, recruitment of a trained undergraduate student for his graduate lab, and external funding.



**Costel Constantin**

Assistant Professor of Physics at James Madison University

“ **We have a success story, that is the beautiful thing about this collaboration.** ”

Constantin was delighted by the outcomes of their initial collaboration and the acceptance of his undergraduate student into Hopkins’ graduate program and lab. He is thankful for the opportunity to help students succeed.

Being part of a larger research team is very rewarding for Constantin and he views this collaboration as a priority. Constantin benefits from the exchange of ideas between himself, Hopkins, and their research groups.

## PHYSICS RESEARCH IN THERMAL CONDUCTANCE

Hopkins and Constantin were each awarded a \$5,000 dollar 4-VA mini grant, “To explore and reveal the thermal conductance of aluminum oxide/gallium nitride interfaces as a function of gallium nitride surface structure” -an excerpt from their grant proposal.

Additionally, **the collaboration served to develop and to increase the research capacity for both Hopkins and Constantin as well as their respective research groups.**

The 4-VA grant progressed some initial research conducted by Constantin’s lab at JMU which was limited due to the lack of more sophisticated techniques and testing equipment. The 4-VA collaboration **rapidly and intelligently improved the research capabilities** of Constantin’s lab group.

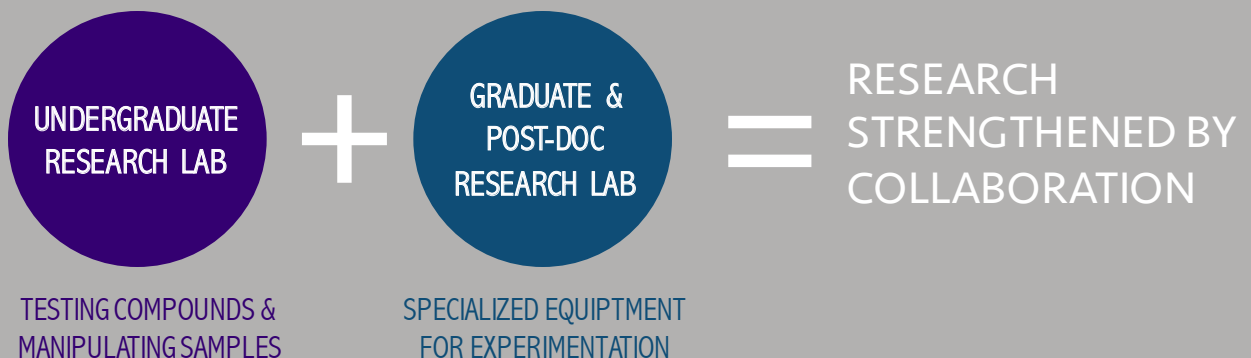
The JMU research group, consisting of undergraduate student researchers, worked to chemically etch the gallium nitride compound and to study the aluminum oxide compound.

UVa’s research group, comprised of graduate and postdoctoral researchers, configured samples and measurement capabilities in order to set up the experiment for JMU undergraduate students to use in the lab. In addition to assisting these undergraduates, the UVA graduate students also investigated and tested the compound using state-of-the-art equipment.

**Funding on this project primarily went to support students.** Allocations were made for instrumentation training for JMU undergraduates, experimentation materials and supplies, conference travel for a JMU undergraduate student and a UVA graduate student, as well as travel funds to support the faculty collaboration between Harrisonburg and Charlottesville, Virginia.

## PROJECT OVERVIEW

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# INDIVIDUALIZED INTERESTS ARE REALIZED

## ALLOWS FOR CONTINUED RESEARCH

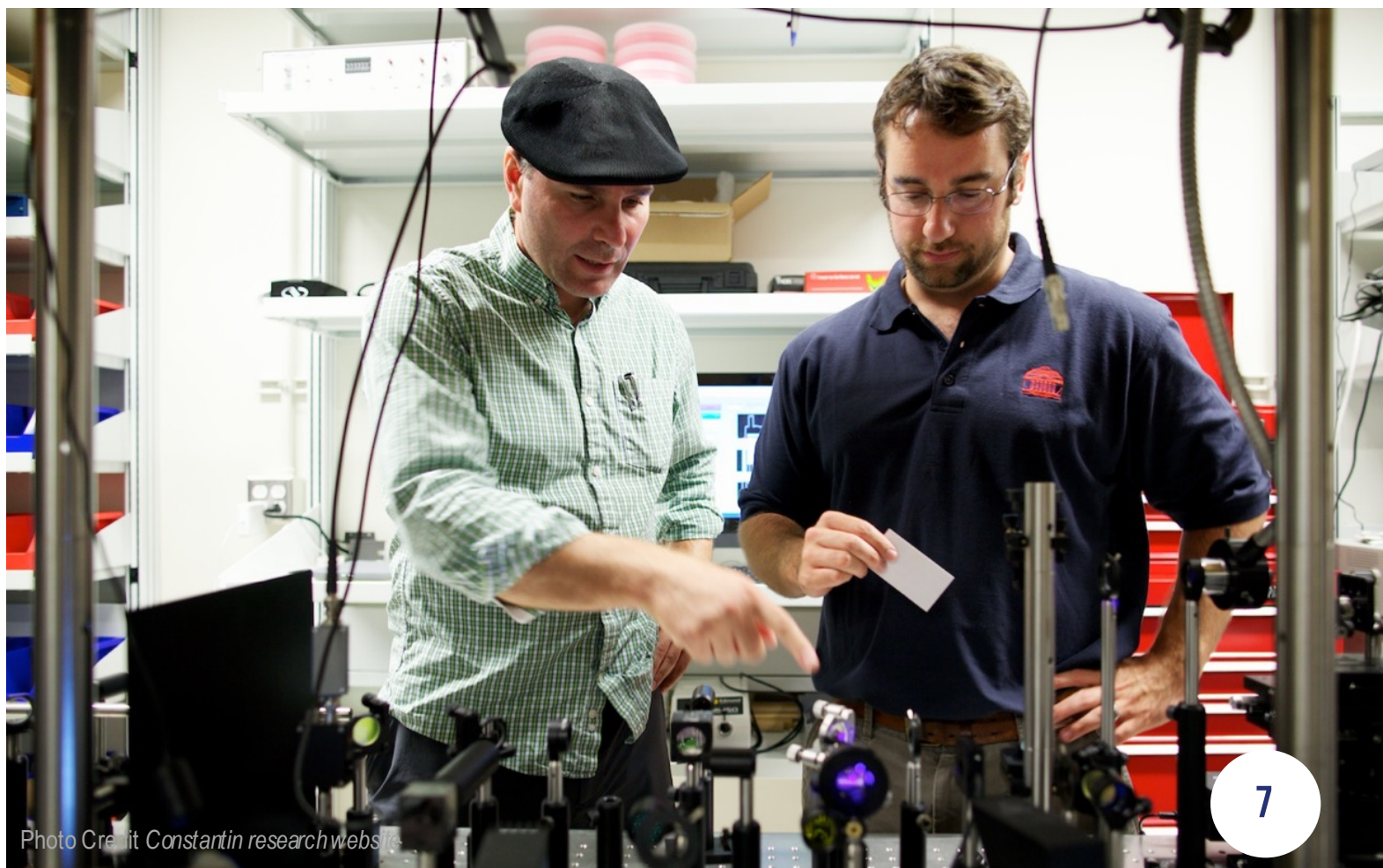
Dr. Constantin started as an Assistant Professor in the Physics department at JMU in 2010. Having come from a research background that required very expensive instruments to conduct his experiments, he knew he needed to re-evaluate his research strategies at JMU.

After trying to be successful with the instruments available, he **surveyed the Commonwealth for specialized equipment that was essential to his research**. Constantin found that UVA had the instruments required for his research. **He thought that he could combine his expertise with the faculty and instruments at UVA – a plan to sustain his research interests.**

## RECRUITMENT OF TRAINED STUDENTS

Dr. Hopkins was interested in the opportunity to collaborate with Constantin as well as his undergraduate student researchers.

**He believed it could be an excellent mechanism for recruiting.** When recruiting graduate students, Hopkins says, “I want to know them”. He likes to **meet with the prospective graduate students and work with them in the lab** before recruiting them for graduate school. His website attracts a number of graduate school inquires throughout the year but having experience in the lab is invaluable to the professor. **This was an opportunity he was able to have with the undergraduates who worked on the 4-VA research grants.**





## ONE MINI GRANT CULTIVATES A FUTURE OF STRONG COLLABORATIONS

The Gallium Nitride mini grant was awarded in 2012 and the research team applied for a scale up grant through 4-VA to expand on their research. With this, the researchers were prepared to submit for external funds and leverage their existing work. They were **awarded a substantial grant through state funds.**

A new research focus led to a second 4-VA mini and scale up grant. During this collaboration they were **awarded a supplemental National Science Foundation (NSF) grant** that was a result of the strong partnership established between JMU and UVa faculty.

**Dr. Hopkins and Dr. Constantin both commented on the great success of 4-VA and its impact on their work.**

### CREATING A CATALYST FOR COLLEAGUES TO CONNECT & TAKE ACTION

Constantin explains that faculty from smaller institutions must be working on a sustainable research project to gain interest from larger research focused institutions. But with a grant – he says, “Everyone takes you seriously.” The 4-VA grant creates a catalyst for colleagues to connect at other institutions and take action.

Constantin said that, **“The grants create bridges between the four institutions, and it tries to convert weaknesses into strengths.”**

### BALANCING & COMPLEMENTING TRADITIONAL FUNDING SOURCES

Hopkins explained that NSF submission requirements are the same for \$50,000 in funds for a graduate student and \$5,000 in funds for an undergraduate student. In this instance, the best use of his time and resources is to complete the submission for a graduate student.

**In this way, 4-VA funds provide a balance and a complement to traditional external funding agencies.**

The 4-VA collaboration provides JMU undergraduates access to his lab and the grant proposal is appropriately aligned with the outcomes.

# GROWING SUCCESS

## IMACPTS OF THE COLLABORATION

### GRADUATE STUDENT PIPELINE

#### Promoting success and advancement in STEM programs

An undergraduate student involved in the first research project between UVa and JMU led to a strengthened interest in physics and research. The undergraduate researcher went from working in Constantin's lab to running experiments in Hopkins' lab and has become a graduate student at UVa.

### EXTERNAL FUNDING

#### Leveraging 4-VA grants for bigger research projects

Hopkins and Constantin built on their research and were awarded \$200,000 in state funds from the Center for Innovative Technology through the Commonwealth Research Commercialization Fund.

### EVIDENCE OF COLLABORATION

#### NSF granting opportunity made available because of collaborative history

4-VA grant work allowed Hopkins to apply for a Research in Undergraduate Institutions (RUI) grant to supplement his active NSF grant. NSF funded faculty can apply for an RUI in order to collaborate on their work with a university whose focus is undergraduate education. The 4-VA grant work provided Hopkins and Constantin with evidence of a strong collaborative relationship.

### SCHOLARLY IMPACT

#### Presenting, publishing, and creating new ideas for research are important outcomes of 4-VA

As both assistant professors are working to advance their professional and academic goals, 4-VA serves as a mechanism to connect faculty with complementary skills who are eager to make progress towards their research goals. Conducting conference presentations and submitting journal articles was an objective for each 4-VA grant. These faculty benefit from the ability to explore new ideas with mini grants to support pilot projects.

## SUPPORTING STUDENT RESEARCH

In addition to research deliverables, Dr. Constantin was focused on student learning outcomes as a component of the grant. He focused his work with JMU undergraduate students on their ability to:

FORMULATE A RESEARCH QUESTION

INDEPENDENTLY DEVELOP A RESEARCH PLAN

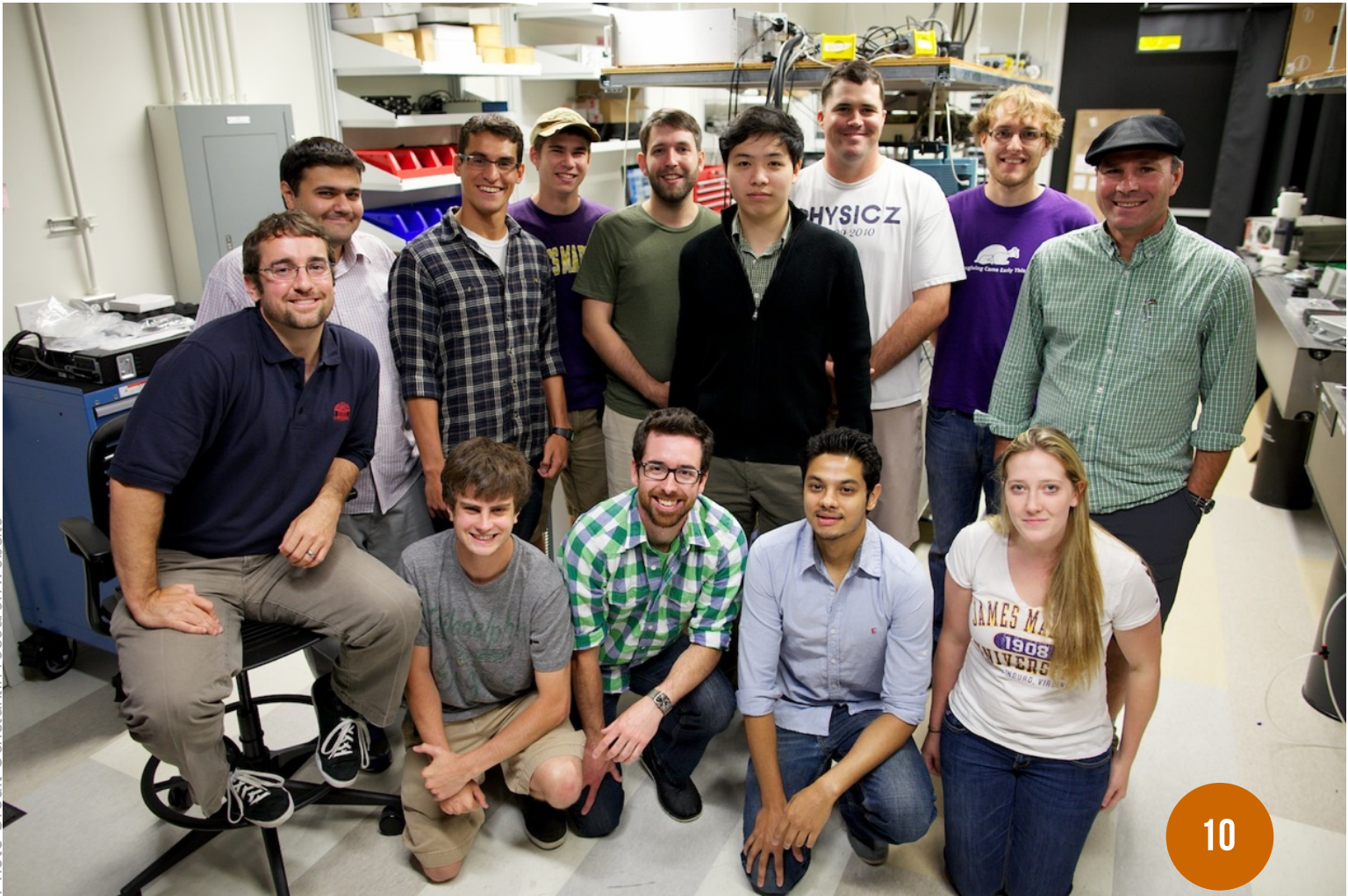
COLLECT AND INTERPERT DATA

CONDUCT RESPONSIBLE RESEARCH

**The 4-VA collaborative seeks to involve undergraduate researchers in original research** in order to further develop students' critical thinking and scientific inquiry skills. Involvement of graduate and undergraduate students in research also supports the success of students in STEM programs. **The collaboration enhanced JMU's ability to motivate students to pursue an advanced degree in physics and engineering.**

Both JMU and UVa research groups are featured below at Hopinks' lab in Charlottesville, VA.

### RESEARCH GROUPS COME TOGETHER



# THE STUDENT EXPERIENCE: CHET SZWEJKOWSKI



## A graduate student pipeline forms as collaborations flourish through 4-VA.

Chet Szwejkowski started working with Dr. Constantin during his sophomore year as a Physics major at JMU. **He was interested in undergraduate research** and started working on the gallium nitride grant with 4-VA. He also participated in the subsequent scale up grant, which provided an opportunity to strengthen relationships between research groups.

The graduate students in Hopkins' lab taught him how to use the equipment that was integral to the experiments. He was able to contribute to some of their work and their publications – specifically some of their work on a protein project. **Working in the lab at UVa was a rewarding experience for Chet.**

He explained that there are only a couple dozen labs in the nation with this kind of equipment.

Chet explained that later on in his undergraduate experience it was helpful to be exposed to a bigger school. He stressed how different the experiences were at a research one university like UVa and the research experiences he had at JMU. **He believes that 4-VA facilitated those noteworthy experiences.**

Chet declared a biophysics concentration in his junior year. "I realized that I wanted to study biologically relevant materials. Hopkins' Lab allows me to do so from a unique perspective."

**Because of his connections at UVa and his level of comfort with the lab, he chose the University of Virginia as the desired school to pursue his graduate studies.**

Chet mentioned that Dr. Hopkins was really encouraging and wanted him to do something he was interested in. Chet directly benefited from the recruitment of undergraduate students at JMU into Hopkins' lab.

**Chet is currently completing his graduate work in Hopkins' lab at UVa.** His research interests include soft matter and the thermal properties of liquid-based interfaces.

WHILE SZWEJKOWSKI WAS AT THE UVA LAB, HE GOT INVOLVED WITH SOME OTHER SIDE PROJECTS. CHET SAID THAT, "JUST BEING EXPOSED TO THE GRADUATE SCHOOL AND THE SPECIFIC EXPERIMENTS" MADE AN IMPACT ON HIM.

ONCE A JMU STUDENT, NOW HE IS IN THE MECHANICAL ENGINEERING PHD PROGRAM AT UVA AND WILL TAKE HIS QUALIFYING EXAMS IN THE NEXT YEAR.

## IN CONCLUSION

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Dr. Hopkins, Dr. Constantin, and their research groups finalized the second scale up grant in August of 2015. They estimate two additional years for future presentations and publications as a result of this work. The ultimate goal of this research project is to develop preliminary results that will make them a successful candidate for external awards.

**The faculty members enjoy their collaborative relationship and benefit greatly from the creation of new ideas.**

Both faculty attribute much of this success to 4-VA and the granting process. They appreciated the concise nature of the grant proposal as well as the flexibility of the awarded funds for student research. These variables contributed to their use of 4-VA funds. Additionally, this put Hopkins and Constantin in a strong position to apply for and receive larger grants.

**4-VA provided essential funding for new faculty that led to a prosperous relationship, larger grant awards, publications, and the development of a graduate student pipeline.**



Image credits

Network by Joel Avery from the Noun Project, Madison building photo and Constantin head shot by James Madison University. Rotunda building and Hopkins head shot photo by University of Virginia.

**Mission**

4-VA's mission is to promote inter-university collaborations that leverage the strengths of each partner university in order to accomplish much more than any individual university could achieve alone.

[www.4-va.org](http://www.4-va.org)

