

Science Undergraduate Laboratory Internships (SULI)

Summer 2022 - Application for: Nicholas Jason Kurth

APPLICANT PROFILE

General Applicant Information

First Name: Nicholas

Middle Name: Jason

Last Name: Kurth

Previous Last Name(s):

Primary Email Address: kurthn42@students.rowan.edu

Alternate Email Address 1: nkurth2002@gmail.com

Alternate Email Address 2:

ORCID: [0000-0002-3801-7436](https://orcid.org/0000-0002-3801-7436)

Current Address

Primary Phone Number: 848-210-5652

Alternate Phone Number: 732-349-6855

Citizenship/Languages/Eligibility Information

I will be 18 years of age or older by the time the internship begins: Yes

Are you a U.S. Citizen? Yes

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EDUCATIONAL BACKGROUND

Academic Information

Are you currently attending a community college or 2-year college?	No
Current academic status:	Sophomore
If you are selected as a participant in this DOE program, will you receive academic credit from your university/college for participating?	No

Undergraduate Institution Information

College/University Country:	United States and U.S. Territories
College/University State/Province/Territory:	New Jersey
College/University Name:	Rowan University
College/University Address:	201 Mullica Hill Road
College/University City:	Glassboro
College/University Zip Code:	08028-1702
Expected/Declared Major:	Physical Sciences - Physics
Minor and/or Concentration Expected/Declared:	<ul style="list-style-type: none"> Physical Sciences - Astronomy Computer Sciences and Information Technology - Computer Programming Mathematics
Expected Degree From This College/University:	Bachelor's
Expected/Completed Graduation Date:	May / 2024
Transcript:	Kurth_Nicholas_Transcript.pdf
Does this institution provide grades?	Yes
GPA Scale:	4.0
Total Attempted Credits:	47.00
Total Earned Credits:	47.00
Total Quality Points:	172.00
GPA:	3.66

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Science, Technology, Engineering and Mathematics (STEM) Courses

Course Title: Analytical Mechanics

Course Number: PHYS-00310

Enrollment Status: Currently Enrolled

Course Title: Data Structures and Algorithms

Course Number: CS-04222

Enrollment Status: Planning to Enroll

Course Title: Electricity and Magnetism I

Course Number: PHYS-00320

Enrollment Status: Planning to Enroll

Course Title: Galactic Astronomy and Cosmology

Course Number: ASTR-11303

Enrollment Status: Planning to Enroll

Course Title: Introduction to Object Orientated Programming

Course Number: CS-04113

Enrollment Status: Recently Completed

Course Title: Introductory Astronomy

Course Number: ASTR-11200

Enrollment Status: Recently Completed

Course Title: Introductory Astrophysics

Course Number: ASTR-11230

Enrollment Status: Currently Enrolled

Course Title: Linear Algebra

Course Number: MATH-01210

Enrollment Status: Recently Completed

Course Title: Modern Physics

Course Number: PHYS-00300

Enrollment Status: Recently Completed

Course Title: Object Orientated Programming/Data Abstraction

Course Number: CS-04114

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Enrollment Status:	Currently Enrolled
Course Title:	Observational Astronomy
Course Number:	ASTR-11240
Enrollment Status:	Planning to Enroll
Course Title:	Ordinary Differential Equations
Course Number:	MATH-01231
Enrollment Status:	Currently Enrolled
Course Title:	Partial Differential Equations
Course Number:	MATH-01386
Enrollment Status:	Planning to Enroll
Course Title:	Physics Research Methods 1
Course Number:	PHYS-00351
Enrollment Status:	Currently Enrolled
Course Title:	Physics Research Methods 2
Course Number:	PHYS-00352
Enrollment Status:	Planning to Enroll
Course Title:	Quantum Mechanics I
Course Number:	PHYS-00410
Enrollment Status:	Planning to Enroll
Course Title:	Quantum Mechanics II
Course Number:	PHYS-00411
Enrollment Status:	Planning to Enroll
Course Title:	Statistical Physics
Course Number:	PHYS-00430
Enrollment Status:	Planning to Enroll

Science Undergraduate Laboratory Internships (SULI)

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Awards or Honors

Award Title: The President's Scholars of Excellence

Month & Year Received: December / 2020

Awarding Institution: Rowan University

Award Title: The President's Scholars of Excellence

Month & Year Received: May / 2021

Awarding Institution: Rowan University

Award Title: The President's Scholars of Excellence

Month & Year Received: December / 2021

Awarding Institution: Rowan University

Award Title: SGA Fall 2021 Scholarship

Month & Year Received: December / 2021

Awarding Institution: Rowan University

Award Title: Nomination for the 2022 Barry Goldwater Scholarship

Month & Year Received: November / 2021

Awarding Institution: Rowan University

High School Graduation or GED

Date of High School Graduation or GED: June / 2020

Country: United States

City: Stafford Township

State/Province/Territory: NJ

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WORK EXPERIENCE & SKILLS

Work Experience

Name of Place of Employment or Activity:	Rowan University
Dates of Employment or Activity:	From 5/17/2021 To 7/29/2021
Hours Per Week:	26.0
Primary Duties:	Summer Student Research
Tasks Performed:	Conducted summer research with a team of students and under the mentorship of physics professor. Work experience was in conjunction with my participation in the Summer Undergraduate Research Program (SURP) at Rowan University.

Name of Place of Employment or Activity:	Perlmutter Family Shoprite of Manchester
Dates of Employment or Activity:	From 7/3/2018 To 5/15/2021
Hours Per Week:	20.0
Primary Duties:	Cashier, Customer Service
Tasks Performed:	Would check out customer, stock shelves, help customers find the product they are looking for, assist with customer service (returns, complaints, answering the phone), and audit the cashier tills. Would also open and close out the store.

Professional Associations

Are you a member of any professional organizations?	No
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Computer Skills

Computer related skills:	<ul style="list-style-type: none"> • Experience using computer algebra programs, such as Mathematica • Programming experience with Java and Python • Have previously used MATLAB for data analysis and modeling • Very knowledgeable with using Google Drive and Microsoft Office
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Laboratory/Technical Skills

Experience with advanced laboratory techniques or equipment:	Experience using Scanning Electron Microscope
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PROGRAM INFORMATION

Eligibility

Have you previously participated in 2
SULI appointments? No

Previous DOE Internship/Fellowship Experience

Have you ever had an
internship/fellowship with the
Department of Energy or any of its
National Laboratories? No

Availability

What is the earliest date you can
begin your internship? 5/9/2022

When do you need to complete your
internship? 9/3/2022

First Choice Host DOE Laboratory

DOE Laboratory: Brookhaven National Laboratory (BNL)

First Choice Research Area: Accelerator Physics/Science

Second Choice Research Area: High Energy Physics

Third Choice Research Area: Cosmology

Second Choice Host DOE Laboratory

DOE Laboratory: Thomas Jefferson National Accelerator Facility (TJNAF)

First Choice Research Area: Accelerator Physics/Science

Second Choice Research Area: High Energy Physics

Third Choice Research Area: Nuclear Physics

Relatives Employed at DOE Laboratories

Are you a relative of an employee at
the proposed host DOE laboratories? No

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ESSAYS

Research Experience:

Even though I am just a sophomore in college, I have been fortunate enough to be involved with a research project that focuses itself on a theoretical study of the structure of space, the zero-point energy of a vacuum, and the Casimir effect. I got involved with this work when I was accepted into the Summer Undergraduate Research Program (SURP), hosted by Rowan University. During my participation, and subsequent continuation into the following semesters, I worked with a team of students under the mentorship of Dr. Eduardo Flores. Together, we would model different lattice structures, derive their respective lattice vectors and equations of motions, as well as calculate the Casimir effect to test the validity of whether or not it can be a possible representation of space. All calculations throughout our work have been made possible with the use of Mathematica. The lattices we have tested thus far, and all of which have proven to be possible contenders as the structure on space, include the following: in one dimension, the loaded string; in two dimensions, the square and triangular lattices; and in three dimensions, the cubic and face-centered cubic lattices. My contributions consist of reviewing the mathematics behind our calculations, running different simulations on Mathematica for each lattice structure, and analyzing results.

By simple reasoning, space (like any structure) should only consist of one lattice type. The fact that we have multiple, each of which result in the n -dimensional Casimir effect, means that we have a contradiction to our logic. However, when we look at the dispersion relations of each lattice, we find that the velocity of the wave changes with direction. This is a major flaw; so in order to remedy it, our future work will be focused on finding a mathematical model of a random lattice. We believe finding such a lattice is the next step because: 1) the speed of the wave will remain constant regardless of direction; and 2) since space is expanding, a random lattice seems intuitive when we think of new structure being created and laid down rapidly. Although I have been active throughout this project, I will play a much more important role in our future work because of the independent progress I have already made towards finding this particular model. Of course, working with anything of a random nature is very difficult, but given the reasoning as to why search for a random lattice, I believe that it can be accomplished.

Research Interests:

My first choice in host laboratory is Brookhaven National Laboratory. For personal reasons, due to its prime location on Long Island, I can have the possibility to bring my car with me, be able to go home on some weekends, and enjoy many days relaxing either on Long Island Sound or at the beach. But for professional reasons, I prefer Brookhaven the most because I will have the opportunity to conduct the research I am most fascinated with. As evident by my application, at Brookhaven I am most excited to conduct research in either accelerator physics, high energy physics, or cosmology. I enjoy each of these disciplines simply because of the fact that they are siblings of one another whose findings add another piece of information towards our understanding of matter, energy, and the Universe. To me, the only difference between these fields is the lens of which their respective discoveries are made. Obviously, accelerator and high energy physics use colliders, while cosmology uses the cosmos. Nevertheless, I am interested in all three, and given the reasons I described as well as the resources available to me at this particular lab, I believe Brookhaven National Laboratory would be a perfect host location for my summer experience.

For my second choice in host laboratory, I chose Thomas Jefferson National Accelerator Facility because it follows a similar logic in decision as with Brookhaven. Again, for personal reasons, I might be able to bring my car, go home once in a while, and enjoy my time off at the beach. Likewise, I have the opportunity to conduct accelerator and high energy physics. However, what makes my choice Jefferson different from Brookhaven is that I can possibly conduct nuclear physics rather than cosmology. Nuclear physics is a highly fascinating field of which I never thought I would have the opportunity to conduct research within. Even though this kind of study can be dangerous, and hence its rarity at the university level, it is also very important for the understanding of the atom; thus my wanting to be involved. With all this in mind, in addition to everything available at my research disposal, it makes sense as to why I selected Thomas Jefferson National Accelerator as my second choice.

If I were not assigned to either lab, I will be happy no matter where I spend my summer so long as I can conduct research in accelerator physics, high energy physics, cosmology, or nuclear physics.

Personal Experience:

In addition to my research skills, I make an excellent candidate to be a part of the SULI program because of my exceptional academic performance, resulting in a perfect 4.00 GPA. Some might point out that this is a result of my first year of college being online due to the COVID-19 pandemic, thereby making it easier. However, I would beg to differ since learning at home posed to be a challenge at times. Given this, I had to refine myself as a student and be able to take better notes, study harder, and find ways of learning outside the classroom. Each of these have carried over into today and other aspects of mine. In particular, these skills have impacted my research skills (which I discussed in a previous prompt), as well as my involvement with extracurriculars—both for the better.

I participate in many clubs and organizations at Rowan University; but two of which I want to specifically highlight are The Image Yearbook Club and the Department of Physics and Astronomy's Diversity, Equity, and Inclusion (DEI) Change Team. Evidently by the name, the purpose of The Image is to design the annual school yearbook. Although this club is very different from physics, I do it out of enjoyment and university pride. Furthermore, because of my participation in this club, I have been fortunate enough to be given the leadership positions of vice president and treasurer, as well as president in the upcoming academic year. As for the other organization I pointed out, our

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DEI Change Team works in conjunction with the American Physical Society's initiative of Inclusion, Diversity, and Equity Alliance (APS-IDEA). The purpose of such is just as the name suggests: to promote diversity, equity, and inclusion in the physics community. The DEI Change Team is something that I have vested personal interest in because I have first hand experience of witnessing a lack of LGBT+ representation. The feeling of there being no one else there to go to is discouraging, and I want to change this for the betterment of physics and the involvement of underrepresented minorities within the study.

With everything I do outside of physics research, and the skills and leadership opportunities associated with each activity, I believe I would make a perfect example of a contributing member to the SULI program.

Professional Goals: Everytime I am asked "what are your long-term goals?", I always feel like an author in the sense that I know what is going to happen now and at the end of the story, but everything in between is to be determined along the way. Clearly, by my previous prompts and application, what I do now consists of acing my college courses, participating in extracurriculars, and conducting research. On the other hand, my end goal is to be enrolled in a PhD program with the hopes of becoming a physics researcher either at a university or a national lab. Everything that occurs between undergrad to obtaining my professional career is to be determined; yet, what I do know for sure is that as I write my story, I would love for my participation in the SULI program to be the next chapter. By participating in SULI, I believe my success and the achievement of my goals will be evermore solidified than if otherwise.

I can say this with confidence simply because of what SULI entails for each of its participants. With the project I am assigned to, I will develop skills in experimentation, as well as a strengthening in critical thinking. Both are necessary since all scientific discoveries rely on devising a test of natural phenomena and seeing as to whether the results match expectations and nature. I would like to also add that with my assigned project, I will be collaborating with laboratory faculty and student peers. Because of this, I will become better at conducting group research and discussing scientific points. Not to mention that at the end of the program, each student participant must present their respective work and submit a report, abstract, and peer review essay. Evidently, my ability in oral and written scientific communication will be greatly improved with the end-of-program requirements.

To reiterate, each of the skills above—experimentation, critical thinking, collaboration, and communication—will be further developed with my participation in SULI. It is imperative that I have each because of their respective importance in becoming an accomplished physicist. Similar to what I mentioned before: through the SULI program, achieving my future goals will be well cemented, therefore enabling me to reach a level of success that I can only dream of.

All in all, *thank you* for this opportunity to showcase my all-around capabilities as a scientist and why I want to participate in the SULI program. I look forward to hearing back soon.

RECOMMENDATIONS

Recommendation 1: **First Name:** Eduardo
Last Name: Flores
Email: flores@rowan.edu
Status: Received 12/20/2021

Recommendation 2: **First Name:** Nathaniel
Last Name: Nucci
Email: nucci@rowan.edu
Status: Received 1/3/2022

Transcript Data

STUDENT INFORMATION

Name : Nicholas J. Kurth

Curriculum Information

Program

Bachelor of Science

College: College of Sci & Math

Major and Department: Physics, Physics & Astronomy

Major Concentration: Honors Studies

Minor: Mathematics

Minor: Computer Science

Minor: Astronomy

This is NOT an Official Transcript

TRANSFER CREDIT ACCEPTED BY INSTITUTION -Top-

TRANSFER Ocean County College

CRD:

Subject	Course	Title	Grade	Credit Hours	Quality Points	R
BIOL	01100	BIOLOGY I	TA	4.000		0.00 I
COMP	01111	COLLEGE COMPOSITION I	TA	3.000		0.00 I
COMP	01112	COLLEGE COMPOSITION II	TA	3.000		0.00 I
MATH	01130	CALCULUS I	TA	4.000		0.00 I
PHYS	00210	PHYSICS I-NO CALC	TA	4.000		0.00 I
PHYS	00211	PHYSICS II NO-CALC	TA	4.000		0.00 I
SPAN	05201	SPANISH III	TA	3.000		0.00 I
		Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points
Current Term:		25.000	25.000	25.000	0.000	0.00
						0.000

Unofficial Transcript

TRANSFER Stockton University

CRD:

Subject	Course	Title	Grade	Credit Hours	Quality Points	R
BIOL	19300	INTRO TO OCEANOGRAPHY	TA	3.000		0.00 I
GEOG	16131	PRINCIPLES OF EARTH SCIENCE	TA	4.000		0.00 I
INTR	99070	FREE ELECTIVE	TA	1.000		0.00 I
		Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points
Current Term:		8.000	8.000	8.000	0.000	0.00
						0.000

Unofficial Transcript

INSTITUTION CREDIT -Top-

Term: Summer 2020

College: No College

Major: Non-matriculated

Academic Standing:							
Subject	Course	Level	Title	Grade	Credit Hours	Quality Points	R
HSC	08350	UG	ST HSC:COMPREHENDING COVID-19	P	1.000	0.00	
ONL	00100	UG	ROWAN ONLINE IMMERSION	S	0.000	0.00	
Term Totals (Undergraduate)							
					Attempt Hours	Passed Hours	Earned Hours
					GPA Hours	Quality Points	GPA
Current Term:					1.000	1.000	1.000
Cumulative:					1.000	1.000	1.000

Unofficial Transcript

Term: Fall 2020							
College:		College of Sci & Math					
Major:		Physics					
Academic Standing:							
Additional Standing:		President's List					
Subject	Course	Level	Title	Grade	Credit Hours	Quality Points	R
CMS	04220	UG	HONR INTERPERSONAL COMM	A	3.000	12.00	
GEOG	16100	UG	HONR EARTH, PEOPLE, & ENVIRON	A	3.000	12.00	
HONR	05101	UG	HONORS: PARTICIPATION	S	0.000	0.00	I
MATH	01131	UG	CALCULUS II	A	4.000	16.00	
PHYS	00130	UG	BLDG MOMENTUM PHYS STU-RS	A	1.000	4.00	
PHYS	00222	UG	HONR INT ELECTRICITY/MAGNETISM	A	4.000	16.00	
PHYS	L0222	UG	HONR LAB INTRO ELECT/MAGNETISM	NG	0.000	0.00	
Term Totals (Undergraduate)							
			Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points
Current Term:			15.000	15.000	15.000	15.000	4.000
Cumulative:			16.000	16.000	16.000	15.000	4.000

Unofficial Transcript

Term: Spring 2021							
College:		College of Sci & Math					
Major:		Physics					
Academic Standing:		Good Standing					
Additional Standing:		President's List					
Subject	Course	Level	Title	Grade	Credit Hours	Quality Points	R
ENGL	02123	UG	TOPICS IN LITERATURE:HORROR	A	3.000	12.00	
HONR	05101	UG	HONORS: PARTICIPATION	S	0.000	0.00	I
MATH	01230	UG	CALCULUS III	A	4.000	16.00	
MATH	03160	UG	DISCRETE STRUCTURES	A	3.000	12.00	
PHYS	00221	UG	INTRO THRMDYNM/FLU/WVS/OPTICS	A	4.000	16.00	
Term Totals (Undergraduate)							
				Attempt Hours	Passed Hours	Earned Hours	GPA
				Hours	Hours	Hours	Hours
Current Term:				14.000	14.000	14.000	14.000
Cumulative:				30.000	30.000	30.000	29.000

Unofficial Transcript

College:College of Sci & Math

Major:Physics

Academic Standing:

Additional Standing:President's List

Subject	Course	Level	Title	Grade	Credit Hours	Quality Points	Revised
ASTR	11200	UG	INTRO ASTR:SOLAR SYS & EXOPLNT	A	3.000	12.00	
CS	04113	UG	HONORS INTR OBJ-ORIENT PRGR-RS	A	4.000	16.00	
HONR	05101	UG	HONORS: PARTICIPATION	S	0.000	0.00	I
MATH	01210	UG	LINEAR ALGEBRA	A	3.000	12.00	
PHYS	00250	UG	PHYSICS RESEARCH I	P	3.000	0.00	
PHYS	00300	UG	MODERN PHYSICS	A	4.000	16.00	

Term Totals (Undergraduate)

	Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	17.000	17.000	17.000	14.000	56.00	4.000
Cumulative:	47.000	47.000	47.000	43.000	172.00	4.000

Unofficial Transcript

TRANSCRIPT TOTALS (UNDERGRADUATE) -Top-

	Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points	GPA
Total Institution:	47.000	47.000	47.000	43.000	172.00	4.000
Total Transfer:	33.000	33.000	33.000	0.000	0.00	0.000
Overall:	80.000	80.000	80.000	43.000	172.00	4.000

Unofficial Transcript

COURSES IN PROGRESS -Top-

Term: Spring 2022

College:College of Sci & Math

Major:Physics

Subject	Course	Level	Title	Credit Hours
ASTR	11230	UG	INTRODUCTORY ASTROPHYSICS	4.000
CS	04114	UG	HONORS OBJ-ORNT PRGM/DATA ABST	3.000
HONR	05101	UG	HONORS: PARTICIPATION	0.000
MATH	01231	UG	ORDINARY DIFFER EQUAT	3.000
PHYS	00310	UG	ANALYTICAL MECHANICS	4.000
PHYS	00351	UG	PHYSICS RESEARCH METHODS I	2.000

Unofficial Transcript

SULI PROGRAM APPLICATION RECOMMENDATION FOR NICHOLAS JASON KURTH

Recommender Contact Information

- **First Name:** Eduardo
- **Last Name:** Flores
- **Title:** Associate Professor
- **Department:** Physics & Astronomy
- **Institution/Organization:** Rowan University
- **Telephone:** 856-256-4856
- **Email:** flores@rowan.edu

Applicant Information

Association

Describe your relationship to the applicant, including how long you've known the applicant, where, and in what capacity.

I met Nicholas in the spring of 2021 when he took my Intro Thermal-Fluids-Waves-Optics course. His final grade was an A. When Nicholas requested to work in a research project with me, in the summer of 2021, I was happy to take him in my group. The group consisted of three physics majors and a faculty member. Two students were seniors and Mr. Kurth was a sophomore. He worked on computer calculations of Casimir force on a discrete lattice in 1, 2 and 3 dimensions. The calculation in a discrete structure required sums instead of integrals. However, the number of terms involved in the sum was huge so the first project was to find ways to simplify the work using integrals instead. Based on the Euler-Maclurin approximation in one dimension he tried to generalize it to two and three dimensions. He succeeded in developing the mathematical technique but discovered that numerical integration is limited and challenging for the level of accuracy required in this project. We went back to their original approach of doing sums. In the fall of 2021, he continued his work on Casimir effect on discrete lattices in 2 and 3D as part of a research course. Nicholas work on this project showed his potential as a researcher. He would take an idea, work hard on it and take it to its logical conclusions. He was not afraid to make mistakes. He wanted to understand why or why not something worked.

Applicant Comments

Please provide substantive comments about the applicant's education, training, aptitude, or promise relevant to the SULI program. Include any relevant additional detail or perspective regarding the applicant's research experience or equivalent experience on complex projects, including the level of independence or other factors that would contribute to the applicant's ability to make an excellent contribution to the SULI program.

An important point to comment is Nicholas's personality and attitude. He is a polite and respectful person. He is positive, enthusiastic and a hard-working individual. Comparing Nicholas with a representative group of students in the same field who have had approximately the same amount of experience and training, I would rate him in the top 1% in general all-around academic ability. This evaluation is based on my experience advising and teaching physics majors at Rowan University for more than 30 years. In my opinion, Nicholas has great potential to succeed in any area of physics. I highly recommend that Mr. Kurth be accepted to the Science Undergraduate Laboratory Internships (SULI).

Applicant Rating

In comparison to other undergraduate students, please rate the applicant relative to his/her peers on the following qualifications:

	Do Not Know	Below Average	Average	Above Average	Superior
Analytical and Mathematical					X
Experimental Research	X				
Overall Academic					X
Initiative and Self Reliance					X
Motivation toward Scientific Career					X
Originality of Thought					X
Emotional Maturity					X
Ability to Work with Others					X
Potential for Leadership					X
Oral Communication Skills					X
Written Communication Skills	X				

SULI PROGRAM APPLICATION RECOMMENDATION FOR NICHOLAS JASON KURTH

Recommender Contact Information

- **First Name:** Nathaniel
- **Last Name:** Nucci
- **Title:** Associate Professor
- **Department:** Physics & Astronomy
- **Institution/Organization:** Rowan University
- **Telephone:** 856-256-4396
- **Email:** nucci@rowan.edu

Applicant Information

Association

Describe your relationship to the applicant, including how long you've known the applicant, where, and in what capacity.

I am pleased to strongly recommend Nicholas Kurth for the SULI program. Nick is a sophomore physics major that I first met in our first-semester freshman seminar course in fall of 2020. This course was offered remotely at that time, due to the COVID pandemic. The course is essentially a college literacy class aimed at engaging new college students, help them build community, and improve their prospects for early success at Rowan. Nick jumped out early in the class as among the most engaged, open, and intelligent students. Nick had already identified a research career as a likely long-term goal so he was particularly keen to learn of opportunities to gain research experience.

Applicant Comments

Please provide substantive comments about the applicant's education, training, aptitude, or promise relevant to the SULI program. Include any relevant additional detail or perspective regarding the applicant's research experience or equivalent experience on complex projects, including the level of independence or other factors that would contribute to the applicant's ability to make an excellent contribution to the SULI program.

Despite being early in his undergraduate studies, Nick applied for our summer undergraduate research program. His research interests were seemingly quite divergent; he wanted to work on either cosmology (galactic-scale) or quantum (subatomic) physics. I remember talking with Nick about these seemingly opposed interests, but he already understood the inherent parallels between the physics of the very large and very small, namely that both cases require moving beyond simple Newtonian ideas. He earned the chance to perform summer research with my colleague, Dr. Eduardo Flores. He joined a team of students studying the Casimir effect, a surprising phenomenon in which force can be observed in a vacuum due purely to zero-point energy. At the end of the summer program, students present their work in poster format. I make a point of visiting the posters of students I know, and the extent to which Nick had grasped not only the complexity of the Casimir effect but the numerical approaches needed to model it. I was impressed at his depth of understanding despite having not yet taken either quantum physics or analytical mechanics.

Nick continued this work with Dr. Flores during the fall 2021 semester, and his depth of understanding has grown considerably in this short time. Over the past few years, I have discussed this project with many students that have contributed in Dr. Flores' research group. Most struggle to translate the complexities of the numerical methods and the subtleties of the concepts at play in their research. Nick stands out as being exceptionally good at communicating these challenging topics.

In addition to my discussions of his research, I have had the pleasure of getting to know Nick more deeply in his work as part of our American Physical Society Inclusion, Diversity, and Equity Alliance (APS-IDEA) Change Team. Nick joined this team in September 2021, and his impact was quickly felt. Nick's perspective was a welcome addition to our team, as a student, a researcher, and a member of the LGBTQ+ community. The APS-IDEA initiative holds shared leadership as a central principle, thus our team aims for all members to be equal voices and equal shareholders in helping to create a more equitable and inclusive environment in our department. The biggest challenge we faced in our first year of work was learning how to promote this shared leadership ideal when our team includes undergraduate students, faculty, staff, and members of administration. It was difficult to overcome traditional ideas of power structure such that the students felt like equal partners. The addition of Nick to the team greatly helped us in this avenue. He is confident and open, but also humble and collaborative. We have engaged primarily in self-study and learning to date, but Nick was eager to push the group toward action. At his suggestion, we added a working group focused on advocacy and community education, and Nick has stepped up as leader of this working group. By enhancing the visibility of our work and educating our community about resources, challenges, and examples of diverse physicists, Nick is helping to drive our efforts to create a more inclusive and equitable department.

Overall, Nick is a very talented young physicist. He is smart, hardworking, and intensely interested in his research. He is eager to expand his knowledge and research exposure, and he is driven to pursue a research –focused career. He is an excellent candidate for the SULI program, and I highly support his application.

Applicant Rating

In comparison to other undergraduate students, please rate the applicant relative to his/her peers on the following qualifications:

	Do Not Know	Below Average	Average	Above Average	Superior
Analytical and Mathematical				X	
Experimental Research	X				
Overall Academic				X	
Initiative and Self Reliance					X
Motivation toward Scientific Career					X
Originality of Thought	X				
Emotional Maturity					X
Ability to Work with Others					X
Potential for Leadership					X
Oral Communication Skills					X
Written Communication Skills					X