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Dillard University Women In Space-Force-Sciences High School Experience in Summer (DU SFS WISHES)

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14. ABSTRACT
Project title: Dillard University Women In Space-Force-Sciences High School Experience in Summer (DU SFS WISHES) Executive summery In the last 8 years (2014-2022), the DU WISHES program attracted 490 minority female high school students from disadvantage school districts communities in Southern US states like Louisiana, Alabama, and as far as Florida and Arizona where 38% of the participants retained in STEM fields and 9% in medical fields. This program contributed to the success of DU physics department to be number two in graduating Black females in Physics in the USA. This proposed outreach program is a continuation of the successful DU WISHES program over the years to support workforce in DAF. The overarching goal of this unique summer program is targeting disadvantage, underrepresented and especially black female in high schools and veteran/current military high school female-students to increase the awareness of STEM fields and increase the capacity in AF workforce which will be grounded in space science and force in STEM. By increasing the recruitment activities, ensure the retention in STEM majors at the high school and undergraduate students in STEM fields by providing the necessary systemic mentoring in research topic related to DAF, tutoring support systems and establish a pipeline to DU University STEM disciplines. In addition, the program will establish a new open-mind communities' learners which are aware of using new pedagogies to increase the Inquiry-based activities and skills through hands-on and minds-on training on critical thinking and exploration education activities to discover Space science by doing space sciences which will inspire them and to ask question how, why, and explore the reasoning behind the observation of the outcomes of the experiments. The DU SFS WISHES program will continue to establish new talented cadres and maintain them in S&T fields to provide DAF with the adequate training skills which they need for todays' technology of sciences of Space Force. This is bridging the gap of the necessary educational training curriculum which is required for any talented work force team. This program will help to bridge the gap of disadvantage, underserved minorities participants and give a special recruiting attention to Veteran/ Current military high school females in STEM fields. This has been a long-time standing problem in every strategic plan for each governmental department or branch. Anticipated outcomes: Impact on the institution: Increase the recruitment of talented, disadvantage, underserved, female minority high school in the Physics department and inspire them to engaged on the current AFOSR funded project and train them for DAF workforce. Impact on students: Contribute to advance the education curriculum, attract more minorities to be trained on Space Force Science to form a qualified community for future workforce for the nation's homeland security and create a baseline to further assess the process. Impact on DoD: The proposed project will contribute to AFRL-AFOSR STEM program described in the latest AFRL-AFOSR- FOA-AFRL-AFOSR-2022-0004. The unit which the proposal is directed to is the AFOSR, Program Manager: Dr. Kimberly Jacob Morris, AFOSR: FOA-AFRL-AFOSR-2022-0004 .

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DU Space Force Sciences WISHES report for 2022 summer program
Dillard University

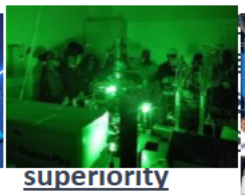
DU- SFS- WISHES 2023
June 8- 22, 2022, Grades 9- 12, 8 am- 3 pm @ Dillard University, PSB

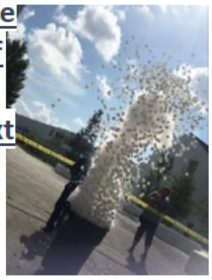
DU - WISHES

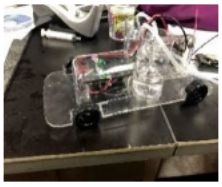
Dillard University- Space Force Science- Women in STEM High School Experience in Summer 2022

Exploring and Learning Science by Doing Science









superiority

Explore through hands-on activities and discover pathways to rewarding STEM careers. Learn the basics of Engineering, Biology, Physics, Optics, Lasers, Aerospace grounded in Space Force Science careers and more with this two-week, *free of cost* summer camp.

We will provide you all the kits needed for the program. At the end of the program, each participant will receive a cash stipend and an iPad after the closing ceremony presentation!
Applications are due by May 20.
Shortlisted candidates will be interviewed with their parent/guardian in the first week of June.

E-mail the completed application form, by May 25, to:
Dr. Julie Basu-Ray, Assistant Program Director
at adarwish@dillard.edu, sjones@dillard.edu

Established by the Program Director, Professor A. Darwish. For the past 8 years this camp has served more than 450 females from mid-south and southern US states!

Executive summary:

DU-SFS-QC-WISHES in partnership with AFOSR and IBM has created this STEM program for high school students and provides college credit for the participants. This year for the first time in eight years, the program provided a unique opportunity to recruit more students from 15 states and provide a residence participation for them. The residence participants were able to watch the night sky with telescopes and take pictures of the neighboring stars and planets. The program also provides an opportunity for three high achieving high school students from the participants to participate with DU undergraduate students' research team in the Physics department on currently funded projects. Faculty from DU's Physics, Mathematics and Biology departments have regularly collaborated in impressing upon the students the interdisciplinary nature of STEM fields. Undergraduate current students from DU's Physics department have also participated regularly in organizing and working along with DU-SFS-QC-WISHES participants in laser, drones and quantum computing activities. This encouraged the young women to engage in open conversations with college-going students, thus inspiring them to join STEM in college and in future careers. A major challenge among minority women has always been the lack of role models in STEM fields. In addition to their hands-on activities, the recruited minority females have been learning about successful minority women in Space science and other STEM fields in the past. They have also interacted with minority established guest speakers, mostly women, in person as well as virtually, from NASA and other universities and diverse research centers from all across the nation. This innovative approach has inspired the participants to learn about the available careers for them in STEM fields and to join and excel in them in future. Most of the students have taken Science courses in their junior and senior years and have joined a BS degree in institutions across the country.

In 2014, Presidential professor A. Darwish established the DU WISHES program to target high schools and most disadvantage communities in New Orleans, LA. The huge increase of the program participants happened, with the great support of IBM in 2022 and 2023 where the number of students increased dramatically from 7 participants in 2014 to 100 participants in 2023 when the program went nationally under the AFOSR and increase the financial support by IBM HBCU Quantum Computing consortium in disadvantaged and underrepresented high schools in 15 States.

The number of participants increased from 7 in 2014 to 70 in in 2022 and 100 in 2023.

DU-SFS -WISHES program achieved its goals in 2022:

1) Recruited 100 disadvantaged, underrepresented minority females from high schools to increase the capacity in the STEM workforce.
2) Established SFS and QC STEM curriculum activities and explorations grounded in Space Force Sciences and Quantum Computing that will excite and stimulate students' curiosity and critical thinking in these areas and enable them to join the talented-trained minority workforce in that field.

3) Provided opportunities for minority female students to learn first-hand about successful minority women in Space Force Science, QC and STEM fields and interact with guest speakers to provide networking and advancement pathways.
4) Assess the program performance and to enhance its intake process and procedure to establish a baseline of minority black females in SFS, QC and their retention in STEM fields.

The two weeks curriculum:

DU Wishes Quantum Computing Curriculum

https://www.youtube.com/watch?v=tFW21xTOswc

Professor Darwish, Dr. Julie basu-Ray, Dr. Rossmanith and Dr. Hong Dai helped guide the students through several topics, including traditional computers, and introduction to quantum mechanics, and quantum computers, space innovation, Space Force Sciences, Even, sky watchers and what all these subjects had to do with Quantum computing and the need of processing a big data.. The students were given a lecture on the theory and conceptual ideas of the topics. Afterwards, they would have a group discussion to get a better grasp on the information and help each other understand some of the more complex topics. Finally, the students would be tasked with an assignment to show their understanding of the information. Along the way, the students were guided, by all of the instructors, in not just finishing the assignments, but also any side questions the students might have on the subject.

Undergraduate students participated un guiding the 99 female students, in addition to three female chaperones since this was a resident program where housing, and accommodation were provided to all the participants.

Given that it is critical to know how classical computers work in order to compare and contrast them with quantum computers, a discussion classical computer was first. It was obvious that, while all of the students were familiar with the use of computers, very few had any idea of how they work. Some history was given, along with how computer programs are made and organized. Furthermore, there was a major focus on the binary numbering system, and the logic associated with classical computer programming. Once the students felt more comfortable with the inner workings of computers, we moved on to quantum mechanics.

Many students had heard of quantum mechanics, but no one really understood what it was actually all about. The history of quantum mechanics was discussed, beginning with Isaac Newton and his theory of light being corpuscular. The discussion continued to Einstein and the Photoelectric Effect. Then, how the theory was built over a period of time by a few people. The major ideas that would be focused on came from the discussion of Heisenberg's Uncertainty Principle, superposition, quantum entanglement, as well as the Pauli Exclusion Principle. It is with these topics that most of the time was spent.

Several thought experiments were imagined, such as the Stern-Gerlach experiment and Young's double slit experiment, showing the fallout of this new quantum mechanical idea. By making use of these thought experiments, the students were forced to start thinking outside of their comfort zone and begin to feel comfortable with some results that wouldn't make sense in the classical world. By the end of the discussion, the students were ready to use this new logic that arises out of quantum mechanics.

It was then that quantum computing was discussed. How is a quantum computer different from a classical computer? How do these differences affect the outcome of computer processes? What types of questions can now be solved through quantum computers? These were the types of questions our discussions focused on. We thought about the calculations or measurements being made on the electrons themselves. The students saw how some of the operations that can be done with quantum computers are impossible on the classical level, and align well with the discussion of entanglement and measurements. This is where things seemed to really fit together. What was a series of theoretical ideas that no one really sees on a normal basis, is now perfectly evident and we can predict the statistical outcomes of these operations.

The students were then tasked with using the IBM Quantum-computing website to create and run real quantum computer programs. We first went through a tutorial like stage to understand most of the operations and how to put together the programs. We also spent time analyzing the results to understand what the computer did and show that it matches with our theoretical ideas of entanglement and other principles we had discussed. Finally, the students worked together in groups to build their own quantum programs, first making a prediction of the result, and then seeing if their prediction was correct. The students were quite impressed with this activity, especially once they understood what was happening at the electron level.

These 3 overarching topics would also be presented by the students during their final presentations. They were responsible for teaching the audience, who would be at all levels of knowledge about computers and quantum mechanics, about what they learned and why it is important. They not only did a good job of presenting the information in a logical and clear to follow way, they also lightened up the presentations with a few quantum mechanical jokes as a play on Heisenberg's Uncertainty Principle and Schrodinger's Cat. This was important to see, as being able to speak at an informal level on a topic as complex as quantum mechanics, shows a familiarity and understanding of the subject.

In addition, cases where a big data is needed and introduction to AI and much of QC is needed to deal with big data is the Space Sciences and outer space as the Air Force Office of Scientific Research are concern with QC: Part of this exploration was covered by Professor Quain from PVA&M university who is the director of Big data center funded by the US Army at PVA&M.

In addition, we enforced thinking out of the box, by educating the participant scholars about the space, out space, and beyond covering more data which required the use of the Quantum computing like :-Relative Size scales for the universe video,

-Drones and big data programs to coordinate among many drones to be used during war and save lives ,-telescope night watch and related to QC and James and Hubble telescopes and how data is coordinated and the use of big space data to discover more galaxies.

-AI and Robotics

-Big Bang Theory and the expansion of the universe, can this be a direct needed of QC as well?

-Dark matter and Dark energy and Einstein theory of relativity and how QC can be used to simplify that.

In addition, a field trip to Stennis Space Center planned and the students visit was marvelous where they asked many questions and why QC is important field related to NASA and Air Force, students were trained as well to use programming to participate in using -NASA Docking animation using Scratch website. Finally, the students were assigned in groups to build a life at Mars and this was a group project under Mars Rover animation project.

Grouping the students:

1. The students were divided into 10 groups with one selected leader by the group.
2. Individual assignments were carried out by each group and reported by the leader of each group.
3. Activities were carried by the participants with the help of the undergraduate students in the Physics department.
4. Five UG students, the programs assistant and the four instructors carried the program, in addition to three female chaperons to control the flow during the three meals, moving between classes and as such help is needed.

The participants:

2022:

#	*NAME*	*Email*	*High School*	*City*	*State*	
1	*Bridget Adeola*	[redacted]	*Northshore High School,*	*Slidell*	*LA*	
2	*Myla Allen*	[redacted]	*De La Salle High School*	*New Orleans*	*LA*	
3	*Deanna Barrett*	[redacted]	*Grace King High School*	*Gretna*	*LA*	
4	*Georgilia Bennett*	[redacted]	*Salmen High School, Salmen, LA*	*Salmen*	*LA*	

5	*Elizabeth Burke*	[redacted]	*Ben Franklin High School*	*New Orleans*	*LA*	
6	*Kylie Butler*	[redacted]	*Lusher Charter School*	*New Orleans*	*LA*	
7	*Leah Butler*	[redacted]	*Willow School*	*New Orleans*	*LA*	
8	*Amyri Cheneau*	[redacted]	*Salmen High School*	*Salmen*	*LA*	
9	*Julynn Collins*	[redacted]	*Ursuline Academy*	*Marrero*	*LA*	
10	*Laila Cooper*	[redacted]	*Ursuline Academy*	*Marrero*	*LA*	
11	*Mari Johnson*	[redacted]	*Ursuline Academy, Marrero, LA*	*Marrero*	*LA*	
12	*Kasey Keelen*	[redacted]	*New Orleans Charter Science & Mathematics High School*	*New Orleans*	*LA*	
13	*Madison Gray*	[redacted]	*Ben Franklin High School*	*New Orleans*	*LA*	
14	*Jazz Meyers*	[redacted]	*St Mary's Academy*	*New Orleans*	*LA*	

15	*Snehalata Mondal*	[redacted]	*Haynes Academy of Advanced Studies*	*Kenner*	*LA*	
16	*Amira Nelms*	[redacted]	*Jones Futures Academy*	*Houston*	*TX*	
17	*Shylah Pflueger*	[redacted]	*St Mary's Academy*	*New Orleans*	*LA*	
18	*Iris Qian*	[redacted]	*Cypress Ranch High School*	*Cypress*	*TX*	
19	*Emerald Richardson*	[redacted]	*Ursuline Academy*	*Marrero*	*LA*	
20	*Bracie Sennett*	[redacted]	*Chalmette High School*	*Chalmette*	*LA*	
21	*Savannah Williams*	[redacted]	*Haynes Academy of Advanced Studies*	*Kenner*	*LA*	
22	*Taylor Williams*	[redacted]	*Haynes Academy of Advanced Studies*	*Kenner*	*LA*	
23	*Ruby Fincher*	[redacted]	*Rosenwald Collegiate Academy*	*New Orleans*	*LA*	
24	*Imari Dupree*	[redacted]	*Patric Taylor High School*	*Marrero*	*LA*	
25	*Morgan Turner*	[redacted]	*Glenda Dawson High School*	*Pearland*	*TX*	

26	***Ja'Shyra Wilson***	[redacted]	***JS Clark Leadership Academy***	***Washington***	***LA***	
27	***Eden Pierce***	[redacted]	***Bellaire High School***	***Houston***	***TX***	

Class of 2023 participants:

Name	**Email**	**High School**	**City**	**State**	
Markeiaja Wilson	[redacted]	University Academy Upper School	Kansas City	MO	
Manjari Guha	[redacted]	Kenner Discovery	Kenner	LA	
Ciara Shipman	[redacted]	New Orleans Math and Science	New Orleans	LA	
Madison Adams	[redacted]	Ridgeway High School	Memphis	TN	
Madison Conerly	[redacted]	St Mary Academy	New Orleans	LA	

Krista Flowers	[redacted]	Liberty Magnet High School	Baton Rouge	LA	
Tatum Williams	[redacted]	St Mary Academy	New Orleans	LA	
Taniya Coleman	[redacted]	Faubion Magnet School	McKinney	TX	
Haley Allen	[redacted]	Lincoln Prep School	Kansas City	MO	
Kennedy Graves	[redacted]	Mount Carmel Academy	New Orleans	LA	
Erin-Ray Pepp	[redacted]	St Mary Academy	New Orleans	LA	
Celeste Johnson	[redacted]	DeSoto High School	Cedar Hill	TX	
Aaliyah Williams	[redacted]	Liberty Magnet High School	Baton Rouge	LA	
Calen Johnson	[redacted]	DeSoto High School	Cedar Hill	TX	
Elyse Bailey	[redacted]	St Thomas More Catholic School	Baton Rouge	LA	
Aniyah Bailey	[redacted]	St Thomas More Catholic School	Baton Rouge	LA	

Cameron Thorpe	[redacted]	West Springfield High School	Springfield	VA	
Kelvinesha smith	[redacted]	Noxubee Country High School	Macon	MS	
Diara Anderson	[redacted]	Armstrong Middle School	Dallas/ Plano	TX	
Aleyah Walker	[redacted]	West Jones High School	Laurel	MS	
Ke'Amber Conner	[redacted]	Noxubee Country High School	Brooksville	MS	
Ciara Richey	[redacted]	Golden Triangle Early College HS	Macon	MS	
D'Jazzmyne Hunter	[redacted]	Gentry High School	Indianola	MS	
Whitney Hughes	[redacted]	Riverside Academy	Garyville	LA	
Ava Peace	[redacted]	North Garland High School	Garland	TX	
Skyler Farley	[redacted]	Veterans Memorial MS, Newton High	Covington	GA	
Jayla Richardson	[redacted]	Chaparral High Scool	Scottsdale	AZ	
Jasmine Bates	[redacted]	Northeast High School	Baton Rouge	LA	

Madison Bailey	[redacted]	Ouachita Parish High School	Monroe	LA	
Raleigh Brock	[redacted]	NO Charlter Math & Sci School	New Orleans	LA	
Autumn Scott	[redacted]	Ocean Springs High School	Ocean Springs	MS	
Meia Smih	[redacted]	St Mary Academy	New Orleans	LA	
Zoey Mattox	[redacted]	BF Liddell Middle School	Macon	MS	
M'Kenzie Smith	[redacted]	St Mary Academy	New Orleans	LA	
Morgan Clark	[redacted]	Madison Preparatory Academy	Baton Rouge	LA	
Michaela Gray	[redacted]	De La Salle High School	New Orleans	LA	
Jorie Mitchell	[redacted]	Forney High School	Forney	TX	
Emily Schwennesen	[redacted]	Home School	New Orleans	LA	

Ally Schwennesen	[redacted]	Home School	New Orleans	LA	
Alana Jackson	[redacted]	Gentry High School	Indianola	MS	
Makayla Nelms	[redacted]	Harding Academy, Cheery Rd Campus	Memphis	TN	
Tremaya Jones	[redacted]	Stepping stones online educational	Miami	Fl	
Laci McGhee	[redacted]	St. Benedict of Auburndale	Mem/ Cordova	TN	
Alaina Johnson	[redacted]	Slidell High School	Slidell	LA	
Autumn Fykes	[redacted]	Lowery Freshman Center	Dallas	TX	
Ava Johnson	[redacted]	National Cathedral School	Bowie	MD	
Chloe Gaudin Christophe	[redacted]	St Joseph's Academy	Duplessis	LA	
Olivia Jones	[redacted]	Katy High School	Katy	TX	
Elligant Johnson	[redacted]	Ouachita High school	Monroe	LA	

Leah Butler	[redacted]	Willow School	New Orleans	LA	
Heaven Polk	[redacted]	St Mary Academy	New Orleans	LA	
Zari Lawson-Kennedy	[redacted]	The Oakridge School	Burleson	TX	
Malaysia Willis	[redacted]	Art In Motion Charter School	Chicago	IL	
L'Oreal Sinegar	[redacted]	Tearlings Catholic High School	Lafayette	LA	
Imani Hunter	[redacted]	Ben Franklin High School	New Orleans	LA	
Johari Primos	[redacted]	Lincoln College Prep Academy	Kansas City	MO	
Joy Rutledge	[redacted]	Baton Rouge High School	Baton Rouge	LA	
Daisha Richardson	[redacted]	Salmen High School	Slidell	LA	
Janae Santos	[redacted]	St Mary Academy	New Orleans	La	

Danielle Beard	[redacted]	St Mary Academy	New Orleans	LA	
Genesis Medina	[redacted]	NOLA , Jefferson Rise	New Orleans	LA	
Nadia Ragin	[redacted]	Meade High School	Laurel	MD	
Moniece Doyle	[redacted]	Salmen High School	Slidell	LA	
Victoria Williams	[redacted]	Ames Middle School	Ames	IA	
Navis Allen	[redacted]	Isidore Newman School	New Orleans	LA	
Natalia Osborne	[redacted]	Bishop Lynch High School	Plano	TX	
kendall Garrett	[redacted]	Lancaster High School	Dallas	TX	
Mahlea McClelland	[redacted]	St Amant High School	Prairieville	LA	
India Proctor	[redacted]	Slidell High School	Slidell	LA	

Cre'Shaun Jones	[redacted]	St Mary Academy	New Orleans	LA	
Madison McGeathy	[redacted]	Ursuline Academy	New Orleans	LA	
Megan McGeathy	[redacted]	Ursuline Academy	New Orleans	LA	
Lea McGeathy	[redacted]	Cabrini High School	New Orleans	LA	
Nadia Butler	[redacted]	Gulfport High School	Gulfport	MS	
Robinay Ulmer	[redacted]	RIverdale	Jefferson	LA	
Leilani May	[redacted]	St Mary Academy	New Orleans	LA	
Jayda Matthews	[redacted]	Marian Catholic High School	Matteson	IL	
Amanda Thomas	[redacted]	Barton Academy for World Studies	Mobile	AL	
Kimora Brooks	[redacted]	Noxubee Country High School	Brooksville	MS	

Payton Ike	[redacted]	Central High School	Tuscaloosa	AL	
Kimora Champagne	[redacted]	Lakeridge High School	Mansfield	TX	
Hiedi Bell	[redacted]	Druid Hills High School	Atlanta	GA	
Ra'Ionne Walker	[redacted]	St.Mary's Academy	New Orleans	LA	
Najilah Carter	[redacted]	Gentry High School	Indianola	MS	
Kennedy Hughes	[redacted]	Riverside Academy	Garyville	LA	
Kaiden Word	[redacted]	St Mary Academy	New Orleans	LA	
Kennedy Carla Newbell	[redacted]	TCC/ South FWISD Collegiate HS	Fort Worth	TX	
Destiny Hinds	[redacted]	DeSoto High School	DeSoto	TX	
Somaitah Hoq	[redacted]	Kenner Discovery	Kenner	LA	
Emerald Richardson	[redacted]	Ursuline Academy	New Orleans	LA	

Morgan Williams	[redacted]	Lebanon Trail High School	Frisco	TX