REU-CAAR:
You're Here!

Credit where Credit is Due

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  Cybersecurity Scholars Handbook.

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Auguste: Why are you telling them all that?

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Auguste: Why are you telling them all that?
Bill: In academia its very important to credit past work!

Purpose of This Talk

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1. Who are the mentors?

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2. What are the projects?

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3. What is expected of you?

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1. Who are the mentors?
2. What are the projects?
3. What is expected of you?
4. What should you expect of us?
5. Nuts and bolts of how the program works.
6. Advice on how to get the most out of this summer!

REU-CAAR

Back in 2013 Samir and Bill wrote an REU grant with the theme
Applying Theory to Practice.

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Discuss Find a topic within CS that this title **does not** cover?

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Discuss Find a topic within CS that this title **does not** cover?

Systems, **HCI**, **Software Engineering**, anything else?

REU-CAAR: Projects, Mentors, Students!

Algorithms Projects

Algorithms Projects

Space Efficient Parallel Algorithms.
Mentored by Laxman.

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He seems to like Parallelism.

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10 Student:

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10 Student:
Elizabeth-UMCP.

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10 Student:
Elizabeth-UMCP.
Rebecca-Bryn Mahr.

Projects and Mentors: Algorithms Projects (cont)

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Exploring the Hilbert and Thompson Geometries Computationally:

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Fun Fact Auguste has 11 siblings: Januarye, Febuarye, ...,
Decembere.

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Cross-species identification of DNA that moves around: Retrospective analysis and improved methods

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Parth-UMCP

ML/AI Projects

Machine Learning For Automonous Driving: Theory and Practice Mentored by Ming.

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Ming is a first-timer for REU-CAAR but has mentored many ugrad projects.

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3 students:

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Sean-Dartmouth

ML/AI Projects

Crop Planning Decision Support with Multi-Agent Reinforcement Learning

Mentored by Aviva.

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BILL: Whats that like?
I mean, what is wanting to help people like?

Quantum Projects

Symmetries, Defects and Boundaries of Bicycle Codes
Mentored by Victor and Dominic.

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Victor: mentored for us in 2023 and 2024.

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2023: **Classical and Quantum Error Correction**

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1 Student: Cassie Hopkins-UC Davis.

Quantum Projects (cont)

Reducting the Overhead for Quantum Error Corrections With LDPC Codes

Mentored by Yuxin and Yifan.

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Both are first times for REU-CAAR but have mentored students before.

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1 Student: Aranav-UMCP

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Qutrit Quantum Quadatic Resideu Codes

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Mentored by Shubham and Victor.

Quantum Projects (cont)

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Victor is the same Victor as before.

Quantum Projects (cont)

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How can Victor mentor two quantum projects?

Quantum Projects (cont)

Qutrit Quantum Quadatic Resideu Codes

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How can Victor mentor two quantum projects? Superposition!

Quantum Projects (cont)

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1 Student: Mihir-UMCP

Quantum Projects (cont)

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Robust Bell Sampling

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Mentored by Michael and Thomas and Dominik.

Quantum Projects (cont)

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Michael has mentored ugrads before. Thomas and Dominik are new.

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Why three quantum mentors on one project?

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1 Student: Tony-CMU

Quantum Projects (cont)

Quantum Projects (cont)

An Apparatus for Quantum Simulation with Dipolar Quantum Fluids

Quantum Projects (cont)

An Apparatus for Quantum Simulation with Dipolar Quantum Fluids

Mentored by Ian and Gretchen.

Quantum Projects (cont)

An Apparatus for Quantum Simulation with Dipolar Quantum Fluids

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They've mentored ugrads before.

Quantum Projects (cont)

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1 Student: Jarrett

Admin

- **REU-CAAR Director:** William Gasarch.

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  Wrote the grant,

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  Wrote the grant, finds the mentors,

Admin

- **REU-CAAR Director:** William Gasarch.
  Wrote the grant, finds the mentors, does admissions,

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- **REU-CAAR Director:** William Gasarch.
  Wrote the grant, finds the mentors, does admissions, manages the REU-CAAR website,

Admin

- **REU-CAAR Director:** William Gasarch.
  Wrote the grant, finds the mentors, does admissions,
  manages the REU-CAAR website, makes decisions on housing,

Admin

- **REU-CAAR Director:** William Gasarch.
  Wrote the grant, finds the mentors, does admissions, manages the REU-CAAR website, makes decisions on housing, lunch activities,

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  The people below help to implement some of those decisions.

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- **Arrange REU Lunches:** Sharron McElroy.

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- **Lots of other Stuff:** Auguste Gezalyan.
- **Airport, Amtrak Pickups:** Clyde, Darling, Auguste.

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- **Lots of other Stuff:** Auguste Gezalyan.
- **Airport, Amtrak Pickups:** Clyde, Darling, Auguste.
- **Help with Final Presentations:** Clyde.

REU-CAAR:
Very Brief History

The Original Grant

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Combinatorics and Algorithms for Real Problems

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4. **Connection:** Help connect you to their colleagues, graduate assistants, others.

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Credit Auguste thought of making the first letters spell words.

Issues that Probably Won't Arise But Need to be Discussed

Sexual Harassment and Discrimination

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   Note that in the United State there is Mandatory Reporting: if a mentor or director hears about a case of sexual harassment, they must report it.
2. While this slide is about Sexual Harassment and Discrimination, feel free to talk to **Bill**, **Laxman**, **Auguste**, or **Aviva** about **any** issue, even if it is uncomfortable.

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Upshot Communication!

Schedule and Activities

First Week++ Talks

You should all know about each others projects:

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In symbols

$$(\forall p)(\exists m, d)[MENTOR(p, m) \wedge TALK(p, m, d)].$$

First Week - Lunch

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4. Bill will join you for lunch some of the first week.

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3. Research-Every day.

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College Park Metro Station

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Check: There are websites that have metro information- check them before any excursion.

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   (Is that a paradox? A project for Summer 2026 REU.)

Elevator Pitch For Projects

Parallelism for Nearest Neighbor Search

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Students Arushi, Atharva, Dinesh, Pranav.

Exploring Hilbert Geometry

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$$\{(p_1, \ldots, p_n) : 0 \leq p_i \leq 1 \wedge \sum_{i=1}^{n} p_i = 1\}$$

which is called the probability simplex.

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$$\{(p_1, \ldots, p_n) : 0 \leq p_i \leq 1 \wedge \sum_{i=1}^{n} p_i = 1\}$$

which is called the probability simplex.

What if you are in another space? A curved space? What can you do? You can do **This project!**

Mentors Auguste and Dave.

Students Carmen, Hridhaan, Lucy, Megan, Nithin, Olga, Megan, Sarah

Crop Planning Decisions Support With Multi-Agent Reinforcement Learning

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Elevator Pitch

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Mentor Aviva
Students Anubah, Daniel, Ethan, Shreya

What Makes Multimodal Question Answering Difficult?

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Mentor Jordan
Students Ahmed, Dmytro, Liam

Classical and Quantum Error Correcting Codes

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Student Alexander

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Mentor Seyed and Jon
Students Bushra (Bea) and Jakin.

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Mentors Andrew and John
Students Andrew (diff Andrew) and David (diff David)

Funding

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Irwin Winkler

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Why am I telling you this?

The Winkler Foundation

Irwin Winkler has established a charitable foundation that gives money to

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Irwin Winkler has established a charitable foundation that gives money to (a) many worth causes and (b) our REU!

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Also, the last book was a nominee for the **National Book Award**.

Show me the Money!

Where Does the Winkler Money Go?

Things the NSF won't pay for:

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Show me the Money!

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Things the NSF won't pay for:

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- Misc.

My Wife Says that if I Lie to You I Must Tell You

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Qutrit Quantum Quadratic Residue Codes

Questions from You?

I welcome questions now and anytime!