REU-CAAR: You’re Done!

William Gasarch-U of MD
Thanks to All Involved:

- Clyde
- Jodie
- Auguste
- Sharron
- Robert
- Paul
Thanks to All Involved:

**Clyde** He helped your talks be awesome!
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**Clyde** He helped your talks be awesome!

**Jodie** She got you paid!
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**Auguste** He was my helper!
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**Sharron** Budget, Rooms, Other Stuff!
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**Jodie** She got you paid!

**Auguste** He was my helper!

**Sharron** Budget, Rooms, Other Stuff!

**Robert** He was Sharron’s Helper!

**Paul** Who brought cool and complicated games to game night!
Thanks to All Involved:

Mentors Who guided your brilliance with their expertise!
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Dept, NSF, Zhu/Google, Iribe/Ocular, Winkler Found $$$$$
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ALL OF YOU! Without you ...
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ALL OF YOU! Without you ... there wouldn’t be a program!
Did the Program Achieve its Goals

1. None of the NSF-funded students died!
2. Bonus: None of the non-NSF-funded students died!
3. All students learned things. For some definition of learned.
4. All students did things. For some definition of did.
5. Key-card access for non-citizens came! Yeah!
6. Those cards didn’t have students face on them! Boo!
7. Some of the key-cards never worked! Boo!
8. Some students became nomads, wandering around looking for rooms. Boo! It may help them survive in the global warming apocalypse. Yeah!
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   It may help them survive in the **global warming apocalypse.** **Yeah!**
Advice from You on How to Improve REU-CAAR

William Gasarch-U of MD
Improve Bill’s Talks

1. The Hat Problem: Students should have to wear hats.
   Bill’s Response: How about Virtual Hats?

2. The Muffin Problem: Need more variety of Muffins.
   Bill’s Response: Next summer: 61 muffins for 19 people, cut so that everyone gets $\frac{61}{19}$ and the smallest piece is $\frac{313}{684}$.

3. Bill should lie less. I actually believed Joe Biden worked on quantum error correction.
   Bill’s Response: Joe dropped out to spend more time with his quantum research!

4. Bill should stick to his lies. I want to believe that Joe Biden worked on quantum error correction.
   Bill’s Response: Ahmed, believes this.
Improve Bill’s Talks

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Bill’s Response

How about Virtual Hats?

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Improve Darren-Vavilov’s Talk About Trails

**Problem** The Darren-Vavilov talk about Trails and having users as part of the design project was content free.
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**Problem**  The Darren-Vavilov talk about Trails and having users as part of the design project was content free.

**Solution**  
Retitle it:
Improve Darren-Vavilov’s Talk About Trails

**Problem** The Darren-Vavilov talk about Trails and having users as part of the design project was content free.

**Solution**
Retitle it:
*How to Get a Job with a Phd in the Humanities:*
Improve Darren-Vavilov’s Talk About Trails

Problem  The Darren-Vavilov talk about Trails and having users as part of the design project was content free.

Solution  
Retitle it:  
How to Get a Job with a Phd in the Humanities:  
Learn how to talk a lot but say a little
Students Differed on How Many Talks

1. There should be less talks.
2. There should be never be 3 hours of talks.
3. The mentors talks (esp quantum) should be more basic.
4. Hmmm, looks like students didn’t differ at all.

Bill’s Response

REU-CAAR and REU-TRAILS should be 4 talks, LUNCH, then 4 more talks.
REU-BRIDGE not an issue since very few of you went to those.
Wed Talks- I thought they were very good, though we will have less next summer.
Students **Differed** on How Many Talks

1. There should be *less* talks.
Students Differed on How Many Talks

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How to Improve Game Night

Students More people should come.
How to Improve Game Night

**Students** More people should come.

**Bill’s Response** That’s on you
How to Improve Game Night

Students More people should come.

Bill’s Response That’s on you

Students There should be more fun simple games
How to Improve Game Night

**Students** More people should come.

**Bill’s Response** That’s on you

**Students** There should be more fun simple games

**Bill’s Response** I’ll have Jakin and Bea bring Quantum Games.
Food!

Welcome: Pizza.
Quantum: Pizza.
AI: Pizza.

Students
Why are the extra lunches always at Potomac Pizza?

Bill
On the one hand, a wise man once said Variety is the Spice of Life.

Bill
On the other hand That wise Man was not me.

Students
Finally a quote you won't claim for your own!
Welcome: Pizza.

Bill

On the one hand, a wise man once said, "Variety is the spice of life."

Bill

On the other hand, that wise man was not me.

Students

Finally a quote you won't claim for your own!
Food!

Food!


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**Students** Why are the extra lunches always at Potomac Pizza?

**Bill** On the one hand, a *wise man* once said

*Variety is the Spice of Life.*

**Students** Why are the extra lunches always at Potomac Pizza?

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*Variety is the **Spice** of **Life**.*

**Bill** On the other hand

Students  Why are the extra lunches always at Potomac Pizza?
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**Students** Why are the extra lunches always at Potomac Pizza?

**Bill** On the one hand, a *wise man* once said

*Variety is the *Spice* of *Life.*

**Bill** On the other hand

*That wise Man was not me.*

**Students** Finally a quote you won’t claim for your own!
Social Activities with Other Programs

1. PRO
   If you dislike the people in REU-CAAR you may find more people to dislike.

2. NOT NEEDED?
   There are 21 people in REU-CAAR so don't really need more social interaction.

3. LOGISTICS
   Lunches cost money. Game Night might get unwieldy with REU-CAAR and REU-MATH and REU-BRIDGE and TRAILS.
   On the other hand, only about half of you come anyway.

4. Hard to force people to be social.
   Will confer with the other REU/TRAILS directors about this but see next slide.
Social Activities with Other Programs

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But see next slide
More Interaction With Other REU Groups

I tried to do this.
More Interaction With Other REU Groups

I tried to do this.
But getting the other REU-directors to cooperate was like
More Interaction With Other REU Groups

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▶ Pulling Teeth.
More Interaction With Other REU Groups

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More Interaction With Other REU Groups

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- Pulling Teeth.
- Herding Cats.
- Pulling Cats Teeth.
Pay the Unpaid Students

1. What's the point of having unpaid students if you are going to pay them?

Begin Rant

The NSF should give us more money and allow us to pay HS students AND non-citizens AND have more slots so we can let more people in.

End Rant
Pay the Unpaid Students

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Pay the Unpaid Students

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2. **Begin Rant**
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2. **Begin Rant**
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**End Rant**
REU-CAAR Projects for Next Summer

William Gasarch-U of MD
Next Summer’s Projects

Bill and Sajjad and Jon

Quantum Ramsey Theory. Write the Grant. It will get funded. Figure out what Quantum Ramsey Theory is. Am I serious? Uncertain.
Next Summer’s Projects

Bill and Sajjad and Jon
Project Quantum Ramsey Theory.
Next Summer’s Projects

Bill and Sajjad and Jon

Project Quantum Ramsey Theory.

Write the Grant
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Write the Grant

It will get funded
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**Bill and Sajjad and Jon**

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Am I serious?
Next Summer’s Projects

Bill and Sajjad and Jon
Project Quantum Ramsey Theory.
Write the Grant
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The figure out what Quantum Ramsey Theory is.

Am I serious? **Uncertain.**
Next Summer’s Projects (cont)

A New Project:

Funded by The Winkler Foundation

Computing Fast Fourier Transforms:

Mentored by Aviva ‘Vin Diesel’ Prins
Next Summer’s Projects (cont)

A New Project: Funded by The Winkler Foundation
Next Summer’s Projects (cont)

A New Project: Funded by The Winkler Foundation
Computing Fast Fourier Transforms:
Next Summer’s Projects (cont)

A New Project: Funded by The Winkler Foundation
Computing Fast Fourier Transforms:

Mentored by Aviva ‘Vin Diesel’ Prins
NLP on Funny vs Offensive

Can an NLP make the following judgments

If Bill says:
- The only people who were kicked out of REU-CAAR were white guys from Harvard, so I am keeping a close watch on Alex. Thats funny!
- I can't tell Sarah from Lucy. Thats racist!
- I can't tell Jakin from Bea. Thats okay! Since one is Chinese and one is Indian.
- If Bill can't tell which one is Chinese which one is Indian. Thats Bill!
NLP on Funny vs Offensive

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NLP on Funny vs Offensive

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**Thats funny!**
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If Bill says *I can't tell Jakin from Bea*
 *That's okay! Since one is Chinese and one is Indian.*
If Bill can't tell which one is Chinese which one is Indian
 *That's Bill!*
A Mathematical Psychology Project on Gullibility

See which of these statements students will believe.

1. The Diamond Industry uses Muffin Math. (Haverford students believed this one).

2. Auguste has 11 siblings whose names are January, February, …, December. (Sharron believes this one.)

3. The lunches are paid for by the Colombian Drug Cartels who gave us money a while back for a project: max cocaine traffic at min risk. (My Chairman believes this one.)

4. After learning why the Quintic could not be solved, Bill became a Hobo for a year. (Auguste believes this one.)

5. Bill was the first to say Fortune favors the bold. (My Ramsey Gang believe this one.)
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5. Bill was the first to say *Fortune favors the bold*. (My Ramsey Gang believe this one.)
A Mathematical Psychology Project on Gullibility

See which of these statements students will believe.

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AI Project on Question-Answer Programs

Mostly Excellent

Geometric Answers

Network Project is in two phases
1. HS phase: Train M.E.G.A.N to solve problems in HS geometry.
2. REU phase: Train M.E.G.A.N to solve problems in Hilbert geometry.
AI Project on Question-Answer Programs

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REU-CAAR and Other Programs

William Gasarch-U of MD
Number of Students

- Most REU programs have around 200 applying
- Most REU programs take 10 students
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- We have 470 applying.
- We take 21 students. (5 were not paid)
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Do I really want 21 students in Summer 2025?
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Do I really want 21 students in Summer 2025?
If they are like you then YES
AWWWWWWWWW
Erin Claims REU-CAAR is Chill

Erin Molloy is a young comp bio professor.
Erin Molloy is a young comp bio professor. Erin claims REU-CAAR is chill!
Erin Molloy is a young comp bio professor.

ERIN I want to work in REU-CAAR rather than REU-BRIDGE.

BILL Why? REU-BRIDGE does Comp Bio where as we do ... a lot of stuff.
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Erin Cool!
IS REU-CAAR is Chill?

Compared to REU-BRIDGE the answer is yes.
IS REU-CAAR is Chill?

Compared to REU-BRIDGE the answer is yes. But is this good or bad?
IS REU-CAAR is Chill?

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Next slides discuss this.
1) We allow students to be in the program multiple times (REU-BRIDGE does not.)
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2) We have a variety of topics.

PRO:
Quantum! ML! AI! Comp Geom! Algorithms! Synergy!

CON:
Admissions harder! Mentors don’t know each other.

3) We minimize formal obligations (REU-BRIDGE has many).
PRO:
Less formal meetings, more research

CON:
In past years some projects drifted (not this year).

More on the next slide.
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More on the next slide.
REU-CAAR is Chill: PROS and CONS II

4) Projects flexible: Aviva's project and Andrew's Project

5) Number of students on a project is flexible: Auguste-7, Victor-1.

REU-BRIDGE has FIVE projects with TWO people on EACH (they have lightened up on that a little).

6) Relaxed attitude about people going to lunches, talks, game nights.

7) We do things we should not. Will discuss over lunch.

Criminals on TV advise: don't write anything down.

I will give a hint about one of them.

Ethan is learning how to sing

I turned 21 in prison, doing life without parole.
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Predictions

William Gasarch-U of MD
Predictions

In the future

▶ Quantum computing will threaten crypto in 10 years.

That last statement will always be true.

▶ Computational Hilbert Geometry will find an application.

to another field of math that nobody cares about.

▶ Exactly one of Auguste, Bill, Anubha will get an EGOT (Emmy, Grammy, Oscar and Tony).

▶ It will be Anubha, who will then be known by her first name ANUBHA!

▶ An AI will be built that can direct an REU program.

We already have one.
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Automated REU Director

But there are still some bugs in the program. See next slide.
Automated REU Director

- Automaton

But there are still some bugs in the program.
See next slide.
Automated REU Director

- Automaton
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A.U.G.U.S.T.E
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Prediction for A.U.G.U.S.T.E

A.U.G.U.S.T.E thinks REU directors do the following:

1. Rock Climbing
2. Badminton (I learned to spell Badminton for this talk)
3. Seeing Baltimore
4. Buying Ice Cream, Cake, and Ice Cream Cake.
5. Eating Ice Cream, Cake, and Ice Cream Cake.

He will learn that it's mostly

2. Writing Grants, Forming a Budget.
3. Doing admissions for 470 students.
4. Organizing Lunches, rooms, activities, talks.
5. Telling the students to text the other students to get to a lunch or a talk.

Prediction A.U.G.U.S.T.E: will be a Great REU director.
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3. **Seeing Baltimore**
4. **Buying Ice Cream, Cake, and Ice Cream Cake.**
5. **Eating Ice Cream, Cake, and Ice Cream Cake.**

He will learn that it’s mostly

2. Writing Grants, Forming a Budget.
Prediction for A.U.G.U.S.T.E

A.U.G.U.S.T.E thinks REU directors do the following:

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**Prediction** A.U.G.U.S.T.E: will be a **Great** REU director.
In the spring of 1985 my advisor (Harry Lewis, Harvard) asked me what I dreamed of doing in the next 39 years. I said: Getting a frantic email from Dmytro who somehow left his charger in the room of his REU-MATH suite mate, who has already left, so Dmytro needs me to email someone saying LET Dmytro into that room! Thank you REU-2024 for making my dream come true!
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Thank you REU-2024 for making my dream come true!
Wrap This Up
and Let's Hear From You!

William Gasarch-U of MD
Lets Wrap this Up

1. Positive thoughts or stories about the program.
2. Tell me something interesting.

I’ll go first.
Positive Things About the Program

1. You all really want to be here and got a lot out of the program.
2. Some students skipped Game Night to work on their Projects. That's awesome, though counterintuitive.
3. The lunches and pizza were great. A.U.G.U.S.T.E disagrees about the food being good. I'm right and he's wrong.
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In the form of a question:
What do the following people have in common:

1. Actor Clint Eastwood.
2. Singer Dolly Parton.
4. Fictional Cartoon Character Steven Universe.
5. ANUBhA!, future EGOT winner.
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**Side Note** Stage names are often middle names followed by a street you live on. For me this works great:
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William Gasarch becomes Ian Marlow.
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On TV the following people are really good at solving crimes:

1. Priests (Father Brown, Father Dowling).
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3. Doctors (Diagnosis Murder, Quincy).
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7. Deaf FBI agents (Sue Thomas. Actress is deaf.).
8. Fat private Detectives (Jake and the Fat Man. Actor is fat.).
10. Real Psychics (Medium, Ghost Whisperer).
11. Mystery Writers (Murder She Wrote, Castle).
12. Owner of a Mystery book store (Mystery Women).
13. Librarian with an MS on real crimes fiction (Arora Teagarden).
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Interesting Fact Three

There are Hamilton parodies about:

1. Captain America
2. Batman
3. William Rowan Hamilton
4. Jesus
5. Angela Merkel (prior Chancellor of Germany)
6. Isaac Newton
7. Luke Skywalker
8. Donald Trump
9. Steven Universe
10. Dr. Who
11. Weird Al Yankovic

Weird Al had his own version of Hamilton as well.

There are many more parodies of Hamilton.
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Your Turn

I will call on everyone. They will tell me
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1. Something positive about the program.
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