

# 2024 Crystallography Lecture and Crystallization Workshop with Dr. Liu (Emory) (hosted by STARS at GT) Report

## Introduction and Contextualization

Below follows the introduction and contextualization of the event, as reported by Susanna.

The Structural Nucleic Acid Anticancer Research Society (SNAA Research Society or also STARS) crystallography research club was founded by Susanna Huang in the 2019 fall semester. It was initiated as a club for students who are interested in research and crystallography.

She was inspired to start the club after attending the 2019 American Crystallographic Association (ACA) conference in the 2019 summer. There, she gave a presentation on some of her earlier macromolecular crystal-growing experiments and heard about the US Crystal Growing Competition. When she returned to school in the fall, she subsequently led her teammates to compete in the 2019 US Crystal Growing Competition, growing aluminum potassium sulfate crystals. The crystals that were grown were very large and beautiful. Surprisingly, she won 2<sup>nd</sup> place at the national level at the US Crystal Growing Competition and from then on was dedicated to share the love and passion of crystallography for local students in the community.

Over the next four years, she led her teammates and organized over five different crystal-growing events, such as crystal-growing competitions and summer camps. Additionally, she led her teammates to present at several STEM teacher conferences, sharing the message of crystal-growing to teachers interested in teaching crystal-growing experiments with their students. Cumulatively, STARS had over 350+ student participants in its programs and had shared its crystal-growing message to over 40 teachers during those several years.

In 2021, STARS was incorporated as a nonprofit organization with Susanna Huang serving as the executive director. The mission of the Structural Nucleic Acid Anticancer Research Society (STARS) nonprofit is to deliver high-impact crystal-growing experiences to K-12<sup>th</sup> and college-level students.

## Introduction and Contextualization: Georgia Tech

Coming to Georgia Institute of Technology, Susanna Huang, as an undergraduate student, became involved in organic synthesis research in the Oyelere Lab. However, she was still interested in expanding the work of the STARS nonprofit and wanted to share with others the importance of protein crystallography and to guide club members on growing protein crystals. In the past, all previous STARS outreach and club work was based on growing inorganic crystals, such as sodium chloride or aluminum potassium sulfate. The closest thing to growing organic

crystals was growing sugar crystals, and STARS members never had the chance to grow macromolecular crystals due to the heavy mentorship, equipment, and funding limitations for macromolecular crystallography experiments. With **(1)** the possible collaborations with faculty researchers at Georgia Tech (e.g. collaboration with the Oyelere Lab), **(2)** the availability of research space and essential equipment (e.g. the availability of the Open Biology Lab for undergraduate students at Boggs 1-59), and **(3)** the significantly increased interest in research from the students themselves at Georgia Tech (in comparison to the high school students who did not know their future career directions yet), Susanna Huang felt that starting up a STARS branch at Georgia Tech could be very possible and could be essential for finally learning, teaching, and performing macromolecular crystallography research experiments.

The vision she established for the STARS branch at Georgia Tech is: (1) Create a wet-lab crystallography research-based community for pre-health and pre-doctoral students as well as (2) foster student-faculty research collaborations on faculty research crystallography projects.

The mission she established for the STARS branch at Georgia Tech is: Provide club members with the opportunity to grow macromolecular crystals (including proteins, nucleic acids and their complexes), learn about crystallography, volunteer at STARS crystal-growing competitions and summer camps, and attend and present at the American Crystallographic Association conference.

In pursuit of this mission, Susanna Huang reached out to a crystallographer she met at the 2023 ACA conference, Dr. Liu (assistant professor at the Winship Cancer Institute of Emory University), to discuss the possibility of him guiding us on our first protein crystallography experiment. He gladly and happily agreed, saying that he can start working on experimentally determining good lysozyme crystal-growing conditions. Subsequently, Susanna reached out to Ms. Alison Onstine, the biology lab manager, to determine if Boggs 1-67 could be reserved for the lecture and the crystallography workshop. Finally, Susanna reach out to Dr. Yang Ha, a beamline scientist and PI at the Lawrence Berkeley National Laboratory and Dr. Angus Wilkinson, Professor and Associate Chair of Academic Programs for the School of Chemistry and Biochemistry and the School of Materials Science and Engineering at Georgia Tech, to determine if they would be interested in joining us for lunch in addition with Dr. Liu, and these two figures also happily agreed.

### 2024 Crystallography Lecture and Crystallization Workshop with Dr. Liu (Emory)

Below discusses what the event was about, what experiments were set up for the event, and what professors or laboratory scientists were present, as reported by Addie.

The goal of the STARS crystallography lecture and crystallization workshop was to provide enjoyable and insightful wet lab experiences to STARS members. In addition, the event introduced the GT STARS branch to non-members interested in crystallography. Dr. Liu, an assistant professor at the Emory University School of Medicine, was the guest lecturer for the event. He and his

undergraduate assistant Fiona Xiao prepared a crystallography lecture and workshop that taught the basics of protein crystallography through lysozyme crystallization. The event was hosted in the Gilbert Hillhouse Boggs Building room 1-67 from 11:00am to 3:15pm on Saturday, January 20th.

Below as follows was the event schedule:

10:30am – 11:00am – Check-in on the main floor of Boggs building

11:00am – 12:00pm – Lecture by Dr. Liu on protein crystallography (Boggs 1-67)

12:00pm – 12:45pm – “Hot potato” + Lunch (in the check-in commons area outside of the lab)

- During “Hot potato,” students had the chance to move between different tables and talk with Dr. Liu from Emory University School of Medicine, Dr. Ha from the Lawrence Berkeley National Laboratory (via Zoom), and Dr. Wilkinson from the Georgia Institute of Technology, Professor and Associate Chair for Academic Programs (Chemistry and Biochemistry).

1:00pm – 3:00pm – Crystallography workshop – Guided lysozyme protein crystallization experiment (Boggs 1-67)

3:00pm – 3:15pm – Wrap up and Closing remarks

3:15pm – 4:00pm - Last touches of cleanups and inventory on the things that we finished using, wash glasses with soap, ensure everything is accounted for, etc.

#### Lecture and Workshop: Planning for the event

As reported by Susanna:

In preparation for the crystallography event, a variety of materials and equipment were needed:

- Crystallization materials (lysozyme protein solution, sodium acetate buffer solutions, siliconized cover slips, salt solutions for the precipitant), and two green tube racks were provided and donated by Dr. Liu (Emory)
- Two large crystallography plates (hanging-drop with sealant) and four smaller crystallography plates (hanging-drop with sealant) were provided and donated by Dr. Liu (Emory)
- Five large crystallography plates (hanging-drop with sealant), five large crystallography plates (hanging-drop without sealant), and nine sitting drop plates (without sealant) were provided and donated by Dr. Lieberman (Georgia Tech)
- Four small crystallography plates (sitting-drop without sealant) were provided and donated by Dr. McShan (Georgia Tech)

Of these materials, the five large crystallography plates (hanging-drop with sealant, provided by Dr. Lieberman), one large crystallography plate (hanging-drop with sealant, provided by Dr. Liu),

along with three small crystallography plates (hanging-drop with sealant, provided by Dr. Liu) were used in the course of the crystallography workshop. The rest of the materials were kept for the STARS at GT club future club meetings

Since crystallography plates are one of the bottle neck costs of crystallization experiments, Susanna had thought about 3D printing them at the GT makerspace (e.g. Project CAD-3D Print, Project C3P), using clear resin. Kayla, one of the STARS at GT club social members was able to CAD the bottom plate based on the dimensions of the plate provided by Susanna, but unfortunately the Makerspace was not open before the workshop event day.

Susanna Huang had been in close contact with Dr. Liu since November 10<sup>th</sup>, 2023, planning out the details of the event and discussing the crystallography possibilities of the event. Between the two possible event day choices, Saturday, January 20<sup>th</sup> and January 27<sup>th</sup>, upon asking the members, the STARS at GT club members seemed to like January 20<sup>th</sup> better, so Saturday, January 20<sup>th</sup> was confirmed as the official event day. Subsequently, Susanna Huang confirmed with Ms. Onstine if the open biology lab would be open for undergraduate students' usage for their own research projects and potential event activities. On December 18<sup>th</sup>, 2023, Susanna and Caty visited Ms. Onstine to determine if the open biology lab would be a good fit for the event and for general club meetings. It was deemed a suitable location with good quantities of important biological equipment (such as micropipettes, incubators, microscopes, etc.). Susanna and Caty also visited Dr. Lieberman on the same day to explain to Dr. Lieberman what the STARS at GT crystallography research club entailed (and see if Dr. Lieberman may be interested in serving as the STARS at GT club advisor). On a similar note, on November 17<sup>th</sup>, 2023, Susanna, Addie, and Morgan had visited Dr. Oyelere, a research faculty at the Georgia Institute of Technology to gauge if he would be interested in collaborating with the STARS at GT research club and let the club members help him crystallize proteins that are of interest for his lab. He has expressed his interest in this type of collaboration.

With the space and the event day confirmed, Susanna Huang organized a meeting on Friday, January 12<sup>th</sup>, 2024, to address the crystallography lecture and crystallization workshop and introduce the event purpose and delineate the role of event organizers (this document prepared by Susanna Huang and shared by Susanna with the other three event organizers can be found at the first link in the Appendix). Susanna split up the tasks into four parts and let the four designated event organizers choose the part each would like to work on: (1) Check-in and Hospitality Assistance (Gabriel Hood), (2) Laboratory set-up and assistance (Addie Kindler), (3) Zoom and feedback form assistance (Susanna Huang), (4) Photography and Instagram assistance (Caty Lue). Each event organizer worked on their designated section and requested event volunteers pertaining to their section. Subsequently, Susanna had a volunteer meeting on Monday, January 15<sup>th</sup>, 2024 for volunteer students to sign up to help volunteer bringing in food/drinks along with volunteering at certain positions at the event for the positions requested by the event organizers.

For each of the sections below, each event organizer spends some time discussing what went about preparing for their section and how they created certain documents or prepared certain lists or signups to help with the organization and preparation for the event, and how it all came to fruition on volunteer day:

*Check-in and Hospitality Assistance – Event Organizer Gabriel*

As reported by Gabriel, revised by Susanna:

The Check-in and Hospitality duties were assigned to Gabriel. One sign-up genius was created by Susanna to assign club members the opportunity to bring materials to the event (refreshments, snacks, etc.), and all slots were filled. Another sign-up genius was created by Gabriel to assign club members the opportunity to volunteer at the event, such as serving as check-in volunteers, photographers for the event, lab preparation helpers, and general clean-up helpers (based on the volunteer types as requested by the event organizers), and all slots were filled on this sign-up genius as well. Lunch was ten dollars per person, consisting of pizza from Domino's in addition to chilled drinks, a bag of chips, among other refreshments. Gabriel counted the tallies for pepperoni and cheese pizzas, made the order for the pizzas, and delivered the pizzas for the event, providing fresh lunch for the event attendees present.

Check-in materials were set up before the meeting by volunteers from the club. The actual check-in process involved providing each person with a blank nametag for them to write on (and for the special cases of Dr. Liu and Dr. Wilkinson, a pre-written nametag), checking each person off the roster, and handing out flyers (which were designed by and printed out by Caty) that provided background information for the professors present at the event.

*Laboratory Assistance – Event Organizer Addie*

The Laboratory Set-up and assistance was the assignment given to Addie. Addie created a list of necessary materials by coordinating with Susanna. On January 15<sup>th</sup>, 2024, volunteer positions were allocated to interested students to help with set up before and during the crystallization workshop. A couple of days before the event, a meeting was arranged with Ms. Onstine to gather all necessary materials from the supply room and do some preliminary lab setup. An email was drafted and sent the Thursday before the event (January 18<sup>th</sup>, 2024) detailing the event location, schedule, and safety requirements. The email was sent to everyone who RSVPed and all attending faculty/professors. On the day of the event, January 20<sup>th</sup>, 2024, the volunteers who had signed up during the earlier meeting, met in the lab about 10 minutes before the end of lunch. These volunteers helped set up all materials for the pipette training. After the workshop, all used pipette tips were sorted into the corresponding recycling containers and all other borrowed materials were cleaned, counted, and recorded. An email was sent to Ms. Onstine at around 5:30pm

on January 20<sup>th</sup>, 2024 thanking her for her help and ensuring her that all materials were properly stored and accounted for.

*Zoom and feedback from Assistance – Event Organizer Susanna*

The Zoom and feedback form assistance was Susanna's assignment. Susanna prepared the Zoom links for Dr. Ha, the beamline scientist from Lawrence Berkeley National Laboratory (LBNL) and for Dr. Oyelere, the faculty researcher at Georgia Institute of Technology, who was also invited by Susanna to attend the event, so that these faculty may join the event remotely. Susanna sent the Zoom links to these faculty on Thursday, January 18<sup>th</sup>, 2024. Susanna also prepared the survey feedback form so that the event attendees may submit their feedback for the event. She considered the different types of feedback information she would like to gather, and in the end, several categories of feedback information were decided upon and used for building the survey feedback form. The purpose of the form was to gauge the effect of the event, such as how much the event attendees enjoyed their time there, how likely the event attendees would like to attend again or have a friend join also, and how likely the event attendees would like to learn more about the organization itself.

Susanna created the release form for the Walton STARS students (minors) who were attending the event (this document can be seen as a link in the Appendix).

Additionally, Susanna also requested for three student helpers on the day of the event: two students for general setup help (9:00am-10:00am) and one student for gauging which event attendees would be interested in talking to which specific professors (10:30am-11:00am). Susanna create the event timeline, which delineated each of the volunteer positions and students associated with each position incorporated in the timeline (which can be found in the appendix), and she organized a volunteers and event organizer meeting at 10:30am to pass out the event timeline to each volunteer and event organizer and to ensure that each student knew their roles and when to perform them. When the event began at 11:00am, Susanna gave a joyful introduction, **(1)** introducing the STARS nonprofit organization, its mission and vision, along with where the STARS at GT college branch plays a role in this organization, as well as **(2)** happily inviting all the student attendees to this exciting workshop event, where STARS will be finally growing protein crystals for the first time, and finally **(3)** heartily introducing the four professors who were at the event or would be attending the event at some point in time: (1) Dr. Liu, assistant professor of Emory (along with his assistant, Fiona Xiao), (2) Dr. Ha, beamline scientist at the Lawrence Berkeley National Laboratory (via Zoom), (3) Dr. Oyelere, Professor and faculty researcher with interests in anticancer therapeutic drug design with the Georgia Institute of Technology, and (4) Dr. Wilkinson, Professor and Associate Chair of the School of Chemistry and Biochemistry and Associate Chair of the School of Materials Science and Engineering at the Georgia Institute of Technology. The crystallography lecture given by Dr. Liu went forward as planned, and the hot potato of the students talking with the three professors during lunch went spectacular, and the pizza

arrived, and the students ate their lunches, and finally, Dr. Liu delivered the crystallization workshop for the students, and the students had such a fun time setting up their lysozyme protein crystals. The leftover crystal-growing materials, trays, buffer solutions, and salts were donated by Dr. Liu to the STARS at GT club. Finally, two days after the event, on Monday, January 22<sup>nd</sup>, 2024, Susanna sent emails to (1) the STARS volunteers, thanking them for their help at making this event possible, (2) the students who attended the event, for thanking them for coming to the event, and of course (3) the professors themselves who took time out of their schedule to make the lecture, lunch, and workshop possible. Susanna sent all the event attendees the survey feedback form and was glad when some completed surveys began being submitted into the form.

#### *Photography and Instagram Assistance – Event Organizer Caty*

The preliminary planning for photography and Instagram assistance was the assignment of the organizer position, given to Caty. Caty created a PowerPoint detailing how photos were desired for the club's Instagram page and specifics of the room and angles to take photos from for the volunteer meeting on January 15<sup>th</sup>, 2024. This was presented to the volunteers for the event and 4 students signed up for time slots between: 11:00am-12:30pm and 1:30pm-2:30pm (divided into 30 minutes for volunteers to work). Then on January 19<sup>th</sup>, 2024, a reminder post about the event was posted to the STARS Instagram page, detailing its location and itinerary. On the day of the event, January 20<sup>th</sup>, 2024, during the volunteer meeting at 10:30am, photography volunteers were briefed on where to take photos. Photos from volunteers were taken during the lecture, luncheon, and laboratory. Photos can be seen in the appendix. After the event, photos were obtained and placed into a shared Google Drive folder. Best photos from the event were selected and edited in adobe. These photos can be seen in the appendix. These photos were used to create two Instagram posts, which were designed on Canva. Posts included information thanking participants, detailing club meeting information, and a request to fill out the post-event survey. On January 22<sup>th</sup>, 2024, photos were taken of the protein crystals. These photos were edited, and a Instagram post template was made in Canva, and posted on January 29<sup>th</sup>, 2024, showing participants following the club page the results from the event. These photos can be seen in the Appendix.

#### Feedback from the event

Below are the cumulative feedback from the event surveys as reported by Caty.

A post-event survey was conducted, sent out January 20<sup>th</sup>, 2024 via email. Survey inquiries included name, email, attendance, event enjoyment, likelihood of participating in another event, how informative the event was, likelihood of joining STARS or recommending it to a friend, and whether they would officially like to join. There were 8 responses to the survey. Responses to multiple choice yes/no questions are found in the appendix (Table 1), however average response were positive towards material learned at the event and desire to join STARS as a social member.

Additionally, there were short answer questions participants filled out (seen in appendix, Table 2). When asked if the participant enjoyed the event, all said yes, stating it was informative and enabled students and professors to communicate with each other. The second question of what the participants was favorite experience/moment during the event garnered responses of talking to professors during lunch, discussing X-ray crystallography with Dr. Liu and students, and micro pipetting. Participants recommended for future event that the event should be advertised more, increased fluidity and clarity of event, and partnering with other clubs on events. These responses will be considered for future events, where the club plans to increase advertising of its events and clarity in the information and schedule provided to participants.

### Conclusion

The concluding remarks on how thankful the event organizers were for the GT facility, to Ms. Onstine, to Dr. Lieberman, as reported by Adelaide:

The event organizers are so thankful to Dr. Liu, Dr. Lieberman, Dr. Ha, Dr. Wilkinson, Ms. Onstine, the GT facility, and everyone else who made this event possible. The goal of STARS at GT has always been to share the experience of growing crystals with students interested in crystallography research. Thanks to everyone involved in this event, students from both Georgia Tech and Walton were able to engage in a hands-on crystallization workshop and an enriching conversation with the participating professors. This event puts the club in a great position to grow crystals in the future using the hanging drop crystallization technique shared by Dr. Liu in the workshop. In addition to regrowing lysozyme crystals, the club student members will be able to experiment with different proteins and buffer solutions, and eventually get and solve diffraction data. In addition, this event created potential avenues of collaboration with Dr. Lieberman and Dr. Ha in future events and experiments. Finally, this event gave the GT students the foundation they need to eventually grow crystals on their own.

### Next Steps

As reported by Susanna:

As the person who initiated STARS those five years ago, Susanna was so excited that the group finally got the chance to grow protein crystals for the first time in the entire history and existence of STARS! The club members had an outstanding time learning about the protein crystallography technique, and Susanna especially cannot wait to share with other students, such as her local high schoolers and middle schoolers, this amazing experience of growing protein crystals.

STARS at GT currently is considering having a similar workshop/lecture event in March of this year. A lecture for this event has yet to be found. When the event is confirmed, the remaining



(1) Coke cans, Sprite cans, and forks along with (2) water bottles and box of chips (housed with Susanna and Gabriel, respectively), can be used for this subsequent event's event attendees. Additionally, the STARS nonprofit organization is currently inquiring local high school teachers and middle school teachers if they may be interested in having their students participate in the annual STARS crystal-growing competition, which is hosted by the nonprofit organization. If this event is confirmed, it is possible that the STARS at GT club members might be able to assist the nonprofit organization with the competition in this May, 2024.

*As reported by:*

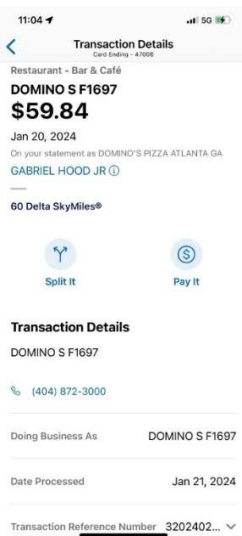
*Catherine Lue, Adelaide Kindler, Gabriel Hood, and Susanna Huang*

*February 11<sup>th</sup>, 2024*

## Appendix

### All event materials:

- **Workshop event STARS meeting topics for event organizers (1/12/2024):**  
[https://gtvault-my.sharepoint.com/:b:/g/personal/shuang466\\_gatech\\_edu/Ed6FqZYL-ZNMg\\_FE5KuQvVYBWI3KEaJLKHzYeHaaMqZGNA?e=NBFUGO](https://gtvault-my.sharepoint.com/:b:/g/personal/shuang466_gatech_edu/Ed6FqZYL-ZNMg_FE5KuQvVYBWI3KEaJLKHzYeHaaMqZGNA?e=NBFUGO)
- Signup Genius for food/drinks donated to the event:  
<https://www.signupgenius.com/go/10C0E4AAEAF23A3F9C07-47239074-volunteer#/>
- Signup Genius for volunteer positions at the event:  
<https://www.signupgenius.com/go/10C0B4FADA82FA2FDC07-47244529-volunteer#/>
- Photography team PPT at the volunteer meeting (1/15/2024): [https://gtvault-my.sharepoint.com/:p:/g/personal/shuang466\\_gatech\\_edu/EWGhwIn4jtREslbaTsV5SiABvWwTr6qUWtsyHUO0l0ozAw?e=2bJjH8](https://gtvault-my.sharepoint.com/:p:/g/personal/shuang466_gatech_edu/EWGhwIn4jtREslbaTsV5SiABvWwTr6qUWtsyHUO0l0ozAw?e=2bJjH8)
- Release form for Participation in Crystallography Lecture and Crystallization Workshop for minors attending the event: [https://gtvault-my.sharepoint.com/:b:/g/personal/shuang466\\_gatech\\_edu/EWpzUNsL1bZLoOAZzVZCr2QBrGDxU4mo9qJ3z9\\_KtnRiMw?e=Uo3qPh](https://gtvault-my.sharepoint.com/:b:/g/personal/shuang466_gatech_edu/EWpzUNsL1bZLoOAZzVZCr2QBrGDxU4mo9qJ3z9_KtnRiMw?e=Uo3qPh)
- **Event timeline:** [https://gtvault-my.sharepoint.com/:b:/g/personal/shuang466\\_gatech\\_edu/EdHJcw-W6fBFmy9gaLvqL6EBthF1x5e7MDSS2uZ9MBpX\\_w?e=M3254a](https://gtvault-my.sharepoint.com/:b:/g/personal/shuang466_gatech_edu/EdHJcw-W6fBFmy9gaLvqL6EBthF1x5e7MDSS2uZ9MBpX_w?e=M3254a)
- **Crystallography experiment procedure:** [https://gtvault-my.sharepoint.com/:b:/g/personal/shuang466\\_gatech\\_edu/EYEDI8k9Ao1PoQ86xsT0v5IBIEC65RB5IVB2wlrTqXU\\_4Q?e=dTaRzm](https://gtvault-my.sharepoint.com/:b:/g/personal/shuang466_gatech_edu/EYEDI8k9Ao1PoQ86xsT0v5IBIEC65RB5IVB2wlrTqXU_4Q?e=dTaRzm)
- Survey Feedback form: <https://forms.office.com/r/eiXYRDmGhv>
- All photos of the event: <https://photos.app.goo.gl/DsCJ3hQHbWxF9Zi49>
- **STARS at GT Instagram page:** <https://www.instagram.com/stars.anticancer.gt/>
- Pizza cost receipt:



## Event survey summary:

Table 1. Multiselect Survey Questions

Question	Responded Yes	Responded No	Average Rating (1-10)
Did you attend the 10:00-11:00 am crystallography lecture with Dr. Liu?	6	2	Not Applicable
Did you attend the 12:00-1:00pm lunch with assistant professor Dr. Liu (Emory), synchrotron scientist Dr. Ha (Lawrence Berkeley National Laboratory), and professor Dr. Wilkinson (Professor and Associate Chair for Academic Programs at GT)?	8	0	Not Applicable
Did you attend the 1:00-3:00pm crystallography workshop with Dr. Liu (Emory)?	6	2	Not Applicable
On a scale of 1 to 10, how much did you enjoy the event experience?	Not Applicable	Not Applicable	8.8
On a scale of 1 to 10, how likely would you attend another event like this one?	Not Applicable	Not Applicable	6.2
On a scale of 1 to 10, how informative and educational did you find this event to be?	Not Applicable	Not Applicable	6.3
On a scale of 1 to 10, how interested are you in learning more about the STARS at GT crystallography research club?	Not Applicable	Not Applicable	6.3
On a scale of 1 to 10, how likely would you recommend a friend to attend an event like this in the future?	Not Applicable	Not Applicable	6.3
Would you be interested in joining as a social club member (if you are not a STARS at GT member)?	5	2	

Table 2. Short Answer Feedback Questions

Question	Short Answer Feedback
Did you enjoy attending the event? Please describe why or why not.	<ul style="list-style-type: none"> <li>• “Yes because there were many parts to keep things interesting, it was informative but still fun with a good, easy going atmosphere”</li> <li>• “I enjoyed attending the event as I was able to learn about crystallography.”</li> <li>• “It was good to meet, talk with, and learn about the student attendees.”</li> <li>• “Yes, it helped me to actually understand my research more”</li> <li>• “Yes, very informative and offered specialized instruction.”</li> <li>• “Yes! The event was educational and really fun. I loved how hands-on the experiment was and I was really suprised by how kind and open the professors were during the "hot potato". Overall it was a great event.”</li> <li>• “Yes. I learned something from the talk, and enjoyed talking with the students.”</li> <li>• “Very much!”</li> </ul>
What was your favorite experience or moment of the event? Please describe it.	<ul style="list-style-type: none"> <li>• “learning how to micro pipette”</li> <li>• “I enjoyed the in person crystal growing as it connected well to my biological experiences.”</li> <li>• “Talking to students”</li> <li>• “Talking to Dr Liu about FPLC and His-TAT binding with X-ray crystallography.”</li> <li>• “The workshop was my favorite event due to the training with the micropipet”</li> <li>• “hot potato”</li> <li>• “I really enjoyed getting to talk to the professors during hot potato. It felt very natural and I'm so glad I got to talk to everyone.”</li> <li>• “‘hot potatoes' that provides interacting time with young student is my favorite one. I would love that</li> </ul>

	session a bit longer (see what I mentioned below).”
What are some recommendations you may have for improving similar events in the future?	<ul style="list-style-type: none"> <li>• “Not Applicable”</li> <li>• “I would recommend additional workshop opportunities to partner with other clubs as well”</li> <li>• “More widely advertise?”</li> <li>• “A printed protocol for the in-lab portions”</li> <li>• “A little more fluidity with the lab workshop and a slightly more clear instructions.”</li> <li>• “I would suggest having a QR code with the venmo at check-in for people who need it.”</li> <li>• “Perhaps we should start this session a bit earlier such 10:30 as each session could be finished beyond the scheduled time slot so there is enough time for the afternoon hands-on session and even the hot potatoes session.”</li> </ul>
Any other comments or questions?	“None”

### List of event attendees

Listing of the number of participants for the lecture, for the lunch, for the workshop, along with their affiliations and classification status. Total number of attendees: 22. Nine STARS at GT members; Four STARS at Walton members; Five GT non-member students; One student assistant; Three invited faculty.

Name	Affiliation	Attended Lecture (20)	Attended Lunch (19)	Attended Workshop (18)
Maya Leveille	STARS at GT member (volunteered)	Yes	Yes	Yes
Siffah Bonsu	STARS at GT member (volunteered)	Yes	Yes	Yes
Adelaide Kindler	STARS at GT member (event organizer)	Yes	Yes	Yes
Susanna Huang	STARS at GT member (event organizer)	Yes	Yes	Yes
Caty Lue	STARS at GT member (event organizer)	Yes	Yes	Yes
Morgan Zitsch	STARS at GT member (volunteered)	Yes	Yes	Yes
Diego Gonzalez	STARS at GT member (volunteered)	Yes	Yes	Yes

Dr. Xu Liu	Invited faculty (Emory)	Yes	Yes	Yes
Fiona Xiao	Invited faculty (Emory)	Yes	Yes	Yes
Aaron Thompson	Non-member GT student	Yes	Yes	Yes
Selina Huang	STARS at Walton HS member (volunteered)	Yes	Yes	Yes
Sanjeev Anand	Non-member GT student	No	Yes	Yes
Dr. Yang Ha	Invited Faculty (LBNL)	Yes	Yes	No
Janani Murugan	Non-member GT student	Yes	Yes	Yes
Mirah Lindsay	STARS at Walton HS member (volunteered)	Yes	Yes	Yes
Sunny Xu	STARS at GT member (volunteered)	Yes	Yes	Yes
Gabriel Hood	STARS at GT member (event organizer)	Yes	Yes	Yes
Lanya Hu	STARS at Walton HS member (volunteered)	Yes	Yes	Yes
Emma van Eekeren	Non-member GT student	Yes	Yes	Yes
Dina Xu Callaway	STARS at Walton HS member	Yes	Yes	Yes
Kahlia Carl	Non-member GT student	Yes	No	No
Dr. Angus Wilkinson	Invited Faculty (Georgia Tech)	No	Yes	No

Photos (as organized and captioned by Susanna):



Event helpers and event organizers. Not pictured: Susanna Huang (who was taking the photo)



The beginning of the event.

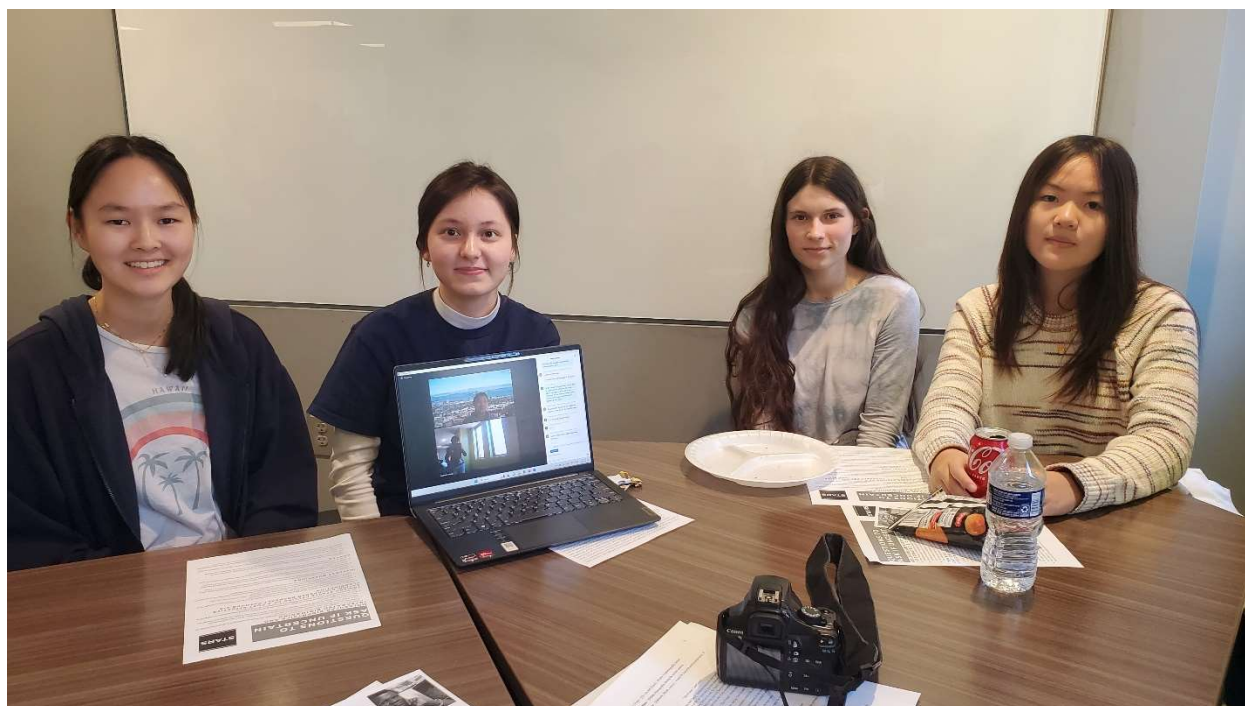


The students listening to the lecture.





Dr. Liu giving the crystallography lecture.



Hot Potato with Dr. Ha.



Hot Potato with Dr. Ha.



Hot Potato with Dr. Liu.



Hot Potato with Dr. Ha.



Hot Potato with Dr. Wilkinson.



Hot Potato with Dr. Wilkinson.



Dr. Liu and Dr. Wilkinson



Dr. Liu and Dr. Wilkinson posing with the four event organizers (Left to right: Susanna, Catherine, Dr. Liu, Dr. Wilkinson, Gabriel, Adelaide)



Adelaide and her helpers setting up the lab for the protein crystal-growing experiment.





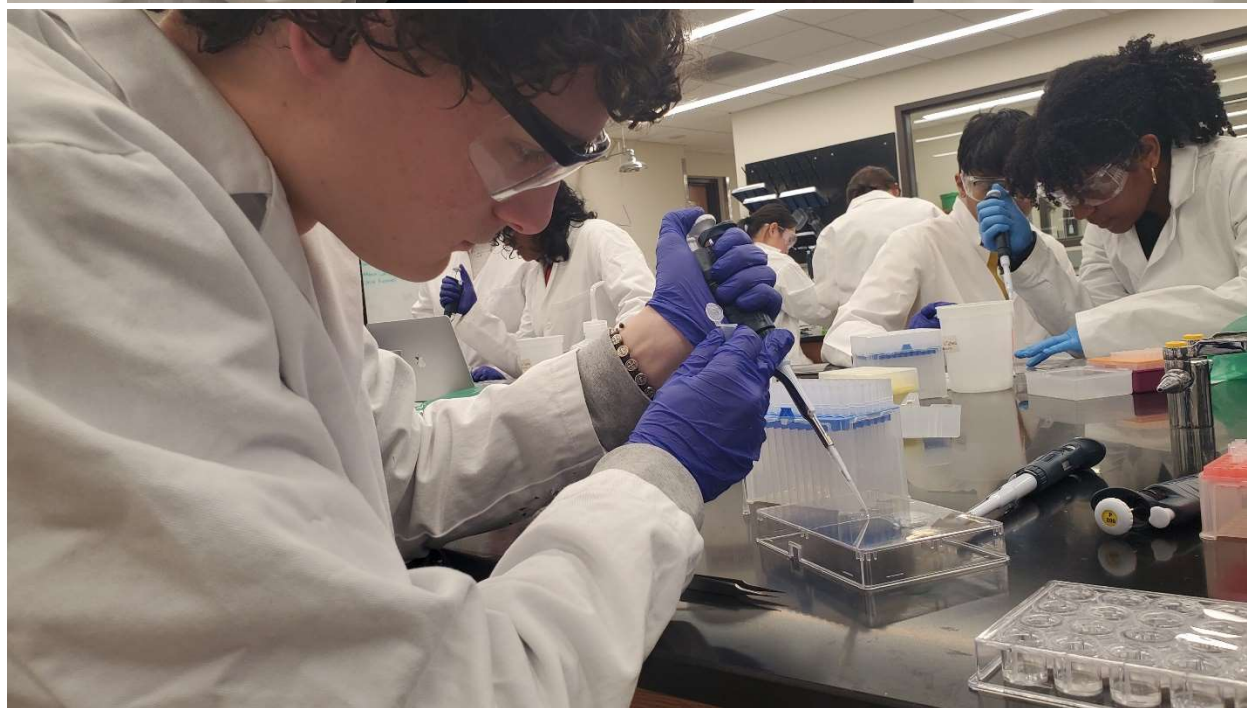
Caty giving safety instructions to the students.



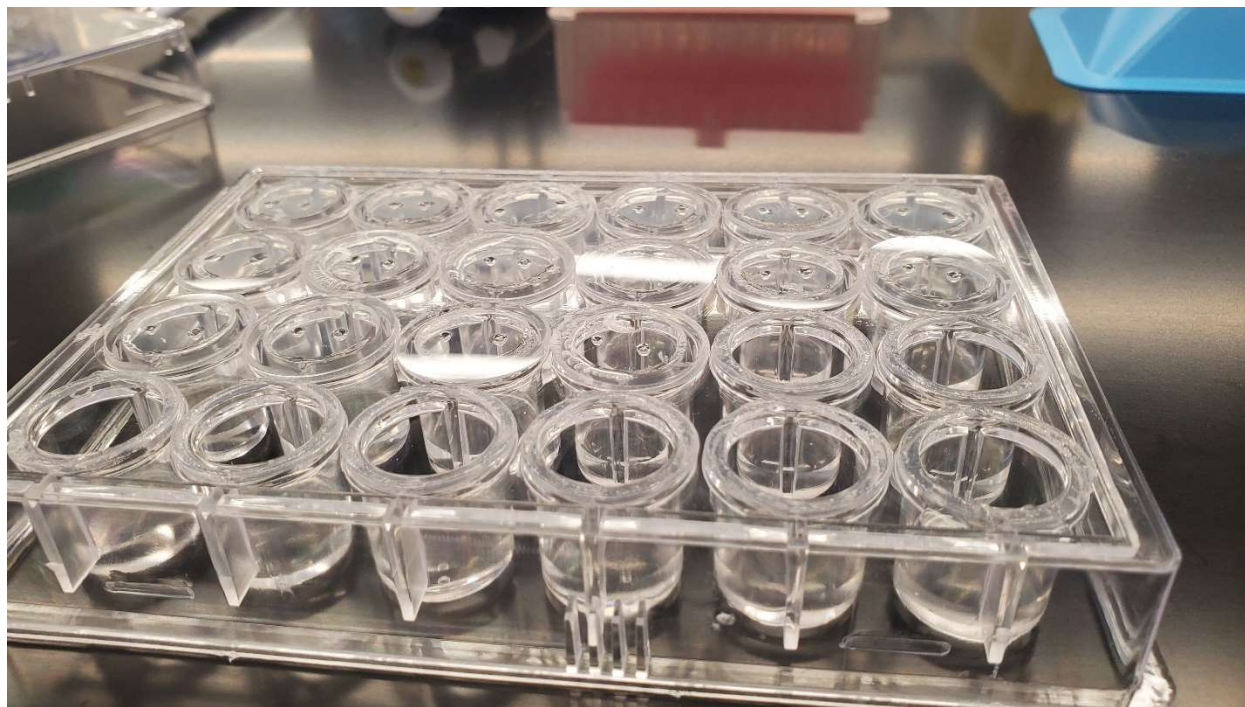
Dr. Liu teaching the students during the lab.



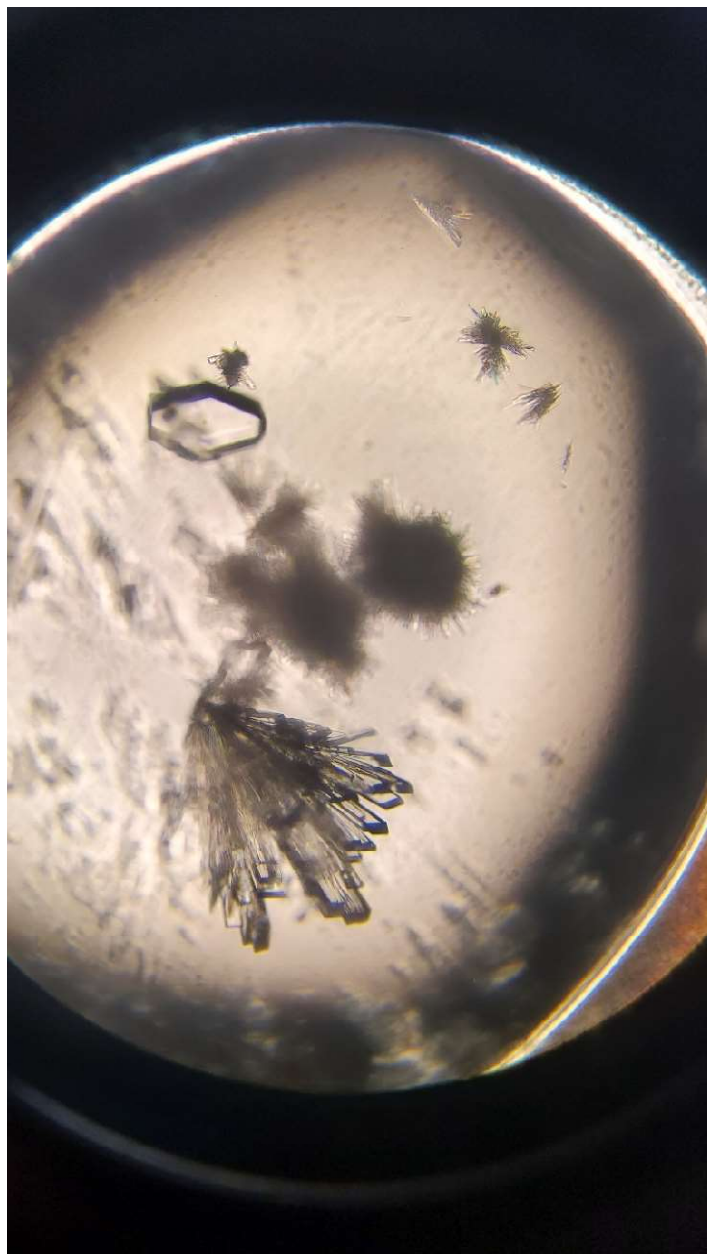
Dr. Liu telling the students about the crystal plates.



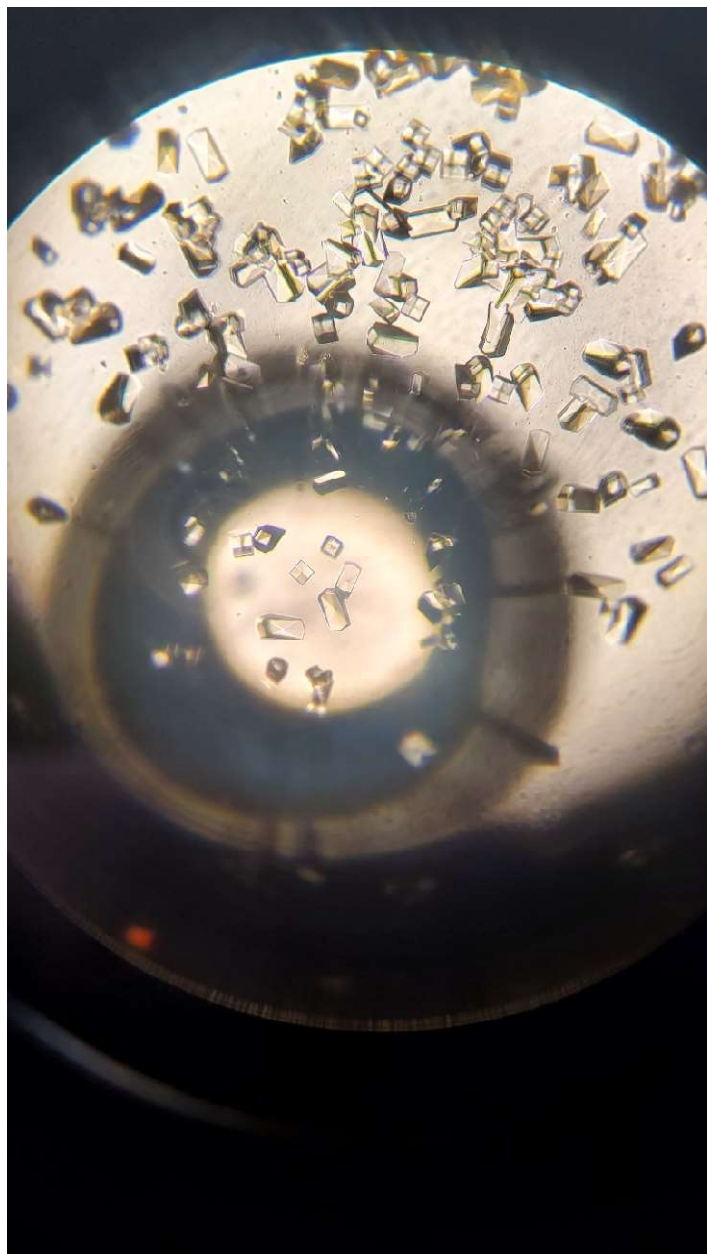
Students working on setting up their lysozyme protein crystals.



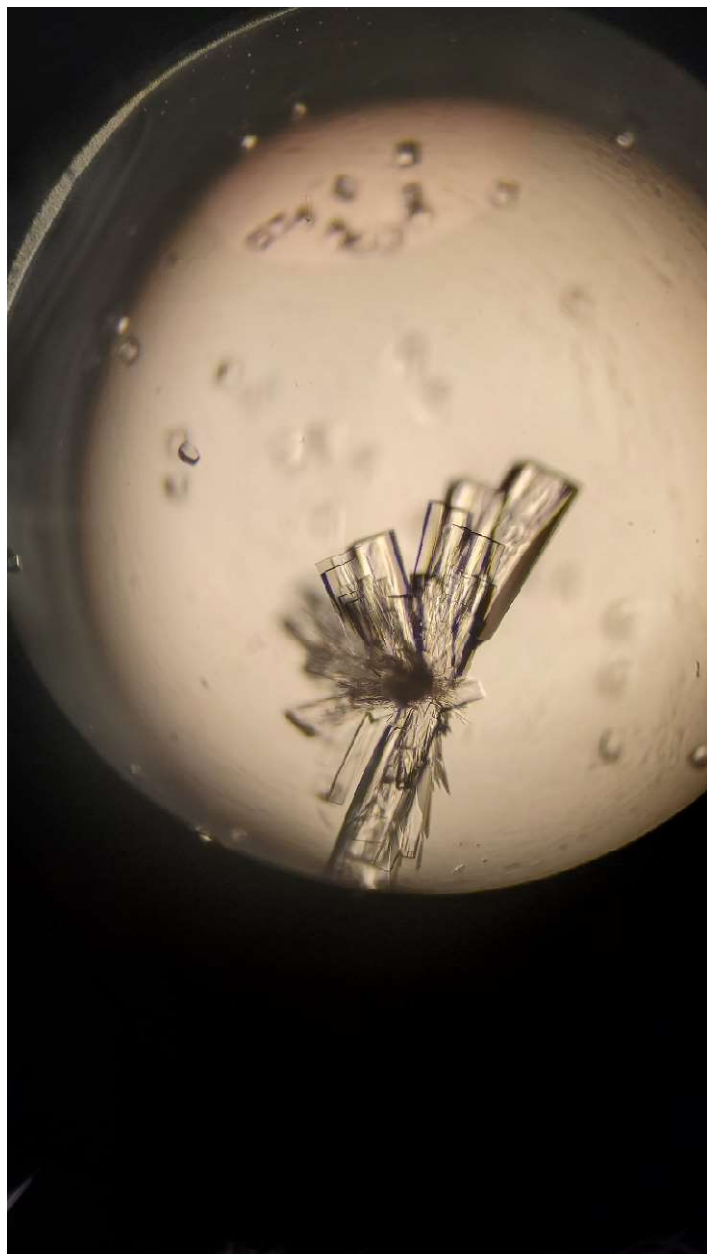
Overall, a very fun event day!!



Beautiful crystals on the next club meeting, two days after the event. (STARS member Maya's crystals).

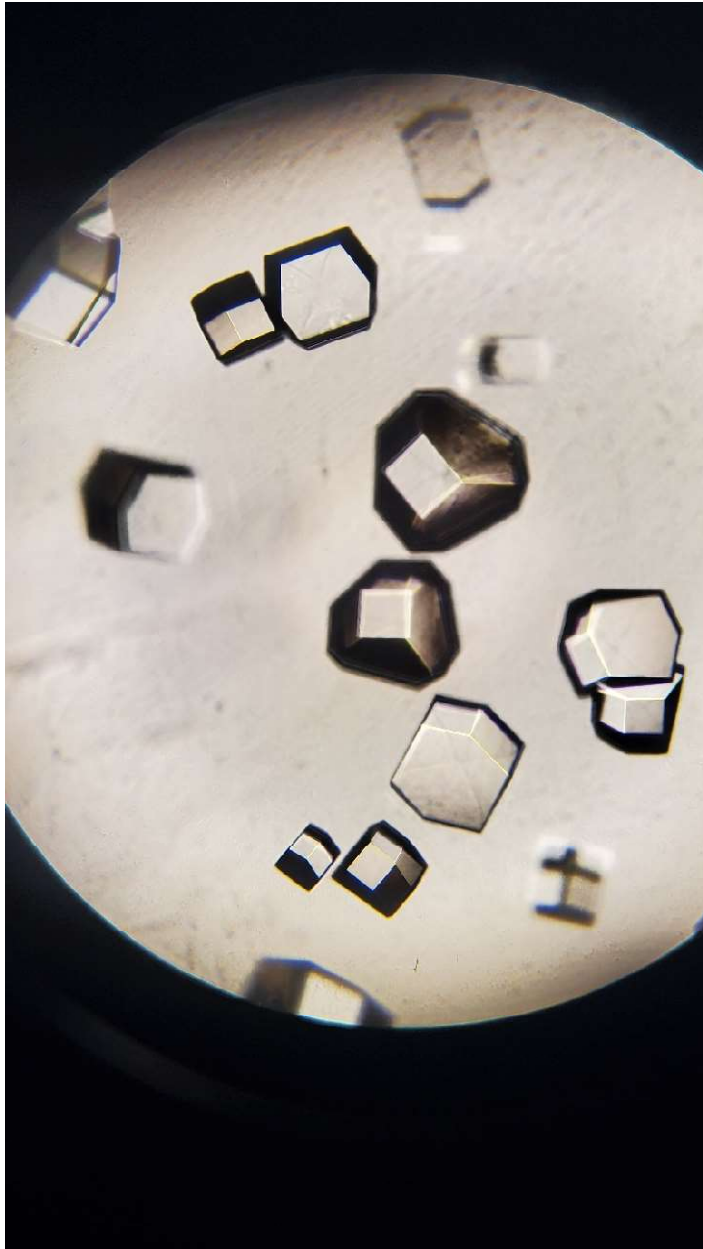


STARS member Morgan's crystals.



STARS leader Susanna's and Sunny's crystals.





STARS members Diego's and Selina's crystals.

**STARS nonprofit activities summary**

- Competed in the US Crystal-Growing Competition (USCGC) annually [Fall 2019 – current]
  - o 2019 USCGC – Susanna Huang won 2nd place in the clearest crystal category (Walton STARS branch; Acting president: Susanna Huang)
  - o 2020 USCGC – Team members experimented with crystallizing glow-in-the-dark highlighter ink and quinine into crystals (Walton STARS branch; Acting president: Susanna Huang)
  - o 2021 USCGC – Walton STARS branch (Acting president: Susanna Huang)
  - o 2022 USCGC – Walton STARS branch (Acting president: Selina Huang)
  - o 2023 USCGC – Walton STARS branch (Acting president: Selina Huang)
- Hosted and organized local crystal-growing competitions annually [Spr. 2021 – current]
  - o 2021 Timber Ridge Crystal-Growing Competition
  - o 2022 Cobb County Crystal-Growing Competition
  - o 2023 Dodgen Crystal-Growing Competition
- Hosted and organized local crystal-growing summer camp [Sum. 2021 – current]
  - o 2021 STARS Crystal-Growing Summer Camp
  - o 2022 STARS Crystal-Growing Summer Camp
- Presented at Cobb County STEM teacher conference [Sum. 2021 – current]
  - o 2021 STEMpalooza STEM teacher conference
  - o 2022 STEMpalooza STEM teacher conference
- Presented at American Crystallographic Association annual conference [Sum. 2023 – current]
  - o 2023 ACA conference (Baltimore, Maryland)
- Hosted and organized crystallography workshops [Spring 2024 – current]
  - o 2024 Crystallography Lecture and Crystallization Workshop with Dr. Liu – STARS at GT branch (Acting president: Susanna Huang)