



# FRONTIERS NEWSLETTER

WINTER 2022

## 2021 Fall Conference at Calvin University

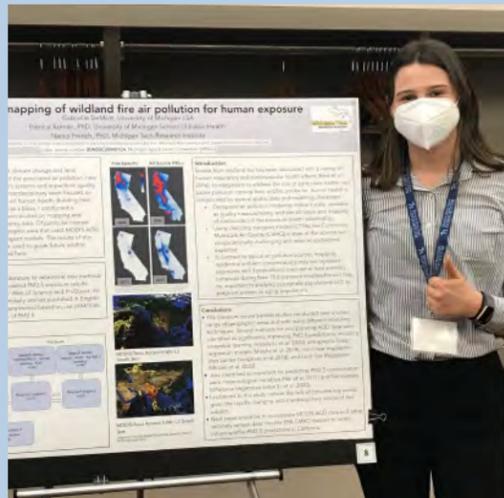
For the first time in the history of the Michigan Space Grant Consortium, the annual Fall Conference was held outside of Ann Arbor this past year. Attendees were welcomed from around Michigan and virtually to the Prince Conference Center at Calvin University in Grand Rapids.

Deanna van Dijk, Professor of Geography, Department of Geology, Geography, and Environment at Calvin University was the Keynote Speaker whose featured talk was "What we can Learn about Science from Michigan Dune Research". You can find a recording of her talk as well as the complete 2021 Fall Conference on [MSGC's YouTube Channel](#).

Speakers had the option of recording their talks before the conference, which can be found on our [website](#) as well as [YouTube channel](#). During the conference all talks and presentations were live. There were three sets of oral presentations with six speakers in each and a large poster sessions that filled the Conference Center.

To change things up a bit this year we offered a longer lunch filled with optional activities: [The Perseverance Dune](#), which happened to be right next door to the Prince Conference Center was a sight to see and an out of the box answer to the Pandemic. The [Ecosystem Preserve](#) lined right up to the back of the Conference Center and consisted of trails, ponds and educational learning all over Calvin's Campus. [The Dice Museum](#) graciously opened its doors for us and was about a 10-minute walk for the attendees, complete with maps. Lastly, we brought a photobooth for attendees to have fun with in between sessions filled with lots of space themed props.

The 2021 Fall Conference was the first in-person conference for many of us since the start of the Pandemic. It was very heartwarming for us all to get together and see the smiles and laughter (behind the masked faces) once again.



## MESSAGE FROM THE DIRECTOR

This will be an exciting year for NASA MSGC and NASA despite still navigating the pandemic. NASA MSGC will be able to expand our impact with new community and industry partners and increased funding to support research experiences for students across our eleven affiliate institutions and NASA Centers. At our Fall 2021 Conference held at Calvin University in Grand Rapids, we learned about the success of last year's programming from over 100 presenters and attendees. The talks – including our Keynote from Prof. Deanna Van Dijk describing her work understanding the Lake Michigan dune system, are available on our [MSGC YouTube channel](#). Please join us on October 22, 2022 at our Fall Conference that will be back in Ann Arbor. We look forward to expanding our partnerships, collaborations and programming across Michigan in 2022.

*Mark Moldwin*

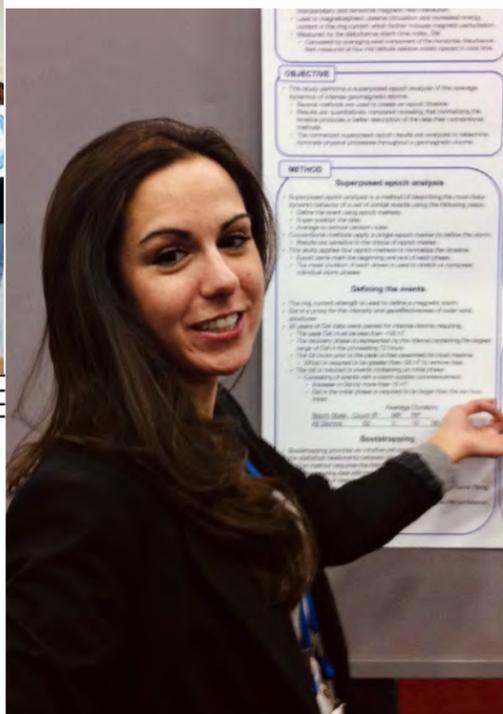
Mark Moldwin, PhD - Arthur F. Thurnau Professor, Department of Climate & Space Sciences & Engineering, Director of NASA's Michigan Space Grant Consortium.



## Auroras & Solar Weather

Roxanne M. Katus, Assistant Professor and MSGC Campus Representative at Eastern Michigan University, has been conducting research using data driven methods to determine the effect of space weather on the Earth System. The project specifically focuses on the orientation of Earth's magnetosphere and how auroras are driven by solar weather. This research project utilized data collected by many different satellites including those that directly measure the nightside terrestrial magnetosphere's reaction to solar activity and those that directly measure solar weather and the aurora.

Magnetic Reconnection is a process which occurs on the nightside of the Earth's magnetosphere during space weather events, but its effects are poorly understood. Disturbances in the magnetosphere can cause energized plasma to be released into the high latitude ionosphere. Katus was able to work on perfecting a method to detect this release of plasma and validated this technique by comparing it to the Supermag substorm database. Katus plans to continue her research into events in the tail of the magnetosphere in the coming years.



**Michigan Space Grant Consortium**  
[www.mispacegrant.org](http://www.mispacegrant.org)

**Prof. Mark Moldwin**  
1418 Climate and Space Research Bldg.  
2455 Hayward St.  
Ann Arbor, MI 48109-2143  
Tel: (734) 647-3370  
[mmoldwin@umich.edu](mailto:mmoldwin@umich.edu)  
[mispacegrant@umich.edu](mailto:mispacegrant@umich.edu)



## MSGC Affiliates

There are 11 affiliated Universities/Colleges around the state of Michigan. The University of Michigan is MSGC's lead institution. If you are interested in learning more about MSGC feel free to reach out to your MSGC Campus Representative or visit our web-page [www.mispacegrant.org](http://www.mispacegrant.org).



**E** **Prof. Roxanne Katus**  
Eastern Michigan University  
rkatus@emich.edu  
Mathematics & Statistics



**G** **Prof. Bopi Biddanda**  
Grand Valley State University  
biddandb@gvsu.edu  
Annis Water Resources Institute



**A** **Prof. Peter Gonthier**  
Hope College  
gonthier@hope.edu  
Physics



**S** **Prof. Virginia Ayres**  
Michigan State University  
ayresv@msu.edu  
Electrical & Computer Engineering



**M** **Prof. Will Cantrell**  
Michigan Technological University  
cantrell@mtu.edu  
Associate Provost & Dean of the Graduate School, Physics



**M** **Prof. Mark Moldwin**  
University of Michigan  
mmoldwin@umich.edu  
Climate & Space



**O** **Prof. Laila Guessous**  
Oakland University  
guessous@oakland.edu  
Mechanical Engineering



**SV** **Prof. Khandakar Abir Rahman**  
Saginaw Valley State University  
krahman@svsu.edu  
Computer Science and Information Systems



**M** **Prof. Larry Molnar**  
Calvin University  
lmolnar@calvin.edu  
Physics & Astronomy, Observatory Director

## Professor Larry Molnar Returns for Calvin

Associate Professor Jason P. Smolinski, Calvin University Board Member and Campus Representative stepped down in early 2021. We thank Jason for his significant contributions and wish him the best of luck in his next adventures.

Prior to Jason joining the MSGC family, Professor Larry Molnar was the Calvin University Board Member and Campus Representative. Dr. Molnar has resumed his role once again and just in time for a busy year ahead of him. A Professor of Physics & Astronomy, Dr. Molnar is also the Observatory Director on Calvin's campus. The MSGC Fall Conference was scheduled to be held at Calvin University this year for the first time at an affiliate University and Dr. Molnar stepped right into hosting. A week later his documentary, Luminous, which describes his search for a star that will explode, held a special screening in the Calvin Covenant Fine Arts Center Auditorium.

### FY2021\* MSGC Funding Snapshot

**\$182,987**

for Educational Programs

**\$64,990**

in Research Seed Grants

**\$296,925**

NASA Internships & Fellowships

**74**

Publications

**450**

College Students

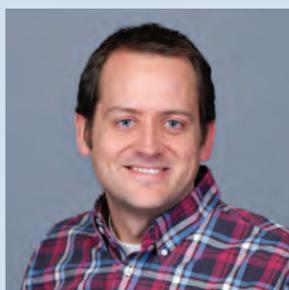
**4,964**

K-12 Students

**188**

K-12 Teachers

\*See page 5 for more details on Luminous.



**A** **Dr. Brian Yurk**  
Hope College  
yurk@hope.edu  
Mathematics

## New Deputy Campus Rep for Hope

Hope has added a Deputy Campus Representative, Assistant Professor Brian Yurk to help assist Professor Peter Gonthier with his MSGC duties. A Hope graduate, Brian has been teaching in the Department of Mathematics at Hope since 2009. Dr. Yurk is no stranger to MSGC. Not only was he an awardee himself, but has been a mentor to his students for MSGC for quite some time now.

## FY2021 Funding Addressing NASA Mission Directorates

**Aeronautics Mission Directorate**

**\$43,453**

**Human Exploration Mission Directorate**

**\$58,106**

**Science Mission Directorate**

**\$173,034**

**Space Technology Mission Directorate**

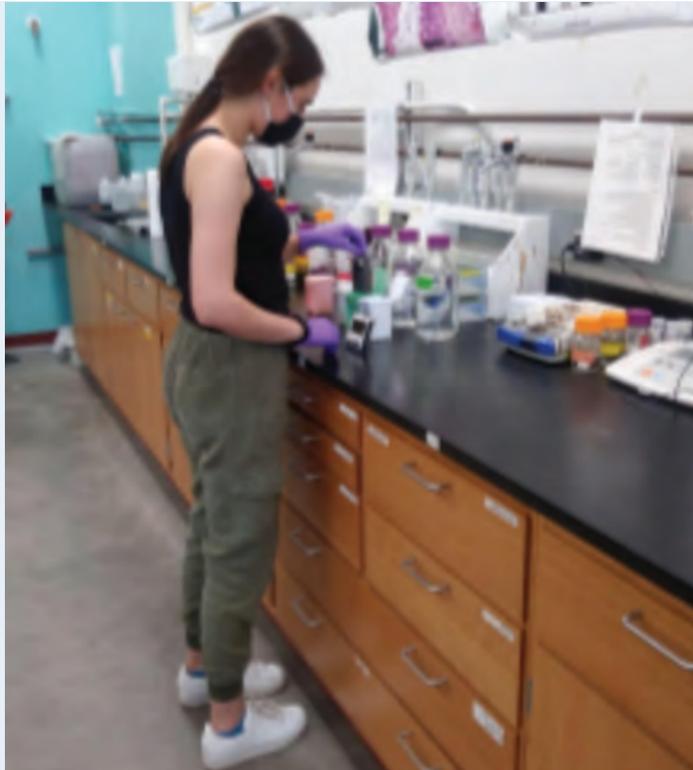
**\$59,014**



**W** **Prof. Ed Cackett**  
Wayne State University  
ecackett@wayne.edu  
Physics & Astronomy



**W** **Prof. Massood Atashbar**  
Western Michigan University  
massood.atashbar@wmich.edu  
Electrical & Computer Engineering



## Climate Change through Coral

Graduate student Tyler Harman brought the broad focus of climate change to the study of marine science research by recognizing the changes that have been happening under the water regarding carbon dioxide, temperatures, solar radiation, greenhouse effect, and more. His research focuses specifically on how the increases in ocean temperature have impacted the coral reefs including the species and organisms within. Harman's research took him out of the lab and on an adventure to the Narragansett Bay in Rhode Island. It was there that he collected colonies of coral, particularly the *Astrangia poculata* to bring back to the Annis Water Resource Institute at Grand Valley State University to perform experimental treatments. Harman narrowed down his focus to increasing temperature as well as adding in disease exposure. While some of his results were impacted due to the COVID shutdown, he did learn that there were non-significant differences of the coral between ambient and elevated temperature treatments. As for the coral experiment with the temperature and the disease exposure, Harman is hypothesizing that it may be thermally resilient in moderate warming temperatures. He is currently conducting an additional duplicate experiment this year to expand the size and compare the seasonal differences.



## Biodegradable Stents with Three Different Metal Alloys

With coronary heart disease still being the leading cause of death in the United States and the industry standards still having only two stint options: bare metal or drug-eluting; researchers have been testing bioabsorbable stent materials since it's only needed for arterial support for about one year. The question is how to do this harmlessly to the human body? Lea Morath, an undergraduate student at Michigan Technological University whose desire is to pursue a career in cardiovascular engineering; has been studying just that. Her research on biodegradable stents is studying if alloying zinc with silver, manganese, copper, or zirconium would produce a stronger implant metal that has a better biocompatibility. Lea tested all three alloys and their thermal treated counterparts for one month and compared her data to another group's test at six months. The results were opposite of what she was expecting based on the other group's results. The thermal treated quaternary alloy had more variability, the thermal treated ternary alloy had more macrophage infiltration, and the binary alloy had a significantly lower smooth muscle cell signal than the quaternary.

## Multiple Programs Benefiting UP Rural Native American Populations

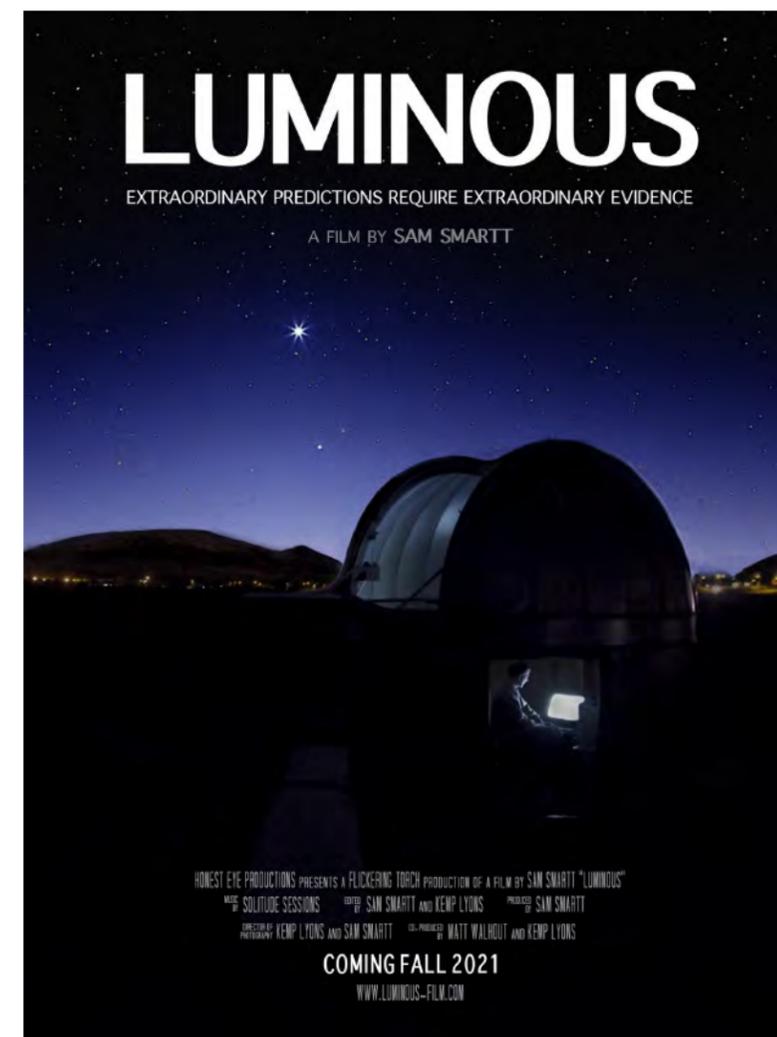


In the western Upper Peninsula, specifically L'Anse and Baraga Schools, Professor Joan Chadde from Michigan Technological University has been leading an important project for quite some time now. Partnering with Michigan Tech Center for Science & Environmental Outreach, BHK Family Resources and the Keweenaw National Historical National Park to promote STEM learning to rural Native American populations for early elementary children and families, they have multiple objectives in mind.

Not only do they work with the regional MiSTEM on PreK and Kindergarten activity kits to make available to their network of teachers. but they also conduct four Wee Engineer and Engineering for Kindergarten training workshops (including dinner!) for PreK and Kindergarten teachers, informal educators, and program coordinators in the western Upper Peninsula. They also host four outreach events (again, including dinner!) focusing on engineering for early learners and their families that include fun, hands-on activities.

## Luminous in Production

Astronomy Professor and Calvin University MSGC Campus Representative, Larry Molnar has had a pretty exciting year. Saturday, October 23, 2021, in the Calvin Covenant Fine Arts Center Auditorium a special screening of Luminous was shown. The documentary is about Professor Molnar's public prediction from 2015 about a star that's going to explode. He was working with undergraduate students, operating a telescope in the remote desert in New Mexico when he made his discovery of the star. The movie follows Molnar's journey of testing his prediction knowing he's now in the spotlight. A reception followed the free screening of the movie at Calvin's Observatory complete with hot chocolate. Leading up to the screening, a preview of the movie was shown at the 2021 MSGC Fall Conference that was held at the Prince Conference Center at Calvin University. The full release of the documentary that has been seven years in the making is in production and is coming soon in 2022. Check out [www.luminous-film.com](http://www.luminous-film.com) for more information.



## 2021-2022 Award Recipients

### Faculty Led Fellowships for Undergraduates Student Participants:

Jacob Adamski, Oakland University  
Josephine Anderson, Michigan State University  
Lindsey Boltz, Hope College  
Caitlyn Bott, Calvin University  
Lauren Bryan, Hope College  
Jadon Clugston, Western Michigan University  
Steven Davenport, Hope College  
Gabrielle DeMott, University of Michigan  
William Diephuis, Hope College  
Kyle Frownfelter, Eastern Michigan University  
Bridget Gagnier, Hope College  
Derek Goderis, Michigan State University  
Blake Harlow, Hope College  
Willem Hoogendam, Calvin University  
Onyinyechi IHEME, Calvin University  
Benjamin Jenkins, Grand Valley State University  
Jacob Kowalski, Hope College  
James Mandeville, Hope College  
Molly McLinden, Hope College  
Anna Molloy, Hope College  
Kristina Mullen, Saginaw Valley State University  
Renato Pinto Reveggino, MTU  
Tristan Porter, Hope College  
Giuliano Romano, Oakland University  
Allison Romanski, Grand Valley State University  
Rachel Shaw, Hope College  
Morgan Sherrard, Hope College  
Liam Spence, University of Michigan  
Chloe Strach, Michigan Technological University  
William Vance, Hope College

### Graduate Fellowships:

Leona Addie, Grand Valley State University  
Jessica Alger, Michigan Technological University  
Ellen Badger Hanson, Western Michigan University  
Diana Bullen, Michigan Technological University  
Robert Carr, Wayne State University  
Deirdre Courtney, Western Michigan University  
Nate Dugener, Grand Valley State University  
Ellen Foley, Grand Valley State University  
Ian Gannon, Michigan Technological University  
Brock Howell, Michigan Technological University  
Ryan Klida, Michigan Technological University  
Savannah Lyons, Eastern Michigan University  
Isaac Malsky, University of Michigan  
Noribeth Mariscal, Wayne State University  
Larissa Markwardt, University of Michigan  
Dominic Messina, Wayne State University  
Benjamin Mohrhardt, Michigan Technological University  
David Moutard, Wayne State University  
Alexis Neff, Grand Valley State University  
Kate Nelson, Michigan Technological University  
Kip Nieman, Wayne State University  
Natalie Nold, Michigan Technological University  
Kassidy O'Connor, Michigan Technological University  
Jonathan Oleson, Michigan Technological University  
Maggie Petersen, Grand Valley State University  
Emily Shaw, Michigan Technological University  
Christian Smith, Western Michigan University  
Amanda Studinger, Michigan Technological University  
Jonathan Walt, Grand Valley State University  
Isaac Wedig, Michigan Technological University  
Kevin Whitley, University of Michigan

### Research Seed

Mohsen Ayoobi, Wayne State University  
Fabia Ursula Battistuzzi, Oakland University  
Ilias Cholis, Oakland University  
Meagan Elinski, Hope College  
Erik Fredericks, Grand Valley State University  
Mohammad Khan, Saginaw Valley State University  
AKM Monayem Mazumder, Saginaw Valley State University  
Sidike Paheding, Michigan Technological University  
Derek Thomas, Grand Valley State University  
Trista Vick-Majors, Michigan Technological University  
Luis Villa-Diaz, Oakland University  
Ankun Yang, Oakland University  
Ziming Yang, Oakland University

### HONES Groups

GV Moon Miners, Grand Valley State University  
BLUE Program, University of Michigan

### PreCollege Program

Luke Bowman, Michigan Technological University  
Harriet Lindsay, Eastern Michigan University  
Sara Maas, Grand Valley State University  
Megan McCullen, Wayne State University  
Kris Pachla, Grand Valley State University  
Gerald Thompkins, The Engineering Society of Detroit

### Public Outreach

Elizabeth LaPensee, Michigan State University  
Karen Gipson, Grand Valley State University  
Deanna van Dijk, Calvin University

### Teacher Training

Catherine Hart-Jansma, Pierce Cedar Creek Institute  
Elena Lioubimtseva, Grand Valley State University

### Multiple Programs

Carrie Dummer, Hope College  
Virginia DeVillers, Plainwell Aviation and STEM Academy (PASA)  
Susan Ipri Brown, Hope College  
Maria Webb, DAPCEP (Detroit Area Pre-College Engineering Program)

### Virtual Learning Program

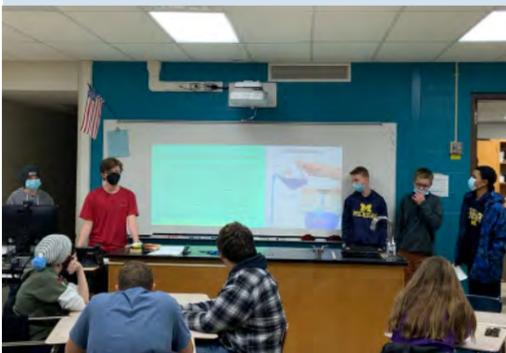
Brooke Chambers, Michigan Science Center  
Mel Drumm, Ann Arbor Hands-On Museum  
Emily Gochis, Copper Coutry ISD  
Gerald Thompkins, The Engineering Society of Detroit  
Johnathan Winckowski, Besser Museum

### NASA Interns

Cayla Coury, Michigan State University/Goddard Space Flight Center  
Anthony Convertino, University of Michigan/Headquarters  
Rutvik Marathe, University of Michigan/Glenn Research Center

### Industry Interns

Tomas De Urquidi, University of Michigan/Orbital Effects  
Nicole Kessler, University of Michigan/Orbital Effects  
Bennett Lawson, University of Michigan/Orbital Effects  
Cade Long, University of Michigan/Orbital Effects  
Ren Monroe, University of Michigan/Orbital Effects  
Himaja Motheram, University of Michigan/Orbital Effects  
Justin Newberry, University of Michigan/Orbital Effects



## Grand Blanc Students Research Headed to ISS

Grand Blanc Community Schools (GBCS) has been taking part in the [Student Spaceflight Experiments Program](#) (SSEP) Mission 16 to the International Space Station (ISS) this year. Each community participating in SSEP is provided a very real research asset – a flight certified, straightforward to use microgravity research mini-laboratory, and guaranteed launch services to transport the mini-laboratory to the ISS where it is operated by the astronauts. A Mission Patch Art and Design Competition is part of the program, allowing hundreds of students across the community to capture through art and design their community's SSEP experience. Up to two Mission Patches accompany the community's selected flight experiment to low Earth orbit. The GBCS students worked in small groups to study microgravity, then developed science experiments that can be carried out in space. They had to research, work with a mentor that had expertise in the area they chose to explore, write a research proposal that fit specific criteria, and then present their research proposal to their teachers. From there, twelve groups were selected to present to a panel of five community members. The panel then selected three groups who will submit their proposal to a national panel at the Smithsonian. The three winning proposals were: "How Do High Molecular Weight Polyethylene Glycol

and Medium Molecular Weight Hydrochloric Acid Diffuse Together in Microgravity?", "How does microgravity affect the decomposition process of blueberries?", and "How does lactose react to stomach acid in microgravity?". The national panel will decide which of the three proposals will be selected to send their experiment to the ISS next spring.



## MSGC Calendar

### May 9, 2022

Funding starts for 2022-2023 Awards

### October 22, 2022

Fall Conference in Ann Arbor

### November 16, 2022

Applications due for 2023-2024 Awards

### May 9, 2023

Funding starts for 2023-2024 Awards

### October 21, 2023

Fall Conference at Western Michigan University

### November 15, 2023

Applications due for 2024-2025 Awards