

# science IMPACT

## CARNEGIE SCIENCE CENTER



A burst of liquid nitrogen and a shower of confetti mark the spot where the Science Center's new Science Pavilion will stand.

## Science Center Breaks Ground on Expansion

New Science Pavilion to Offer STEM Learning Labs, Special Exhibitions, Digital Theater

With a drumroll from a local high school drumline, a shower of confetti, and three liquid nitrogen explosions to “break” the ground, Carnegie Science Center kicked off the construction of its major expansion project.

The GroundBOOMing – a scientific twist on the conventional groundbreaking – took place in October, 25 years after Carnegie Science Center opened on Pittsburgh’s North Shore.

The Science Pavilion will be built eastward along the Ohio River facing Pittsburgh’s Point, where the Allegheny and Monongahela rivers join to form the Ohio. The expansion is part of *SPARK! A Campaign for Carnegie Science Center*, which also funds two new permanent exhibitions, a new giant-screen digital theater, and endowment.

“This is much more than the construction of a building,” **Bill Hunt**, chair of the Carnegie Museums of Pittsburgh Board of Trustees,

told the crowd at the GroundBOOMing. “We’re here to celebrate the vital role that Carnegie Science Center plays in this community.”

Hunt underscored the Science Center’s role as a beloved regional attraction, as a partner to educators, and as a national leader in the development of STEM learning and career-development experiences.

“This expansion is a commitment to the future of our children, so they can learn about and become more engaged with science...[The Science Center’s growth will] provide an outcome that will lead to future economic vitality within our region,” Hunt said. “I have never heard any area in the country ever complain about having too many scientists in their midst. Skilled workers are the future of the new, global economy.”

Allegheny County Executive **Rich Fitzgerald** and City of Pittsburgh Mayor **Bill Peduto**

also spoke at the event, citing the value of the Science Center to the community as a venue for family fun and its importance in educating and inspiring the next-generation workforce of the region.

Science Pavilion construction is now underway and is expected to run through mid-2018. The Science Pavilion will house:

- **STEM Learning Labs:** State-of-the-art STEM Learning Labs will offer flexible classroom and lab space. Totalling 6,000 square feet, doubling the Science Center’s existing classroom space, the labs will host innovative and inspiring programs for thousands of young people each year and hundreds of educators, serving to equip the next generation science and technology workforce.
- **Special Exhibitions Gallery:** For almost a decade, since construction of a subway station required the demolition of the Science Center’s previous traveling exhibitions building, world-class traveling exhibitions have bypassed Pittsburgh because of a lack of an appropriate venue. The two-story special exhibitions gallery will provide 14,000 square feet of space expected to draw visitors from a wide geographic region.
- **Conference and Event Space:** The Science Center is already seen as the “town hall” of science learning and discussion, and this space will provide an enhanced setting for that mission. This multi-purpose area, called PointView Hall, is located on the top floor with an outdoor terrace and extraordinary view of the Point and Pittsburgh skyline. It will be used to host science programs, professional conferences, and social events.
- **Rangos Giant Screen Theater:** A total renovation of the existing large-format theater with laser digital technology will deliver the brightest and clearest images, along with the most advanced sound system, on the largest screen in Pittsburgh.

# directors' note



**T**his past fall has been a momentous one for us. As the cover story describes, we held the Ground-BOOMing for our new Science Pavilion in late October, 25 years after first opening our doors here on Pittsburgh's North Shore.

This fall we also celebrated the fifth "birthday" of the Chevron Center for STEM Education and Career Development, which we launched in November 2011. In those five years, we have seen hundreds of thousands of young people in STEM-focused programs and competitions. We've launched STEMisphere.org, an online directory of regional STEM resources for use by kids, parents, and educators. We've commissioned and published a regional study on the perceptions and attitudes about STEM and its potential for workforce development among teachers, parents, students, and business leaders. We've developed the Carnegie STEM Excellence Pathway to help schools strengthen their STEM programming. We're now serving more than 300 "Pathway Partners" across 18 states, impacting nearly 4 million students. And another thing: We opened a Fab Lab!

Here at the Science Center, we live, eat, and breathe STEM. So we find it disheartening to review the national statistics on the under-representation of women in STEM fields. Overall, women comprise 47% of the U.S. workforce, but just over 36% of all chemists and materials scientists are women. That percentage decreases to 25% for computer and math professionals and just 15% of engineering professionals.

Through our Carnegie STEM Girls program, we've developed programming to help girls – particularly middle school girls – see the excitement and opportunity in STEM careers. We employ research-based methods to engage girls: exposing them to female role models, helping them see how STEM professionals can help others and improve the world, and engaging them in hands-on project-based activities.

But even middle school may be too late. A recent study published by the journal of the *American Educational Research Association* showed that while boys and girls enter kindergarten with similar math abilities, girls start to fall behind as early as first grade. While the issues are complex, the study authors suggest that teachers' expectations may be a factor: Teachers rated girls' math skills worse than boys' even when both groups of students behaved and performed identically on tests. Teacher expectations play a major role in performance, making our professional development efforts a critical part of our mission.

As we move into 2017 and beyond, we will continue to work diligently to delight, excite and inspire all kids – and to help their teachers and parents do the same. We're committed to helping our region – and our nation – fill the future STEM workforce pipeline – and to assure that workforce includes all parts of our society.

**Ron Baillie and Ann Metzger**  
*Henry Buhl, Jr., Co-Directors*

## CARNEGIE SCIENCE CENTER

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[CarnegieScienceCenter.org](http://CarnegieScienceCenter.org)

Carnegie Science Center delights, educates, and inspires through interactive experiences in science and technology. By making science both relevant and fun, the Science Center's goal is to increase science literacy in the region and motivate young people to seek careers in STEM (science, technology, engineering, and math).

The Science Center also serves as a town square for community dialogue on science and its social implications and seeks to showcase regional science and technology advances.

One of the four Carnegie Museums of Pittsburgh, the Science Center is Pittsburgh's premier science exploration destination, reaching more than 700,000 people annually through its hands-on exhibits, camps, classes, and off-site education programs.

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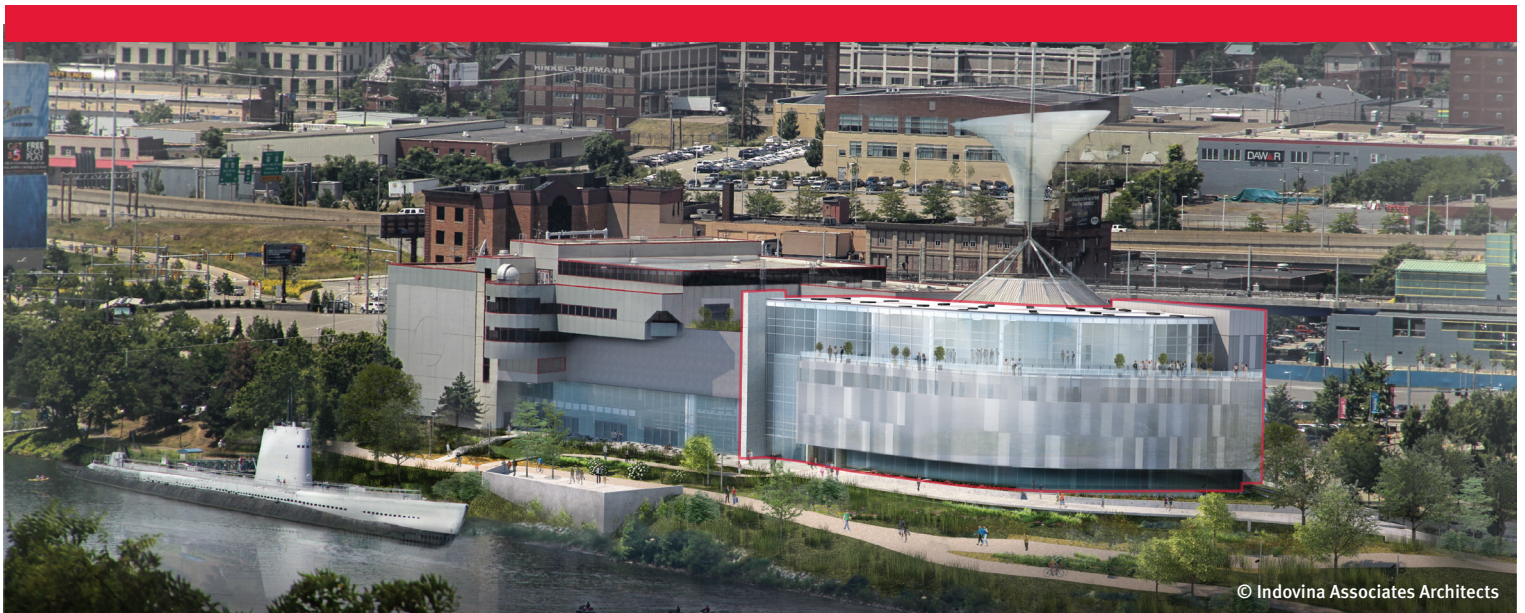
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[CarnegieScienceCenter.org/Publications](http://CarnegieScienceCenter.org/Publications).

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In this rendering, Carnegie Science Center’s expansion is shown on the right side of the building, wrapping around the existing building and providing enhanced connectivity with the river trail. The section to the right of the red line represents the Science Pavilion addition.

## Science Center Breaks Ground on Expansion *(continued from cover)*

“We are thrilled to be taking this momentous step in creating the next-generation Science Center,” said **Ron Baillie**, Henry Buhl, Jr., Co-Director of Carnegie Science Center. “The Science Pavilion will greatly expand our resources and allow us to engage and inspire even more students in the fields of science, technology, engineering, and math.”

The GroundBOOMing drew an audience of 200 people, including community leaders, corporate partners, donors, educators, and students.

“**We’re creating more opportunities for kids – all kids – to see themselves in a future that’s more exciting and more hopeful because they’re prepared to be a part of it.**”

Middle school students from Schiller STEAM Academy led a parade around the existing building to kick off the event. The Perry High School Band Drumline accompanied them with music and cheers. Both schools are Pittsburgh Public Schools located in Pittsburgh’s North Side neighborhoods.

A presentation about states of matter by the Science Center’s demonstration theaters team culminated in three liquid nitrogen explosions lifting high-density foam “rocks” out of holes in the ground. This “Ground-BOOMing” feat was met with applause and cheers as dozens of Science Center staff popped biodegradable confetti out of cannons.

“This expansion continues our mission of meeting the needs not only of students, but of the community as a whole,” said **Ann Metzger**, Henry Buhl, Jr., Co-Director of Carnegie Science Center. “Having a scientifically literate citizenry is critical to our region’s future. With increased space, we’ll again be able to bring the sort of amazing traveling exhibits to Pittsburgh that inspire people of all ages and spark their interest in science.”

Last year, the Science Center saw more than 500,000 visitors. More than 90,000 students participated in the Science Center’s STEM education and career exploration programs. The Science Center’s outreach program reached an additional 170,000 students over a five-state region. The expansion is designed to provide meaningful STEM experiences to even more children in the Pittsburgh region and beyond.

*The SPARK! Campaign*, led by its chair **Suzy Broadhurst**, is made possible by the generous contributions of more than 160 donors.

“We’re creating more opportunities for kids – all kids – to see themselves in a future that’s more exciting and more hopeful because they’re prepared to be a part of it,” Broadhurst said. “That’s what STEM learning is really all about.” ■



Students from Schiller STEAM Academy led a parade around the existing building to kick off the festivities. Here, they stand with museum leaders and local government representatives.



Educators from around the country convened at Carnegie Science Center in August to learn how to implement the Carnegie STEM Excellence Pathway in their regions. This is the first Pathway Provider Training Institute. A grant from the Institute of Museum and Library Services is now establishing a consortium of Science Centers, which will scale the Pathway as a national model.

## Science Center Awarded National Leadership Grant for STEM Excellence Pathway

### Grant Establishes National Consortium of Science Centers

Designed to help schools improve their STEM education practices through a positive, collaborative approach, the Carnegie STEM Excellence Pathway is reaching thousands of schools across the United States with the potential to enhance the education of nearly four million students.

A grant from the Institute of Museum and Library Services (IMLS) will enable Carnegie Science Center to form a consortium with four science centers across the country to establish the Carnegie STEM Excellence Pathway as a national model and to continue growing the Pathway's impact.

Through the Pathway's self-evaluation, participating schools evaluate their STEM education practices on 20 criteria, then develop a tailored strategy to identify and address specific self-defined goals to advance the quality of their efforts.

The Science Center is now training fellow informal science

institutions to deliver the Pathway in their own communities. The project will better equip schools to offer high-quality STEM programming. It will also establish science centers as effective STEM resources and strong community anchors that, in partnership with educational and allied organizations, will play an important role in enhancing economic vitality by helping students build essential 21st century learning skills.

The \$473,677 grant, supported by the Association of Science-Technology Centers (ASTC), will allow the Science Center to form a consortium with: Arkansas Discovery

Network (Little Rock, Ark.), Discovery Place (Charlotte, N.C.), Fort Worth Museum of Science and History (Texas), and Saint Louis Science Center (Mo.).

Each consortium member will engage a diverse cohort of 10 school districts to participate in using the Pathway self-evaluation during the 2017–2018 school year.

“The Carnegie STEM Excellence Pathway provides a proven model for other science centers to adopt and implement in their local communities,” said **Alana Kulesa**, Carnegie Science Center's Director of Strategic Education Initiatives. “With the

support from IMLS, we can now develop a national network of Pathway Providers to increase the collective impact of our efforts to improve STEM education. It is our hope that this project will help our science center colleagues elevate their role with school partnerships, with an ultimately profound impact on students across the nation.” ■

#### Carnegie STEM Excellence Pathway

**353 PARTNERS**  
COMPRISE:



**8,217**  
**SCHOOLS**



**19 STATES &**  
**WASHINGTON, D.C.**



**3,989,037**  
**STUDENTS**

# BOARD SPOTLIGHT



## Noland Cheung

Science has always been part of **Noland Cheung's** life.

His father, a biochemist, encouraged Cheung's interest in science, a discipline that led him to chemical engineering, public policy, and eventually to intellectual property law, where he protects the intellectual property of inventors.

Cheung joined Carnegie Science Center's Board in January 2012, ascending to the role of Board Chair in January 2017.

"Science has been very important in my life," he said. "If you're looking for the one place in this region that signifies the excitement and the growth of science, the Science Center is the pinnacle."

He believes in the power of informal science to spark children's passion for education – all through hands-on, fun experiences.

"We're helping to shape the next generations," he said. "For me to be part of that and to help that process is just a dream."

Cheung, director at the law firm of Cohen & Grigsby, P.C., chairs the intellectual property group and helps inventors. He's secured protection on inventions on everything from board games to chemicals. Recently, his team helped a student develop a patent on a wearable device that charges electronics – all powered by the wearer's footsteps.

While working in a tar manufacturing plant after graduating from Carnegie Mellon University, Cheung experienced intellectual property for the first time, when his plant manager sought guidance about how to patent a new type of distillation column. That experience sparked his interest in patents and inventions, and it led him to Dickinson Law School of Penn State University. After law school, he worked at Bayer, eventually heading the intellectual property group and then moving to his role at Cohen & Grigsby.

Cheung and his wife Lisa, a pediatrician, have three daughters – Christina, 19; Juliana, 16; and Alexandra, 13. The family spends their free time playing board games, experiencing Pittsburgh's food scene, and traveling to explore new cultures.

When they visit the Science Center, they enjoy admiring the Miniature Railroad & Village® display, gazing into the skies at the Buhl Planetarium & Observatory, and experiencing Omnimax films.

# GRANTS & AWARDS

- ▣ Fab Lab Carnegie Science Center will establish a new outreach program thanks to a \$200,000 grant from **BNY Mellon Foundation of Southwestern Pennsylvania**.

A second mobile Fab Lab will increase Carnegie Science Center's capacity to meet the STEM education and career needs of underserved students and communities throughout the region. The grant includes 80 free visits by the new Fab Lab van to a total of 2,500 students at under-resourced schools and/or community organizations.

- ▣ A \$70,000 grant from **PNC Foundation Grow Up Great** will extend the Buzzword Pittsburgh Early Learner project for a third year.

- ▣ **PPG** has renewed its commitment as a Founding Partner of the Chevron Center for STEM Education and Career Development with a \$50,000 grant.

- ▣ **Duquesne Light** awarded a \$50,000 grant for a Conservation Day to be held on Martin Luther King Day in 2017. The grant provides for free admission for all visitors, as well as free parking and a free movie as capacity permits.

# MICROBITS

## Fab Lab Wins International Award

Fab Lab Carnegie Science Center won the third place Chevron STEM Education Award, among 686 Fab Labs worldwide. The Award was announced in August in China at "Fab12," a global Fab Lab meet-up. Science Center staff **Jason Brown**, Senior Director of Science and Education; **Liz Whitewolf**, Fab Lab Technical and Education Manager; and **Jon Doctorick**, Mobile Fab Lab Coordinator, attended and presented at the conference, sharing strategies for teacher professional development and student engagement.

## Chain Reaction Contraption Contest Past Participants Return as Judges

Two Chain Reaction Contraption Contest alumni returned as judges in December's contest.

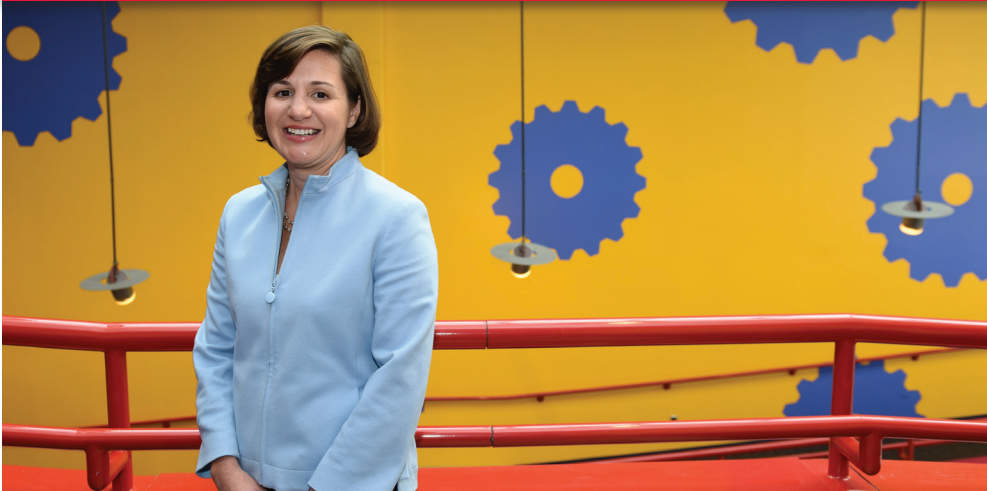
**Jake Kendra**, who participated in the contest while a student at Trinity Area High School in Washington, Pa. in 2011 and 2012, served as an operations judge in this year's contest. He is a December 2016 graduate from Penn State University who studied mechanical engineering and will work at SMS Group Technical Services after graduation.

**Phil Johnston**, a mechanical engineer at Bombardier Transportation who graduated from Penn State University, also served his first year as a Chain Reaction judge. He participated in the Chain Reaction Contraption Contest in 2007 and 2008 as a student at Derry Area School District in Westmoreland County.

Both Kendra's and Johnston's teams won first place in the contest during their senior years of high school.

# PARTNER SPOTLIGHT

Sally McCrady PNC Bank



Sally McCrady leads PNC's partnership and collaboration with Carnegie Science Center on initiatives such as the Grow Up Great program for early learners.

**Sally McCrady is executive vice president and director of Community Affairs for PNC Bank, as well as chairwoman and president of the PNC Foundation. In her time at PNC, she has led the Grow Up Great program and has worked on initiatives of advocacy, grants, awareness, and volunteerism.**

## What is the PNC Foundation's mission?

The PNC Foundation, which receives its principal funding from The PNC Financial Services Group, supports organizations that provide services for the benefit of communities in which it has a significant presence. The foundation focuses its philanthropic mission on early childhood education and community and economic development. Grow Up Great has created a bilingual \$350 million, multi-year initiative to help prepare young children for success in school and life.

## Why does PNC value its support of Carnegie Science Center?

Carnegie Science Center nurtures children's innate curiosity by providing materials and exhibits that help them develop a love of science. This expertise has complemented our efforts to make a meaningful impact in children's early education. The Science Center has been a great partner in building our understanding of what inquiry-based science looks like. Through the Science Center's example, we have learned to create impactful grant programs that include developmentally appropriate children's activities, professional development for teachers, and family engagement so the learning extends beyond the classroom and into the home.

## Why is a STEM-prepared workforce important to PNC?

PNC is investing in resources to enhance the bank's information technology, provide online banking products and services to its customers, and enhance cybersecurity – all of which involve STEM skills. We believe the best way to prepare the future workforce is to start early with inquiry-based science education that fosters young children's natural sense of curiosity.

## In what ways has PNC supported the Science Center?

Carnegie Science Center is one of our oldest, most enterprising partners in Grow Up Great. PNC's grants to the Science Center created a pilot program in early childhood science that we later took to scale in a 14-city initiative to help foster a foundation in science for preschoolers. In addition, we have worked with the Science Center to promote early science learning and funded specific programs that extend educational programming outside its physical walls to children in the community.

PNC is supporting the Science Center's *SPARK! Campaign* with a gift that will fund the creation of the Little Learner Zone, a reimagined exhibit space where generations of young learners and their families will explore and learn together. The gift will also support complementary community-based programming, including outreach activities for neighboring North Side families.

## Do you have any favorite exhibits/activities at the Science Center?

My favorite exhibit at the Science Center is the one my younger son loves the best, namely *One World, One Sky*. The planetarium show taught him about the stars and gave him an appreciation of Chinese culture. For a full year, my son requested weekly visits to the Science Center so he could watch the show. I think I could recite most of the program from memory!



# STEMISPHERE

Your Portal to a Universe of Opportunities

Do you know of exceptional STEM resources in our region?

Submit them at [STEMisphere.org](http://STEMisphere.org)

For more information, or if you have questions, contact:

**Michele Howard**

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# Teaching Excellence Academy Launches to Support Region's Educators

## Science Center Workshops Offer Professional Learning Opportunities for Teachers

Carnegie Science Center launched the Teaching Excellence Academy this fall to help teachers sharpen their STEM pedagogy skills. The Teaching Excellence Academy offers a varied set of workshops for teachers in all grade levels, with specific workshops in STEM, early learner education, and the engineering design process. Trainings focus on instructional methods to help students develop essential 21st century skills, such as communication, collaboration, critical thinking, innovation, problem solving, and knowledge application.

“When we talk to teachers in our community, we hear time and time again that they’re searching for new, effective ways to integrate STEM into their classrooms,” **Jason Brown**, Carnegie Science Center’s Senior Director of Science and Education, said. “We feel it’s our duty as a trusted voice of science in the region to help support teachers with professional learning opportunities through our Teaching Excellence Academy.”

Carnegie Science Center’s Teacher Advisory, a group of educators representing diverse schools across the region, helped to shape the Teaching Excellence Academy

by offering input on themes and content.

The Teacher Advisory, established this year, requested programming related to project-based learning and designing lesson plans around students’ questions. In response, two workshops focus on those topics.

In the “Building Your PBL Classroom” workshops, teachers in grades K–5 explore how to integrate project-based learning (PBL) into the classroom. Educators are asked to use their expertise and experience to

In “Ask and Answer: Subtle Shifts to Get Your Kids Devising Questions and Generating Conclusions,” Science Center staff educators help K–12 teachers to transition their traditional classroom to one that is more inquiry-focused. This challenge does not require a total curriculum rewrite or building lesson plans from scratch. The workshop offers simple classroom strategies to turn traditional lessons and activities into ones that are driven by student questions and creativity and that give kids the opportunity to practice and develop STEM skills.

Workshops in Fab Lab Carnegie Science Center focus on classroom application of new technologies, such as 3D printing, CNC routing, and laser cutting.

For early learners, workshops encourage teachers to integrate robotics into their classrooms – even at the Pre-K level – through developmentally appropriate concepts. Even at their young age, early learners can understand that robots provide unseen services every day in the transportation, medical, and manufacturing industries.

Science Center staff deliver the workshops on-site or can take the programs directly into educators’ classrooms. ■

### Teaching Excellence Academy professional learning opportunities include:

- Teaching Content through Games
- Spice Up Your Science
- SMASH JAM: Integrating Literacy & Science Using Digital Video
- Building Respectful, Responsible Kids and Positive Adult-Child Relationships
- Intro to Fab Lab
- Story Science: Physics with the Three Little Pigs

develop STEM projects that directly address real-world problems and require students to be engaged using 21st century skills. Science Center facilitators provide project resources, group work strategies, and collaborative opportunities.

## Science Fair Winner Earns Honors in International Competition



*Aria Eppinger also earned the Carnegie Science Award in 2016 in the Intermediate Division. Here, she accepts the Carnegie Science Award from Debra Van Holst of NOVA Chemicals.*

A local student’s science fair project is earning international acclaim. **Aria Eppinger**, a student from Pittsburgh’s Squirrel Hill neighborhood, debuted her research at Carnegie Science Center’s Covestro Pittsburgh Regional Science & Engineering Fair in spring 2016, where she won top honors in the Medicine/Health/Microbiology Category of the Intermediate Division (7th and 8th grade). Her project, titled “Roundup’s Effect on Bacteria,” studied the deleterious effects of a popular weed-killer on beneficial bacteria that live in the human gut.

She then took her work this fall to the Broadcom MASTERS (Math, Applied Science, Technology and Engineering Rising Stars), the premier international science and engineering competition for middle school students, where she took second highest honors. Eppinger won the \$20,000 Robert Wood Johnson Foundation Award for Health Advancement for showing the most promise in health-related fields. ■

# CARNEGIE SCIENCE CENTER

One of the four Carnegie Museums of Pittsburgh

One Allegheny Avenue | Pittsburgh, PA 15212

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*With careful inspection, two girls study X-rays to piece together the shape of a skeleton at Carnegie Science Center's new BodyWorks exhibit.*



**BodyWorks**, presented by Allegheny Health Network, uses brand-new interactive exhibits, live shows, and demonstrations to explore the incredible mechanics that make up human beings. Community partnerships with Allegheny Health Network and the Pittsburgh Supercomputing Center ensured that state-of-the-art, real-world medical technologies are featured in the exhibit.