



Science and Technology of Materials, Interfaces, and Processing Southern California Chapter

Spring/Summer 2017

Quarterly Newsletter

Special points of interest:

- LA and OC Science Fair Winners
- 2017 SCCAVS Short Course Program Enrollment Now Open
- Elmer Carvey Scholarship
- LIGO Talk and Tour Re-Cap from 3/28/17
- The Science Behind Total Solar Eclipses

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Los Angeles & Orange County Science Fair Winners

Contributed By Corinne D'Ambrosio and Jim Garner

The annual Orange County Science and Engineering Fair judging day was held at the OC Fairgrounds on Wednesday, March 22, 2017. Special Awards judges Corinne D'Ambrosio and Dan Coursen, Jr were on hand to choose this year's recipient of the Dan Coursen Memorial Award, given annually to first and second prize winners at both the OCSEF and LASF. The award is in memory of local business owner, long-time committee member, and special awards judge Dan Coursen, Sr of Coursen Coating Labs.

The winners of the OCSEF and LASF competitions go on to compete not only in the California State Science Fair but also the Broadcom MASTERS and Intel ISEF.

This year's First Prize Winner at OCSEF (\$100) was 11th grader Matthew Tang of Northwood High School in Irvine. His project, titled "Design and Fabrication of Thin Film Stretch Sensors for a Finger Flexion Assessment Glove" utilized sputter deposition technology at the Khine Lab at UC Irvine. His study aimed to optimize the fabrication parameters of these sensors and use them to design a finger flexion assessment glove which maps changes of resistance to the computer screen to display finger movement in order to determine the robustness and feasibility of the sensors for practical real-world applications.

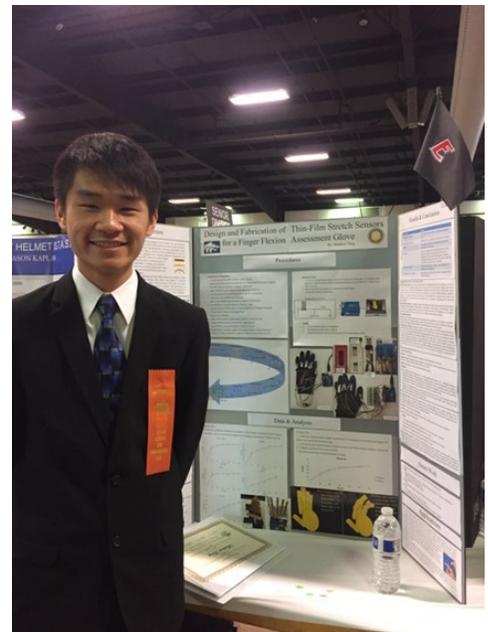
Those applications include home health care monitoring, human motion detection, gesture remote control of electronics, human machine interaction and haptics (for example, virtual reality!) He sputter coated Pt and Au on to a polystyrene sheet, creating PDMS-based thin film nanowrinkled stretch sensors, which were then shrunk and applied to the glove. He did three iterations of this device and found that with the cost of making each sensor at less than one dollar, these sensors can be a more economical and robust replacement than other strain sensors.

This year's Second Prize winner at OCSEF (\$50) was home-schooled 8th grader Kristin Dea for her project titled, "Evaluating the Performance of Glass Window Samples." Her experiment was to find out if the tint of different glass samples affect the light and temperature measured using a digital lux meter (for light) and thermometer (for heat). She constructed her own

test box and made her measurements three times, leading to the conclusion that glass with tint has lower foot-candle and temperature measurements. When asked about the properties of the glass window samples she used, she mentioned that coating the windows with materials to reduce transmission was of interest to her future research.

The SCCAVS awarded cash prizes to three students who presented excellent science projects at the Los Angeles County Science fair on March 29.

First prize went to Kiran Hamkins and Viola Shin, Juniors at Crescenta Valley High School for "Experiments in Water Splitting with Transition Metal and Bismuth Vanadate Catalysis." They used a novel method of measuring and comparing hydrogen production rate for various alloy ratios. Such work in surface interfaces and chemistry is a major area of interest to the AVS. Both students are planning to study biochemistry related subjects in college.



First Prize Winner Matthew Tang at OCSEF

(continued on page 4)



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The Science Behind Total Solar Eclipses

Excerpt From <https://www.timeanddate.com/eclipse/total-solar-eclipse.html>

Total solar eclipses occur when the New Moon comes between the Sun and Earth and casts the darkest part of its shadow, the umbra, on Earth. A full solar eclipse, known as totality, is almost as dark as night. On August 21 the Great American Eclipse will be visible from a narrow path spanning all across the USA from the East Coast to the West Coast (see map and local times below), weather permitting.

Only those located in the path of the Moon's full shadow, its umbra, can see a total solar eclipse. The Moon's umbra travels eastward at about 1,700 km/h (1,056 mph).

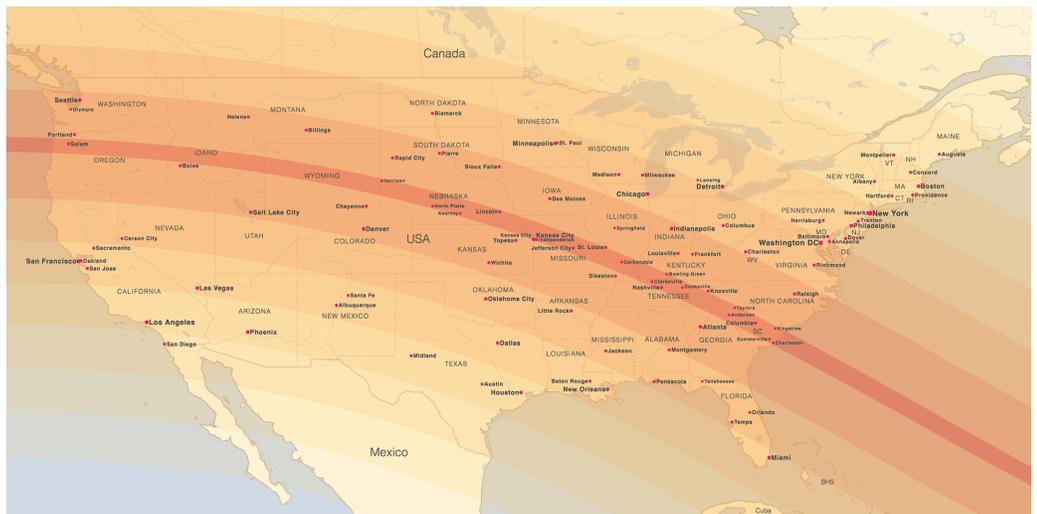
A total solar eclipse can last for several hours. Totality can range from a few seconds to 7.5 minutes. The longest total solar eclipse of the 21st century took place on July 22, 2009 when the totality lasted 6 minutes and 39 seconds.

Total solar eclipses typically happen a little less than once a year when:

There is a New Moon.

- The Moon is near a lunar node.
- Earth, the Moon, and the Sun are aligned in a straight line.

The Moon is near perigee.



**SOUTHERN CALIFORNIA
CHAPTER OF THE AVS :
THE SCIENCE &
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Upcoming Events

Semicon West/
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July 11-13, 2017
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Chapter Activities

LIGO Talk & Tour Re-Cap

The SCCAVS hosted a presentation and tour on **Engineering behind the Laser Interferometer Gravitational-wave Observatory (LIGO)** at Caltech on Tuesday, March 28th 2017.

The design and fabrication of Advanced LIGO was presented. Among the cutting-edge technologies discussed was an ultra-high vacuum system, laser source, active vibration isolation, ultra-low loss fused silica optics, active thermal compensation, and very low noise analog and digital electronics.

After the presentation, there was a tour of the 1/100th scale (40 m) interferometer system. To give an idea of the true scale, the corner and end stations on the full-size chambers are connected by beam tubes which are 1.2m diameter and 4km long! There are 50km of weld bead per beam tube and stiffening rings prevent buckling of the tube by air pressure. The tube is only 3.2mm thick!

The SCCAVS would like to thank our speakers, Chief Engineer Dennis Coyne and Senior Vacuum Engineer Jon Feicht.



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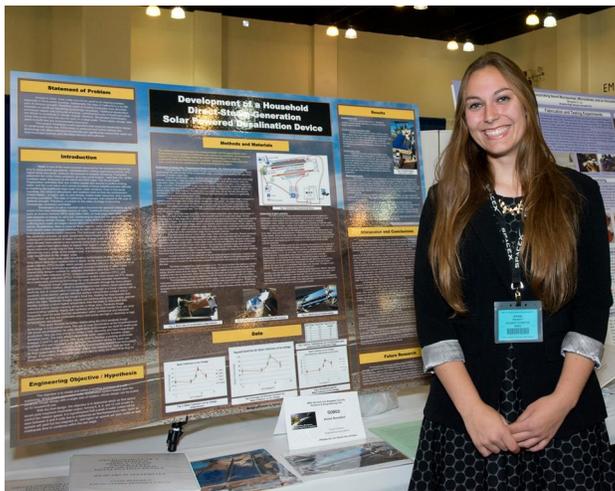
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Science Fair Winners (Cont'd)

Second prize went to Annie Benedict, a Senior at Palos Verdes Peninsula High School for "Development of a Household Direct-Steam-Generation Solar Power Water Recovery System." She created a remarkably complex plumbing and electronic controls apparatus by herself. This demonstrated the kind of ingenuity and dauntless determination required in all scientific research. She is interested in studying biomedical engineering or neuroscience.

Next year's fairs will be in Orange County from March 20-22nd and Los Angeles from March 22-24th and Orange County.



Second Prize Winner Annie Benedict at LACSEF

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2017 Elmer Carvey Scholarship

Contributed By Jeff Lince

The Southern California Chapter of the AVS Science and Technology Society (SCCAVS) currently administers a scholarship program for undergraduate students planning a career in the physical sciences. It is the **2017 Elmer Carvey Memorial Scholarship** -- established in honor of Elmer Carvey, an active member of the SCCAVS from 1964 until 1982.

This Scholarship is valid for undergraduate studies at any public four-year college in California, i.e. California State University or University of California. **The stipend is \$1,500 and may be used for tuition.** The award is for one year, but may be renewed. Applications are accepted from students in physics, chemistry, materials science and engineering. Applicants should be planning research in areas of interest to the SCCAVS, including surface and thin film science, nanotechnology, the understanding of materials properties, and the development of new materials and devices. (Biological sciences are generally not covered by this Scholarship unless the student's study area is interdisciplinary and involves areas of interest listed above.)

The application materials should be sent to one of the mailing addresses below. They must be received by July 1, 2017, for the 2017-2018 academic year. Scholarship recipients will be notified by August 1, 2017. The link below gives information concerning the scholarship and our Chapter, as well as the application form. If you have any questions, please contact us at info@sccavs.org.

Jeff Lince
The Aerospace Corporation
PO Box 92957, Mail Stop M2-271
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The Scholarship application may be found here: <http://sccavs.org/CarveyScholarshipApplication.pdf>

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June/July 2017

Sun	Mon	Tue	Wed	Thu	Fri	Sat
25	26	27	28	29	30	1
2	3	4 <i>Happy July 4th</i>	5	6	7	8 ^o <i>Full Moon</i>
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 [•] <i>New Moon</i>	24	25	26	27	28	29
30	31	1 <i>Chapter Meeting</i>	2	3	4	5

AVS[®] Science and Technology
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2017 SCCAVS Short Course Registration Now Open

AVS Southern California Chapter Short Course Program
 Holiday Inn Buena Park Hotel & Conference Center
 7000 Beach Blvd.
 Buena Park, CA 90620

October 2-4, 2017,

Class Hours – 8:30 a.m.-5:00 p.m.
 Breaks: 10:00 a.m. and 2:30 p.m.
 Lunch: 12:00-1:00 p.m. **Included**

EARLY REGISTRATION DEADLINE: September 3, 2017

<https://www2.avs.org/shortcourses/schedule/sccavs/regform.html>

****FOR COURSE AVAILABILITY CONTACT:**
 Heather Korff, 530-896-0477, heather@avs.org

Monday, October 2	Tuesday, October 3	Wednesday, October 4
Fundamentals of Vacuum Technology (Day 1)	Fundamentals of Vacuum Technology (Day 2)	N/A
Operation and Maintenance of Vacuum Pumping Systems (Day 1)	Operation and Maintenance of Vacuum Pumping Systems (Day 2)	Vacuum Leak Detection
Evaporation for Thin Film Deposition	Sputter Deposition	Atomic Force and Scanning Tunneling Microscopy

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