

# H · V · I · S

H Y P E R V E L O C I T Y I M P A C T S O C I E T Y

## President's Welcome



*Welcome to our summer 2014 newsletter. This newsletter contains information regarding several key upcoming events and activities that you as a member of the Hypervelocity Impact Society can help with.*

*Remember, this is your Society and it needs YOUR support and involvement.*

*Here is what you will find in this newsletter:*

- ★ *HVIS2015 – Mark it on your calendar!*
- ★ *Call for Nominations for the HVIS Board of Directors*
- ★ *A Society Leader Retires*
- ★ *Special Interest Feature: The Two-Faced Moon*
- ★ *Call for Distinguished Scientist Award Nominations*
- ★ *Call for Alex Charter Student Scholar Nominations*

*This Newsletter comes at the beginning of the countdown to HVIS2015, which will be held April 26-30 2015, in Boulder, Colo. The organizing committee has put together an exciting program that not only ensures that your research interests are addressed, but is also highly diverse to meet your professional development needs. Your HVIS Board and Conference Committee members are here to serve you, and look forward to seeing all of you in Boulder next spring!*

*Sincerely yours,  
Dave Lambert*

## HVIS 2015

The Board of Directors of the Hypervelocity Impact Society is pleased to announce that the 13th Hypervelocity Impact Symposium will be held April 26-30, 2015 in Boulder, Colo. This Symposium serves as the principal forum for the discussion, interchange and presentation of the physics of high- and hypervelocity impact and related technical areas. It is intended for scientists, engineers, and technical managers from academia, industry, government and defense programs.



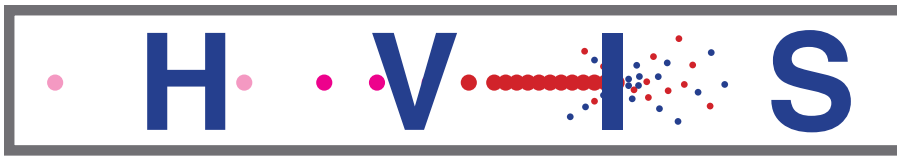
The HVIS Symposia have a long-standing international reputation as a catalyst for stimulating research in this area through a wealth of oral and poster presentations, and commercial exhibits. The Symposium's proceedings are the major archival source of papers published in this field. Oral and poster presentations will be made in the following technical areas:

- **Hypervelocity Phenomenology Studies**
- **High-Velocity Launchers and Diagnostics**
- **Spacecraft Meteoroid/Debris Shielding and Failure Analyses**
- **Material Response (including EOS)**
- **Fracture and Fragmentation**
- **High-Velocity Penetration Mechanics and Target Response**
- **Armor/Anti-Armor and Ballistic Technology**
- **Analytical and Numerical Methodologies**
- **Theoretical/Applied Mechanics Relevant to Hypervelocity Impact**

A special session in the topical area of Asteroid Impact and Planetary Defense Technology is also being planned. This special session will include a full afternoon of papers devoted to this topic, including a

*(continued on the next page)*

# Call for nominations



## BOARD OF DIRECTORS

The Nominations Committee is beginning the process of selecting a list of six candidates to stand for election to the HVIS Board of Directors. The committee normally begins with a long list of 25-35 potential candidates and pares the list down to the final six by means of a series of ballots. You, the membership, will then elect two new members to the Board from the final list of six candidates. The election will be held via e-mail ballots in the February-March 2015 timeframe.

Candidates for election to the Board of Directors must be current members of the Hypervelocity Impact Society. It is desired that the Board of Directors reflects and represents the membership and interests of the Society to as great a degree as possible with a limited number of members. Board members are elected for three terms. A term is defined as the period between successive Symposia.

At this time you are invited and encouraged to take an active part in your Society by submitting the names (simply by sending an email to [Sikhanda.s.satapathy.civ@mail.mil](mailto:Sikhanda.s.satapathy.civ@mail.mil)) of outstanding candidates (including yourself!) that you would like to have included in the initial long screening list that will be considered by the Nominations Committee.

To be considered, we must receive your nominations for the initial list by **Aug. 31, 2014.**

Please note that candidates for the Board of Directors may also be included on the ballot by submitting a petition signed by 14 members (10%) of the Society. The deadline for receipt of candidates nominated by petition is **Nov. 30, 2014.**

The current members of the Board are:

- **David E. Lambert**, President
- **James D. Walker**, Past-President
- **Todd W. Bjerke**, Secretary-Treasurer  
*(Term ends at HVIS2015)*
- **Charles E. Anderson, Jr.**
- **Lalit C. Chhabildas**  
*(Term ends at HVIS 2015)*
- **Brett R. Sorensen**  
*(Term ends at HVIS 2015)*
- **David L. Littlefield**
- **William P. Schonberg**
- **David L. Dickinson\***  
*(Term ends at HVIS 2015)*
- **Frank K. Schäfer\***  
*(Term ends at HVIS 2015)*

Thank you for your participation, and we look forward to receiving your nominations!

\* To be replaced by new Board members by this election

## HVIS 2015 continued...

plenary speaker as well as a panel discussion related to nuclear deflection/disruption options. Companies are also invited to exhibit during the Symposium. Space is limited to 10 exhibitors, so make your plans early!

The Symposium venue is the **St. Julien Hotel & Spa** ([www.stjulien.com/](http://www.stjulien.com/)). Not only does it feature world class accommodations and facilities, but it is also just a short walk away from the famous Boulder Pearl Street Mall.

The Symposium Co-Chairs are **William Schonberg** (Missouri S&T) and **Timothy Maclay** (Celestial Insight); the Technical Program Co-Chairs are **Joel Williamsen** (IDA) and **Steve Evans** (NASA). Commercial Exhibits are being coordinated by **William Reinhart** (Sandia). More information on the Symposium, including contact information, hotel reservations, schedules, commercial exhibits, and timelines can be found at the Symposium website, [hvis2015.mst.edu](http://hvis2015.mst.edu).

We are looking forward to seeing you all in Boulder next year!

Also, be sure to "like" our Facebook page and stay connected as the details and speakers become available for this conference!



[www.facebook.com/HVIS2015](http://www.facebook.com/HVIS2015)

# Dr. Lalit Chhabildas

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Chhabildas

**Dr. Lalit Chhabildas**, long-time society member and leader and world-renowned researcher in high pressure shock physics, retired in April 2014 from the Munitions Directorate of the Air Force Research Laboratory. Dr. Chhabildas retires as the Senior Scientist for Enhanced Energy Effects at Eglin Air Force Base, Fla. Many of you know of his innovative research contributions during his 30 years at Sandia National Laboratory. He had retired previously from the U.S. Department of Energy and then spent the past six years at Eglin Air Force Base establishing shock impact and energetic materials research programs for AFRL, as well as serving a critical function mentoring the technical and leadership staff.

Lalit was hired at Sandia National Laboratories in 1976 to develop the infrastructure (diagnostics, experimental techniques, etc.) necessary to allow the use of the two-stage light-gas gun for high precision high-pressure high-temperature research on

materials. One underlying theme of his research has always been to enhance the capabilities of the gun beyond merely being able to conduct equation of state studies. Not only has the gun's projectile velocities been enhanced to 19 km/s — almost three times the two-stage light-gas gun operational capability — he has also diversified and enlarged the research discipline and topics in which the gun is used. Examples include using normal impact techniques to induce multi-dimensional loading, quasi-isentropic loading, intermediate strain-rate loading, fracture and fragmentation, shock-induced melting and vaporization — just to name a few.

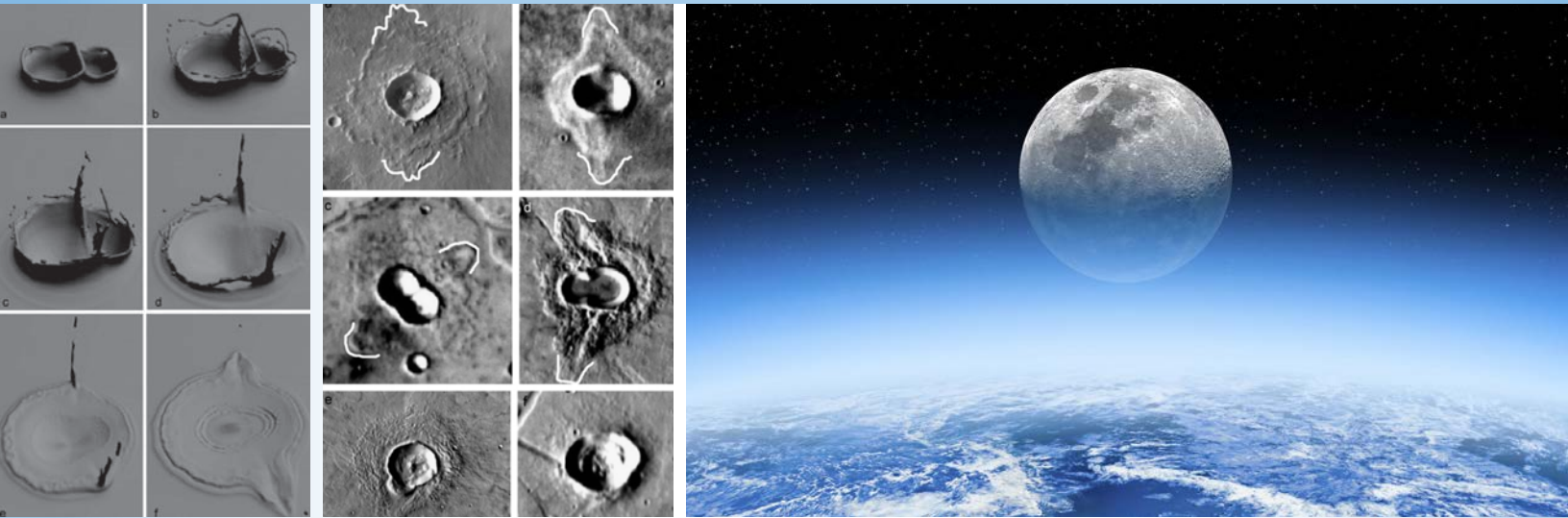
Dr. Chhabildas has many professional distinctions and awards, including induction as technical Fellow in the American Physical Society (APS) and Aeroballistics Range Association (ARA). He is a past President, Secretary/Treasurer and currently on the Board of Directors for the Hypervelocity Impact Society (HVIS). Dr. Chhabildas has been awarded HVIS'

honored Distinguished Scientist Award, as well as ARA's highest honor, the Ballistics Award. He has been very active as chairman, plenary and invited lecturer for these and other professional conference events.

Most recently, Dr. Chhabildas has led the christening of yet another shock and impact related research capability, the High Pressure Particulate Physics (HP3) at Eglin AFB. This facility specifically addresses Air Force weapons research interests in survivable, high-performance energetic materials, in addition to pressure-shear loadings and materials equation of state.

When you see Lalit at HVIS2015, please be sure to congratulate him on his highly successful career and to wish him well during his retirement!

## *A society* **LEADER** *retires*



Special interest feature:

# The two-faced moon

Every now and then, we get to brag about the success of someone who was a student participant at a previous Hypervelocity Impact Symposium. An article entitled, "Asymmetric distribution of lunar impact basins caused by variations in target properties," co-authored by one such

former student participant — **Katarina Miljković** — recently appeared in *Science* (Vol. 342, pp. 724-726, 2013). This article was also highlighted in the January 2014 issue of *Physics Today*. The article explains the differences in impact cratering on the two sides of the Moon.



Miljković

Scholar at the 2007 Hypervelocity Impact Symposium (Williamsburg, Va.). At that time, she was a student of **Dr. Emma Taylor**, another Alex Charters Student Scholar (1996 HVIS, Freiburg, Germany).

During the past two years (and counting), Katarina has been heavily involved with the GRAIL lunar orbiter mission that mapped the gravity of the Moon to the highest precision ever. The GRAIL mission has provided fantastic data, and for the first time, an insight into the crustal and mantle properties of the Moon that are affected by or that had affected cratering mechanics and effects. Katarina and her coauthors used

numerical impact modeling by the hydrocode iSALE to explain why there are more large impact basins on the nearside of the Moon than on the far side. Apparently, the collapse of a transient impact crater is sensitive to the shear strengths of the crust and mantle, which are both temperature dependent. The collapse of the transient impact crater on the warmer, and thus weaker, near side results in a larger crater.

Emma Taylor was Katarina's supervisor for the first year of her Ph.D. study at the Open University in Milton Keynes, UK. Her thesis title was "Investigation of the dust around Europa by impact experiments and modeling." She mostly worked with the light-gas gun at the Open University, focusing on ejecta fragmentation during cratering into ice and rocks/minerals (mostly gypsum). The idea was to understand how meteoroid bombardment affects the surfaces of icy satellites (for example, Jupiter's moons) and how dust clouds form around bodies with no atmosphere. The application of that work can be used in the design of a dust detector design that could fly on a mission to Jupiter system someday.

Katarina has held post-doctoral research appointments first at Imperial College London modeling high velocity impacts (cratering, collisions) using iSale; then two years at Institut de Physique du Globe de Paris; and now at MIT, Department of Earth, Atmospheric and Planetary Sciences, where she is collaborating on investigations using the GRAIL data.

Congratulations, Katarina, on a fantastic career and on your recognition in *Science* and in *Physics Today*!

# Call for nominations

## DISTINGUISHED SCIENTIST AWARD

The Hypervelocity Impact Society (HVIS) Awards Committee administers awards on behalf of the Society to recognize distinguished service and activity in the field of hypervelocity impact. The Distinguished Scientist Award is presented at the Hypervelocity Impact Symposium to an individual or research team for significant and lasting contributions to the field of hypervelocity science. The award consists of a plaque citing the accomplishments of the award winner and a monetary award of an amount set by the Board of Directors. The recipient(s) also becomes an Honorary Member of the Society, i.e., a lifetime member with all the privileges and responsibilities of a regular member except that dues are waived.

Formal letters of nomination are now invited for the Distinguished Scientist Award. Award candidates may be nominated by anyone who has been involved in hypervelocity impact science and engineering, not just Society members. In preparing the letter of nomination, nominators should include supporting information about the candidate, should address the candidate's technical recognition within the community, highlight the importance of their work and its contribution to hypervelocity science, and describe the

nominated individual's personal contribution and service to the technical field of hypervelocity impact. The Awards Committee would like to see the widest participation from the scientific community in nominating a Distinguished Scientist whose contributions reflect the talents of researchers around the world.

A list of previous award recipients and a description of their contributions is provided below. Unsuccessful nominees from the 2010 and 2012 Symposia will automatically be considered for the award at the 2015 Symposium. Nominations can be submitted via post or email to:

### **Dr. Shannon Ryan**

Defence Science and Technology Organisation  
506 Lorimer St., Fishermans Bend, VIC 3207  
Australia  
*Email: shannon.ryan@dsto.defence.gov.au*

Nominations must be received no later than **Oct. 3, 2014**.  
Questions about the award should also be directed to Dr. Ryan.

## List of Past Winners

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### **Alexander C. Charters (1989)**

Aeroballistic range design; spark photography; projectile aerodynamics; two-stage light-gas gun technology; hypervelocity impact; and, terminal ballistics

### **Alois J. Stilp & Volker Hohler (1992)**

Hypervelocity launch techniques; two-stage light-gas gun technology; sabot technology; penetration mechanics; hypervelocity impact; and, dynamic response of materials

### **James R. Asay (1994)**

Time-resolved shock-wave diagnostics; strength of materials at high pressures, shock release techniques; high-pressure solid-liquid phase boundaries; and, kinetics of melting and vaporization

### **Burton G. Cour-Palais (1996)**

Hypervelocity impact; meteoroid and orbital debris threat environment; meteoroid and orbital debris shielding; engineering design equations for shielding; and, developer of the multi-shock shield concept

### **Hallock F. Swift (1998)**

Aeroballistic range design; high-speed photography; high-speed instrumentation; two-stage light-gas gun technology; hypervelocity impact; and, debris cloud dynamics

### **Charles E. Anderson, Jr. (2000)**

Penetration mechanics; numerical simulations of penetration; modeling dynamic material response; and, terminal ballistics

### **Dennis L. Orphal (2003)**

Penetration mechanics; fundamental studies in hypervelocity impact; innovative hypervelocity projectile concepts; reverse ballistics experimentation; and, cratering dynamics

### **Lalit C. Chhabildas (2005)**

Experimental shock physics; high-pressure dynamic response of materials; three-stage hypervelocity launcher; shock-induced vaporization; isentropic and multi-axial loading techniques

### **Gordon R. Johnson (2007)**

Large distortion, explicit, nonlinear finite element code development; Lagrangian meshless methods; development of computational material constitutive models; dynamic material response; and, armor/anti-armor applications

### **Peter H. Schultz (2010)**

Solar system impact cratering, atmospheric effects on impact cratering and ejecta; oblique hypervelocity impacts; impact flash spectroscopy; particle-image velocimetry of ejecta; and, electromagnetic properties of hypervelocity impact

### **Andrew J. Piekutowski (2012)**

Two-stage light-gas gun experimentation; debris cloud dynamics; imaging of debris clouds; experimental penetration mechanics; and, three-stage light-gas gun development

# Alex Charters Student Scholars

## CALL FOR NOMINATIONS

### The Hypervelocity Impact Society is pleased to announce a call for nominations to the Alex Charters Student Scholars (ACSS) Program.

The ACSS program provides conference registration and travel reimbursement support to selected students for attendance at the 2015 Hypervelocity Impact Symposium. HVIS2015 will be held in Boulder, Colo., during the week of April 26, 2015 ([hvis2015.mst.edu](http://hvis2015.mst.edu)).

● **ELIGIBILITY:** Students currently enrolled full-time in an academic institution at the time of the conference and interested in hypervelocity impact phenomena are eligible for nomination to the Alex Charters Student Scholars Program. This program is aimed primarily at graduate students, although undergraduate students may also apply.

● **AWARD PACKAGE:** Each student selected as Alex Charters Student Scholars will receive travel reimbursement support for attendance at HVIS 2015 (reimbursement for transportation and lodging expenses only). Alex Charters Student Scholars will also receive complementary conference registration and a copy of the conference proceedings (a \$700.00+ value).

● **HOW TO SUBMIT NOMINATIONS:** The nomination must be submitted by the student's academic advisor, on the letterhead of the academic institution. The nomination is limited to a maximum of three pages, and must include the following items:

- names, addresses, email addresses, and telephone numbers of both the student and the advisor
- a brief overview of the student's academic background and record
- a discussion of why the symposium would be helpful to the student

Nominations submitted after the deadline or exceeding the three-page limit will not be considered. Send completed nominations (by postal mail or e-mail) to:

#### Dr. Ronald E. Brown

Research Professor, Physics Department  
Naval Postgraduate School  
Monterey, CA 93943  
United States  
Email: [rebrown@nps.edu](mailto:rebrown@nps.edu)

Nominations must be received **no later than 31 Oct. 2014**.

Alex Charters Student Scholars will be selected based on a review of the nominations by the HVIS Educational Outreach Committee. Questions on the program may also be directed to Dr. Brown.



HVIS is devoted to the advancement of the science and technology of hypervelocity impact and related technical areas that facilitate an understanding of hypervelocity impact phenomena.

### HVIS Committee Chairs

#### Awards Committee

Administers awards on behalf of the Society in recognition of distinguished service and activity in the field of hypervelocity impact.

**Shannon Ryan**

Email: [shannon.ryan@dsto.defence.gov.au](mailto:shannon.ryan@dsto.defence.gov.au)

#### Educational Outreach Committee

Administers the HVIS Alex Charters Student Scholar Program, whose purpose is to provide travel reimbursement support for students to attend the Hypervelocity Impact Symposia.

**Ronald Brown**

Email: [rebrown@nps.edu](mailto:rebrown@nps.edu)

#### Membership Committee

Promotes membership in the Society.

**Brooke Myers**

Email: [brooke.myers@du.edu](mailto:brooke.myers@du.edu)

#### Nominations Committee

Responsible for nominating candidates for election to the Board of Directors of the Society.

**Sikhanda Satapathy**

Email: [sikhanda.s.satapathy.civ@mail.mil](mailto:sikhanda.s.satapathy.civ@mail.mil)

#### Publications Committee

Assists in the preparation and dissemination of materials for the benefit of the Society.

**John Borg**

Email: [john.borg@mu.edu](mailto:john.borg@mu.edu)

#### Site Selection Committee

Charged with developing prospective hosts for future Symposia.

**Gene Hertel**

Email: [esherte@sandia.gov](mailto:esherte@sandia.gov)