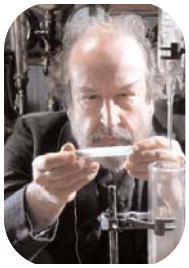

***Absolute Zero*** premiered in January 2008 on the award-winning PBS science series NOVA. Based largely on Tom Shachtman's acclaimed book, *Absolute Zero and the Conquest of Cold*, the two television specials demonstrate how civilization has been profoundly affected by the mastery of cold.

Underwritten by the National Science Foundation and the Alfred P. Sloan Foundation, ***Absolute Zero*** is a unique blend of science, cultural history and adventure story. The PBS specials feature the struggles of philosophers, scientists and engineers over four centuries as they attempted to understand the nature of cold, to explore its deepest reaches, to create the "cold technologies" that have transformed society and to seek a deeper understanding of matter itself. ***Absolute Zero*** became one of the highest rated NOVA specials over the last decade.

## National Educational Outreach & Promotion Campaign

Devillier Communications, Inc., (DCI) was responsible for creating and executing a successful national outreach campaign on behalf of ***Absolute Zero***. The campaign, which took place over a two-year period, had four major objectives:

- Introduce some of the most important scientific breakthroughs and human achievements in this relatively unknown field of low-temperature physics.
- Engage the American audience in a story that touches their lives in innumerable ways while generating the greatest possible audience for ***Absolute Zero***.
- Serve as a catalyst for community-based collaboration and partnerships with science museums, libraries, schools, PBS stations and related organizations.
- Actively engage science professionals, researchers and technicians in public outreach and education



In order to accomplish these goals, DCI working in collaboration with the University of Oregon, Twin Cities Public Television, Windfall Films and Meridian Productions, undertook the following strategies.

# THE ABSOLUTE ZERO NATIONAL PARTNERSHIP PROGRAM

A key element of the national campaign was the creation of a National Partnership Program that drew upon the leadership of national scientific, educational, governmental, and professional organizations that support science education and have a particular expertise in low-temperature physics. The strategic alliance served as an essential building block for the national outreach effort.

On behalf of ***Absolute Zero***, DCI enlisted the support of twenty-one prestigious organizations as National Partners or National Participants.

They included professional physics associations, such as the American Institute of Physics, the Acoustical Society of America, the American Physical Society, the Cryogenic Society and the National Society of Hispanic Physicists; major scientific institutions, such as the National High Magnetic Field Laboratory at Florida State University and Los Alamos National Laboratory and the Center for Ultra Cold Atoms (MIT); educational groups including The American Association of Physics Teachers, The National Science Teachers Association, the Society of Physics Students, the Society for Advancement of Chicanos and Native Americans in Science and the National Alliance of State Science and Mathematics Coalitions; informal educational organizations, such as the Association of Science-Technology Centers and TryScience.org and *USA TODAY* Education and major Federal agencies including the National Institute of Standards and Technology (NIST) and the Department of Energy.

**National Partners and Participants:**

- Served on the National Awareness Advisory Committee, which provided ongoing guidance on behalf of the campaign.
- Suggested content for the ***Absolute Zero*** educational outreach materials and invited ***Absolute Zero*** team members to make presentations at their annual meetings and conferences.
- Participated as campaign spokespersons and promoted ***Absolute Zero*** in their internal publications (newsletters and magazines) and on their respective Web sites.
- Encouraged their members to participate in outreach activities in collaboration with PBS stations and other community groups.
- Recommended well-respected low-temperature experts and educators to serve as ***Absolute Zero*** *Experts*.
- Were featured on the ***Absolute Zero*** Website and profiled in the quarterly ***Absolute Zero*** Newsletter.

Throughout the campaign, Partners and Participants conducted a variety of outreach initiatives aimed at educators and students across the country. For example, The Center at the National High Magnetic Field Laboratory based at Florida State University, provided an ***Absolute Zero*** *Expert* and featured the program at its bi-annual Open House that was attended by thousands of students, parents and teachers.

The National Science Teachers Association in association with the National Institute of Standards and Technology (NIST) featured an informative and inspiring presentation by their Nobel Laureate William Phillips. The interactive Webcast, which was promoted to over 80,000 science teachers, continues to be featured on NSTA's Web site: www.nsta.org.

**NSTA Web Seminar:**
**Absolute Zero: The Cold, Hard Facts About the Coolest Stuff in Physics**

**Dr. William D. Phillips**
William D. Phillips received a Ph.D. from MIT in 1976. After two years as a Chaim Weizmann postdoctoral fellow at MIT, he joined the National Institute of Standards and Technology (NIST) (then the National Bureau of Standards) in 1978. He leads the Laser Cooling and Trapping Group in the Atomic Physics Division of NIST's Physics Laboratory. The group has developed many of the techniques for cooling, trapping and manipulating atoms that are in general use around the world. In 1997 Phillips shared the Nobel Prize in Physics "for development of methods to cool and trap atoms with laser light."

NIST also sponsored an ***Absolute Zero*** presentation by Nobel Laureate William Phillips at the Parkland Magnet Middle School for Aerospace Technology in Rockville, Maryland in early 2007. The "Science of Cold", was seen by the entire student body, their teachers, local officials including Jerry Weast, Superintendent of Montgomery County Public Schools, U.S. Representative Chris Van Hollen and NIST Acting Director James Turner. NIST continues to encourage teachers to order free DVDs of the presentations viatheir organizational Web site (www.NIST.gov).

***Absolute Zero*** team members were invited to make presentations at a number of national meetings hosted by National Partners and Participant such as the American Association of Physics Teachers (AAPT), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the Cryogenic Society of America as well as related meetings conducted by AAAS and the Applied Superconductivity Conference.

## CAMPAIGN WEB SITE

The companion website, **www.absolutezerocampaign.org** served as the nerve center for the outreach campaign. It was a place where students, teachers, parents and others could learn more about this unique field of scientific endeavor. Teachers and informal educators were able to download carefully designed teaching modules, a low-temperature timeline, biographies of important historical figures, related graphics and even student games. The Web site featured ***Absolute Zero*** *Experts* and was linked to the Web sites of the National Partners and to NOVA.

"National Partners & Participants rated the *Absolute Zero* Campaign Web site as very useful both to their work and for teachers and informal educators of middle school students."

*-- Goodman Research Group, Inc. 2008*

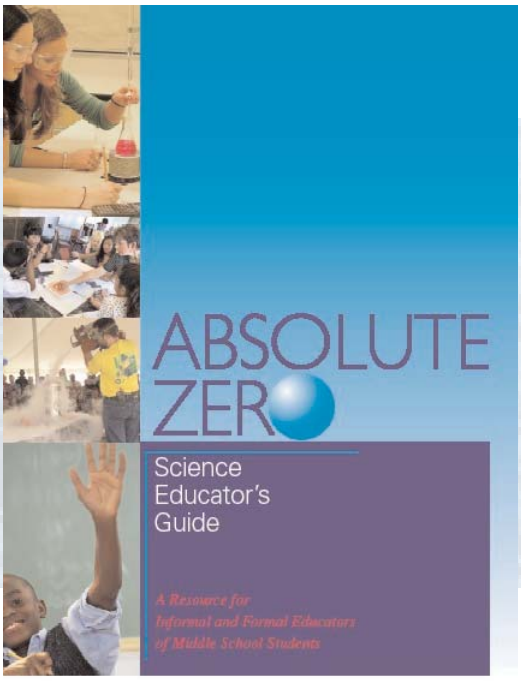
## ABSOLUTE ZERO EDUCATIONAL MATERIALS

In collaboration with the National Partners, DCI produced two unique educational guides that served as the cornerstone of the outreach campaign. The ***Absolute Zero*** guides were created for use in classrooms, in science centers, museums and libraries, by PBS stations and other community organizations. The guides, which were downloadable on the Web site, were aligned with the National Science Education Standards and included an extensive list of low-temperature resources.

The *Absolute Zero Community Education Outreach Guide* is a resource for teachers and informal educators of middle school students. Drawing from the history of the human quest to explore the cold, this guide focuses on topics – from historical attempts to understand the physics of heat to modern day magnetically levitating trains – that are covered in the programs. The Educational Outreach Guide provides suggestions on how to engage young people in supplemental school activities, including fascinating hands-on demonstrations.

Also written in collaboration with low-temperature physicists and classroom teachers, the *Absolute Zero Science Educator's Guide* offers additional suggestions on how best to engage students in science and low-temperature physics while underscoring the importance of the process of scientific inquiry.

***Absolute Zero*** Guides are available on the ComPADRE Pathway, a part of the National Science Digital Library. (www.comPADRE.org.)




"The Partners/ Participants involved in the development of the ***Absolute Zero*** guides were quite pleased both with the process used in producing the outreach guides and their organization's role in the process."

*-- Goodman Research Group, Inc. 2008*

## ABSOLUTE ZERO EXPERTS

Students and Teachers at an educational presentation at the Jefferson Lab in Virginia.

Another integral part of the national outreach campaign was an informal Speakers Bureau comprised of experts in the field of low-temperature physics. Recommended by National Partners and Participants, the ***Absolute Zero*** *Experts* helped to spread the word in formal and informal settings, agreed to serve as mentors and to enlist the support of their colleagues in this important endeavor. They also incorporated ***Absolute Zero*** materials in their regular educational presentations. They included:

Dr. Dennis Clougherty, professor of physics at the University of Vermont, is a theoretical condensed matter physicist. Dr. Clougherty works in the field of superconductivity and the quantum sticking and evaporation of ultracold atoms and molecules.

Dr. David G. Haase, professor of physics and Director of the Science House, which is based at North Carolina State University. The Science House is a national model of university collaboration with K-12 schools. Its extensive outreach program regularly connects with more than 5,000 teachers and 20,000 students across the state. ***Absolute Zero*** materials were disseminated throughout North Carolina.

Dr. Eric Palm, Millikelvin Facility Chief at the National High Magnetic Field Laboratory, has been conducting experiments in low-temperature for two decades. He incorporated ***Absolute Zero*** materials in all of his classroom demonstrations ranging from elementary through high school settings throughout northern Florida.

Dr. John Pfotenhauer, professor, department of engineering physics, University of Wisconsin is a member of ASME, ASEE, APS and the Cryogenic Society of America. He disseminated ***Absolute Zero*** materials to high school teachers throughout Madison and incorporated ***Absolute Zero*** in his low-temperature demonstrations at the University.

Dr. Roberto Ramos, assistant professor of physics at Drexel University, serves as faculty advisor to physics students. He featured ***Absolute Zero*** at a Drexel University Open House for 500 high school students and incorporated ***Absolute Zero*** materials in his classes.

Dr. Dwight Whitaker, assistant professor of physics, Williams College, incorporated ***Absolute Zero*** in his middle school and high schools presentation in Williamstown, Mass.

## ABSOLUTE ZERO EXPERT VIGNETTE:

### Superconductivity in Southern Mississippi

Dr. Alina Gearba, Assistant Professor of physics at University of Southern Mississippi and ***Absolute Zero*** *Expert*, led demonstrations on the science of cold at approximately 20 high schools in Southern Mississippi, including high schools that do not have physics classes. Dr. Gearba had college students from her laboratory join her during these demonstrations, often visiting the high schools from which they graduated. She primarily chose demonstrations from the *Absolute Zero Community Education Guide*, including those involving liquid nitrogen and those related to superconductivity.

Alina Gearba and USM physics student Jeff Varnado demonstrate low-temperature experiments to a high school class in Mississippi.

Dr. Gearba was invited for repeat visits. She noted that her student audiences were always larger the second time. Principals began to notice that "physics isn't boring; it's neat." One high school teacher noted that students "were enthusiastic about the frozen demonstrations; they talked about absolute zero for weeks after the demo." Dr. Gearba estimates that she reached over 1,000 students in Southern Mississippi during the campaign.

*---Goodman Research Group, Inc. 2008*

*"The national educational outreach and promotion campaign exceeded our expectations. It was a real pleasure working in collaboration with Linda Devillier and her very professional and talented team."*

--- Dr. Russell Donnelly, Professor of Physics and Director of the Cryogenic Helium Turbulence Laboratory, University of Oregon &
Principal Investigator and Advisory Committee Chair for *Absolute Zero*.