Intel Science Talent Search

2005 Science Talent Institute
March 10-15, 2005

The Intel Science Talent Search (Intel STS), America's oldest and most highly regarded pre-college science competition, provides an incentive and an arena for U.S. high school seniors to complete an original research project and have it recognized by a national jury of highly regarded professional scientists. The projects are a result of inquiry-based learning methods designed to nurture critical reasoning skills, experience science through the use of the scientific method and to demonstrate how math and science skills are crucial to making sense of today's technological world and making the best decisions for tomorrow.

The 40 Finalists of the 2005 Intel Science Talent Search, who will be competing for $530,000 in scholarships, represent about 2.5 percent of those who completed entries in this scientific and educational competition. These 15 females and 25 males are awarded an all-expense-paid trip to Washington, D.C. to attend the Science Talent Institute, March 10-15, 2005. Each Finalist who participates in the Science Talent Institute will receive an Intel® Centrino™ mobile technology notebook computer and a scholarship of at least $5,000. Ten of the Finalists will be selected by the board of judges to receive one of the following four-year scholarships: First Place: $100,000, Second Place: $75,000, Third Place: $50,000, Fourth - Sixth Places: $25,000, and Seventh - Tenth Places: $20,000.

The Finalists are 16 to 18 years of age and come from 35 schools in 15 states. Chosen from among 1600 entrants, they submitted a report on their scientific research, the official entry form and supporting documents. Completed entries were received from 47 states, the District of Columbia, Puerto Rico and two overseas schools. *Finalist ages in this publication are as of March 15, 2005.*

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INTEL SCIENCE TALENT SEARCH

"Finding Tomorrow's Scientists"

History

Created in 1942 by Science Service, one of the most respected non-profit organizations advancing the cause of science, as a means for encouraging talented high school students to pursue a career in science, math, engineering and medicine, the Science Talent Search has become an American institution.

The Science Talent Search has recognized over 2500 finalists with more than $5 million in scholarships. Alumni of the STS include more than 100 recipients of the world's most coveted science and math honors including three National Medal of Science winners, ten MacArthur Foundation Fellows, two Fields Medallists and six Nobel Laureates.

In 1998, Intel Corporation was named the new title sponsor of this competition that was formerly sponsored by the Westinghouse Foundation. Since assuming this role, Intel has significantly improved the STS by bringing back some of the traditions long associated with the program. Additionally, Intel increased awards and scholarships from $207,000 to $1,250,000.

Awards and Scholarships

Semifinalists Each of the 300 students named a semifinalist in the Intel STS will receive a $1,000 award for their outstanding science research. These awards will be mailed to the semifinalists after the Science Talent Institute (STI) in the Spring.

Schools Each school will receive an award of $1,000 for each Semifinalist named in the Intel STS. The award must be used to further support excellence in science, math or engineering education at the recipient school. In the case of home schooling, the awards will be given to the affiliated school or school district of the home school. The award will be mailed to the school after the STI in the Spring.

Finalists The top prize will be a $100,000 four-year scholarship. The second place finalist will receive a $75,000 scholarship and the third-prize winner will go home with a $50,000 scholarship. Fourth- through sixth-place finalists each receive a $25,000 scholarship; seventh- through tenth-prize winners will receive a $20,000 scholarship. The remaining 30 finalists will receive a $5,000 scholarship award. In addition to the scholarship awards, each of the finalists participating in the Science Talent Institute will receive an Intel® Centrino™ mobile technology notebook computer.

The Process

Each year, over 1500 seniors enter the Intel Science Talent Search. Each completed entry consists of the student's written report on their scientific research, the lengthy official entry form that elicits evidence of student creativity and interest in science, and supporting documents.

All Intel Science Talent Search entries are reviewed and judged by top scientists from a variety of different disciplines. The top 300 entrants are selected as semifinalists, and from these 300 semifinalists, 40 finalists are chosen to attend an all-expense-paid trip to Washington, D.C. to the Science Talent Institute (STI), where they will undergo final judging. On the basis of a rigorous round of interviews, 10 top scholarship winners are selected.

While in Washington, DC, students meet leading scientists and visit places of historic and political importance. Past winners have met with the President and First Lady, the Vice President and distinguished science advisers. The young scientists display their prize-winning exhibits at the prestigious National Academy of Sciences, where they describe their research to thousands of visitors—many of them important figures in governmental and scientific communities. Many others studying the exhibits are highly motivated students who are planning to enter the Science Talent Search in their senior year.

While the purpose of the Science Talent Institute is the science competition, the students say they most value the opportunity to meet and interact with their scientific peers, often for the first time. Friendships and professional associations made during the STI week continue through and beyond college.

State Representation in STS Since 1942

Since 1942, New York State has produced the majority of finalists, accounting for 863 or 33%. California is in second place with 184, followed by Illinois with 157; Pennsylvania, 103; Florida, 96; Maryland, 87; New Jersey, 84; Virginia, 83; Massachusetts, 82; Ohio, 79; Texas, 64; Wisconsin, 50; and Indiana, 47.

Other states that have produced at least ten finalists are Michigan, 39; Connecticut, 38; Oregon, 35; Minnesota, 34; Georgia, 28; Arizona, Colorado, Oklahoma 24 each; Missouri and the District of Columbia, 21 each; Washington, 20; Nebraska, 19; Iowa, Tennessee and West Virginia, 18 each; Alabama and New Hampshire, 17 each; Montana and New Mexico, 16 each; Kansas and Hawaii,14 each; North Carolina, 13; Louisiana, 11; and Mississippi, 10.

Intel Corporation

Intel's sponsorship of the Science Talent Search is part of the Intel® Innovation in Education initiative, a sustained commitment – in collaboration with educators and government leaders worldwide – to help today's students develop the higher-level thinking skills they need to participate and succeed in a knowledge-based economy. For more information, visit www.intel.com/education.

Michael Jeremy Barany

Roseville Area High School

MINNESOTA

Michael J. Barany, 17, of **Falcon Heights**, discovered possible new uses for silicon in organic synthesis reactions for his Intel Science Talent Search project in **chemistry**. Dithiasuccinoyl (Dts)-amines are sulfur and nitrogen-based chemicals used in medical and chemical safety applications. Synthesis of Dts-amines typically involves numerous steps, with low yields and many byproducts. Using spectroscopic techniques, Mike confirmed that with the inclusion of silicon, high-yield direct synthesis of Dts could be achieved using bis(chlorocarbonyl)disulfane and bis(trimethylsilyl)amine precursors. Mike presented his research at the 28th European Peptide Symposium in Prague, and will publish his results in the *Journal of the American Chemical Society*. Mike intends to study math or science at Stanford University and pursue a doctorate. First in his class of 498 at **Roseville Area High School**, Mike is captain of the debate team, has played on the tennis team and is active in the jazz band. He participated in the University of Minnesota Institute of Technology Honors Program, and received the Neal Kwong Youth Citizenship Award in 2003. His parents are Drs. George and Barbara Barany.

Ailish Elizabeth Bateman

Pierson High School

NEW YORK

Ailish Elizabeth Bateman, 17, of **Sag Harbor**, isolated and determined the structure of a novel antibiotic compound extracted from a beech tree fungus, *Scorias spongiosa*, commonly called sooty mold, for her Intel Science Talent Search project in **chemistry**. Ailish's demonstration – that the new isolated compound was effective in inhibiting the growth of several Gram-positive bacteria – could potentially lead to its use to successfully treat diseases. She determined the molecular structure of the new antibiotic compound, called scoriosin, using mass spectroscopy, nuclear magnetic resonance, correlation spectroscopy and infrared techniques. She then purified the compound using normal phase column chromatography. Her results are being prepared for scientific journal publication. Ailish is first in her class of 54 at **Pierson High School**, where she serves as president of the French club, editor of *Folio*, a student-written section of the community newspaper, and is on the varsity Quizbowl trivia team. She enjoys rollerblading and graphic design. After completing her university studies, Ailish hopes to pursue a career in scientific research. She is the daughter of Charles and Roisin Bateman.

David Lawrence Vigliarolo Bauer

Hunter College High School

NEW YORK

David Lawrence Vigliarolo Bauer, 17, of the **Bronx**, entered the Intel Science Talent Search with a **materials science** project that he believes has the potential to save thousands of lives by rapidly detecting and evaluating individual exposure to biochemical agents. Based on an understanding of the fundamental properties of fluorescent nanocrystals, known as quantum dots (QDs), David designed a new type of universal sensor for neurotoxins that recreates their actual effect in the body. His detection assembly uses QDs as a kind of "battery," while AChE or acetylcholinesterase, an enzyme that nearly all neurotoxins inhibit, functions like a "dimmer switch." The amount of energy transferred to an AChE-dye conjugate is used to determine if a neurotoxin is present. David is president of the science club at **Hunter College High School** in New York and won the Coach's Award in varsity fencing. He is co-author of a paper submitted to the *Physical Review B* of the American Physical Society, and founder of a nonprofit organization that works for social justice in Liberia. He is the son of Lawrence Bauer and Diane Vigliarolo and hopes to continue his studies at the CUNY Honors College.

Justin Scott Becker

Hendrick Hudson High School

NEW YORK

Justin Scott Becker, 18, of **Cortlandt Manor**, studied heart disease for his Intel Science Talent Search project in **medicine and health.** Individuals with hyperhomocysteinemia (HHcy) – elevated plasma levels of the amino acid homocysteine (Hcy) – have an increased risk of developing cardiovascular disease, but how the condition increases the risk is largely unknown. HHcy has been largely thought of as a blood vessel disease, but Justin theorized that it might also affect heart tissue. Using heart tissue from rats with HHcy, Justin tested his theory and found that elevated Hcy inhibits the ability of nitric oxide (NO), an essential regulating molecule, to control how much oxygen is consumed by the heart muscle. He also found that high levels of Hcy cause this by activating an enzyme called NADPH oxidase, and by blocking the enzyme normal NO activity is restored. First in his class of 193 at **Hendrick Hudson High School** in Montrose, Justin has perfect SAT scores. He is captain of the debate and varsity tennis teams and an All-State Violist. The son of Dr. Richard and Terry Becker, Justin has numerous awards and honors. He hopes to study biology and political science at Harvard.

Samuel Mohun Bhagwat

Winston Churchill High School

MICHIGAN

Samuel Mohun Bhagwat, 16, of **Livonia** aims at classifying determinantal sequences for his Intel Science Talent Search **mathematics** project. A determinantal sequence is a sequence a_n of nonzero integers, one for each integer n, where the determinant $a_n a_{n+3} - a_{n+1} a_{n+2}$ takes on the same fixed nonzero value d for all choices of n. All such sequences have two useful invariants, ± = $(a_0 + a_2)/a_1 = (a_2 + a_4)/a_3 = \ldots$ and ² = $(a_1 + a_3)/a_2 = (a_3 + a_5)/a_4 = \ldots$ The sequence is *reduced* if no prime integer divides all the odd-indexed entries, and no prime integer divides all the even-indexed entries; the reduced sequences are the basic building blocks for all others. For reduced sequences, ± and ² are integers, and Sam classifies the reduced cases when 0 d•±² d•4. For ± and ² outside this range, he shows there are only finitely many reduced sequences for each choice of *d*. The son of Dr. Ashok Bhagwat and Helen Gay, Sam studied guitar and his father's native language, Marathi, the last two summers in India. At **Winston Churchill High School** he is captain of the varsity Quiz Bowl team, and his awards include a Grand Award at the Science and Engineering Fair of Metro Detroit. Sam plans to attend Harvard.

Bruce Xiangji Brewington

Fairport High School

NEW YORK

Bruce Xiangji Brewington, 17, of **Fairport**, focused on laser fusion research for his Intel Science Talent Search project in **physics**. Bruce developed a complex computer program that solved an intriguing problem: how to locate and characterize defects in cryogenic laser fusion targets used in inertial confinement fusion, a technique being explored as a future option for power generation. Cryogenic targets are thin plastic shells (1 mm diameter) surrounding layers of deuterium (heavy hydrogen) ice. The more uniform and defect-free these layers are, the better the fusion performance. Shadowgraphs, however, often show defects with origins which are not understood because – until Bruce's program was developed – their locations were unknown. His program typically analyzes 50 shadowgraphs viewed from different directions, uses a new algorithm to combine information and creates a 3-D model showing locations, sizes and shapes of imperfections, which should ultimately lead to defect-free particles. Bruce is active in the math club at **Fairport High School** and has participated in *Magic: The Gathering* tournaments. He hopes to attend MIT and is the son of and Robert and Dr. Grace Brewington.

James Andrew Cahill

Flagstaff High School

ARIZONA

James Andrew Cahill, 18, of **Flagstaff**, investigated the possible existence of astronomically significant solar alignments within the Lomaki Pueblo, an eleventh century Anasazi ruin, for his **earth and planetary science** entry in the Intel Science Talent Search. He collected data for approximately one year, regularly observing a light portal at the Wupatki National Monument site in Northern Arizona. Through subsequent analysis of light/shadow interaction patterns, James discovered several alignments of astronomical significance, including sunset alignments on the equinoxes and alignments at the November and February cross quarter dates. He believes this could indicate that the site had served as an ancient solar calendar. His work was accepted for a poster presentation at the Oxford VII International Conference on Archaeoastronomy in June 2004, only the second time that a high school student has presented. James is co-founder of the cycling club at **Flagstaff High School**, where he lettered in cross country. He plays saxophone and guitar, and his hobbies include mountain bike racing and model aviation. The son of Dr. James and Nancy Cahill, he plans to study at the University of Arizona.

Sisi Monica Chen

Northview High School

GEORGIA

Sisi Monica Chen, 17, of **Duluth** studied the growth rate of the function $g(n)$, the least number of 1's needed to express n using only addition, subtraction and multiplication for her Intel Science Talent Search project in **mathematics**. For positive n she gives upper and lower bounds for this function in terms of n, and shows that $g(3^k) = 3k$. A related function $f(n)$ counts the least number of 1's if one does not allow subtraction, just addition and multiplication; the behavior of f is relevant for computation, but difficult to understand. Sisi shows that $f(n) > g(n)$ for infinitely many choices of n, and she shows that $f(n) = g(n)$ infinitely often. Sisi attends **Northview High School** where she is co-captain of the Science Olympiad team and, for the past two years, has been co-president of the Beta Club, which raised over $3,000 toward a cure for cystic fibrosis. She has earned awards for her performances in both viola and piano, and was nominated as the 2004 "Poet of the Year" by the International Society of Poets. Born in China, she is the daughter of Dr. Guantao Chen and Daoling Bi. Sisi plans to study mathematics and genetics at Harvard.

Stanley Shang Chiang

John L. Miller-Great Neck North High School

NEW YORK

Stanley Shang Chiang, 17, of **Great Neck**, researched quantum bits (qubits) and superconducting materials for tunable transformers for his Intel Science Talent Search **physics** project. Qubits, the fundamental units of the theoretical quantum computer, have been fabricated individually, but currently there is no mechanism to couple them in pairs so they can act in unison, as they would need to do in a quantum computer. For his project, Stanley designed and fabricated a tunable transformer to couple qubits, and he tested the resulting Josephson junctions in liquid helium at 4.2° K (-452° F). He concluded that the junctions are suitable for the transformer and could eventually serve as part of a quantum computer. At **John L. Miller-Great Neck North High School**, Stanley is co-captain of the chess team and co-editor of the yearbook. An accomplished pianist, he has performed at Carnegie Recital Hall and Steinway Hall. He holds numerous math, science and engineering awards, speaks Mandarin Chinese and Spanish fluently and is a former captain of the school's Spanish Jeopardy team. The son of Dr. Chien Kuo Chiang and Judy Chiang, Stanley hopes to attend Harvard or MIT.

Robert Thomas Cordwell

Manzano High School

NEW MEXICO

Robert Thomas Cordwell, 17, of **Albuquerque**, submitted his **mathematics** project for the Intel Science Talent Search in graph theory. Bob's project considers ways to partition the complete graph K_n on n vertices into subgraphs; he considers edge partitions, one in which each edge of K_n lies in exactly one subgraph. To describe this, he represents K_n as the vertices of a regular polygon with n sides, joining all the vertices with straight lines. He requires all subgraphs to be cycles, which is only possible when n is odd. A cycle which does not intersect itself is called *inclusive* if it goes around the center of the n-gon; otherwise it is *exclusive*. Bob proves that K_n can be partitioned into inclusive cycles of lengths 3 and 4 for any odd n. If $n + 1$ or $n - 1$ is divisible by 8, he shows that K_n can be partitioned into exclusive 3-cycles as well. Bob, who has perfect SAT scores, is first in his class of 343 at **Manzano High School**. A second generation Eagle Scout, he has won numerous awards, including the Rensselaer Medal. The son of Dr. William and Rosemary Cordwell, Bob plans to major in mathematics and computer science at the University of Chicago.

Timothy Frank Credo

Illinois Mathematics & Science Academy

ILLINOIS

Timothy Frank Credo, 17, of **Highland Park**, studied the speed of secondary particles of light and particle detectors for his Intel Science Talent Search **engineering** project. Tim sought to develop a more precise method to measure the time in picoseconds (10^{-12} seconds) that it takes charged secondary particles of light (such as, pions, kaons, and protons) to travel. To do so, he designed the anode for a particle detector's multi-channel plate. His research proposes a new time-of-flight (TOF) system whereby an energetic secondary particle traversing a microchannel plate window produces Cherenkov light. (Cherenkov light is caused when charged particles move faster than the speed of light.) Tim, as primary author, made a poster presentation of his project at the 2004 IEEE Nuclear Science Symposium in Rome. At the **Illinois Mathematics and Science Academy** in Aurora, Tim is a varsity swimmer and participates in the junior academy of science. In his spare time, he enjoys cycling, guitar, piano and economics. He reads French fluently and earned a perfect score of 1600 on his SATs. The son of Dr. Robert and Margaret Credo, Tim hopes to major in physics at Stanford.

Stephen Jacob DeVience

Notre Dame High School for Boys

ILLINOIS

Stephen Jacob DeVience, 18, of **Chicago**, designed, developed and demonstrated the functional feasibility of a novel photoelectric effect spectrophotometer (PES) based solely on the use of a reverse-biased phototube for his Intel Science Talent Search in **engineering**. While working in the laboratory he constructed in his home basement, Steve built his PES with no mechanical parts – only a phototube – making his device a rugged substitute for the generally delicate and expensive conventional instrument used today (which consists of a monochromator with prisms, gratings and diodes) that researchers use to identify chemicals and their relative concentrations. Steve believes his PES can be built more cheaply than the devices currently available. Steve is first in his class of 195 at **Notre Dame High School for Boys** in Niles, where he serves on the yearbook staff, performs community service with the Hesburgh Scholars Program and was an all-state biology winner in a Worldwide Youth in Science and Engineering competition. His ambitions are to attend MIT in preparation for a career in biological engineering, and researching new drugs and vaccines. Steve's parents are Mark and Andrea DeVience.

Joline Marie Fan

Upper Arlington High School

OHIO

Joline Marie Fan, 17, of **Columbus**, studied the drag reduction phenomenon created by the interaction of acoustic waves on the motion of mesobubbles in both reactive and non-reactive flow systems for her **engineering** project in the Intel Science Talent Search. Her previously patented "Gas Ejector" system design and its accompanying drag reduction application enable the production and injection of microbubbles into a gas-liquid system. Used in combination with an acoustic transducer in both vertical column and horizontal pipe flow systems, Joline was able to excite the mesobubbles attracted to the node region of the wave (unlike the smaller microbubbles), thereby increasing the bubbles' transport activity and the flow rate of the system. Her findings could increase efficiency of heating and cooling systems, chemical reactors and the de-oxygenation of water in fruit juice production. The daughter of Drs. L. S. Fan and Sue Weng, Joline is first in her class of 482 at **Upper Arlington High School**, where she has won numerous awards in music, fencing and debate. Co-author on two journal publications, Joline plans to attend Princeton, study chemistry and pursue a doctorate.

Michael Andrew Forbes

Montgomery Blair High School

MARYLAND

Michael Andrew Forbes, 17, of **Silver Spring**, submitted a **computer science** project to the Intel Science Talent Search concerning a type of vehicle routing algorithm commonly known as a "Traveling Salesman Problem." These problems are of interest to researchers because they attempt to find the most cost-efficient route for delivering goods to a number of places, such as a supermarket scheduling deliveries to several stores in one area. For his project, Michael examined the situation when a single fixed-capacity vehicle attempts to optimize its delivery route when the levels of supply and demand are different. His paper presents algorithms for solving the problem and suggests a relationship between his problem and others that may be easier to solve. At **Montgomery Blair High School**, Michael serves as president of Blazernet, the high school Internet service provider, and the Linux Users Group. His awards include several for math and the Top Newcomer Award for freestyle competition ballroom dancing. His hobbies include origami, bonsai and golf. The son of Dr. Kevin Forbes and Lorraine Daly, he hopes to attend Cornell in preparation for a career in theoretical computer science.

Abigail Ann Fraeman

Montgomery Blair High School

MARYLAND

Abigail Ann Fraeman, 17, of **Olney**, submitted a **space science** project to the Intel Science Talent Search based on the recent discovery of a water vapor cloud around a star, called IRC +10216. Current research suggests that the cloud results from photodissociation of water from the surface of orbiting comets. Abigail proposed that the reason these orbiting comets are clustered and unevenly distributed is due to the presence of an unseen Jupiter-sized planet that is also orbiting the star. She created a C++ computer simulation to investigate whether or not such a planet could create an asymmetric system around the star, and she concludes that it could. At **Montgomery Blair High School** in Silver Spring, Abigail plays violin and heads the forensics team. Abigail, an avid fencer, has competed in the junior Olympics and national fencing championships, and also enjoys acting and music. Last year, she was one of only 16 international student astronauts selected for a ten-day assignment inside Mars Exploration Rover mission control at the Jet Propulsion Laboratory in Pasadena. The daughter of Martin and Kathy Fraeman, Abigail one day hopes to become a field geologist on the moon or Mars.

Sherri Yifan Geng

Montgomery Blair High School

MARYLAND

Sherri Yifan Geng, 18, of **Rockville**, created an automated detection system to identify seizure patterns in digital EEG (electroencephalograph) data for her **medicine and health** entry in the Intel Science Talent Search. She spent two summers at the Walter Reed Army Institute of Research, working to eliminate the time-consuming manual process of scanning large amounts of continuous EEG recordings through automation. Her solution – a novel computerized detection algorithm based on principal and discriminate analyses – may also be used to analyze other types of time series-based physiological information, such as electrocardiogram (EKG) data, and she is applying for a patent. At **Montgomery Blair High School** in Silver Spring, Sherri is an editor-in-chief of the school newspaper, co-president of the physics team and president of the science club. A published author and poet and an accomplished musician, she has perfect SAT scores and has received numerous awards for academic achievements and top honors as a world-class table tennis player. Born in China, Sherri is the daughter of Drs. Zheng Geng and Jennifer Xie and plans to study at Harvard.

Karen Lynn Geringer
Plainedge High School

NEW YORK

Karen Lynn Geringer, 16, of **Massapequa**, collected and analyzed over 15,000 individual responses from 16 different national surveys in order to study relationships in public opinion towards terrorism and its prevention after the attacks of September 11th for her Intel Science Talent Search project in **behavioral and social sciences**. Using the nonparametric statistical test known as Spearman's rho, Karen was able to determine that attitudes towards national security reform and civil liberties restrictions correlate with the subjects' ethnicity, proximity to urban areas and political party affiliation. These associations also contribute to an individual's acceptance of issues such as racial profiling, FBI investigations, and worldwide terrorism prevention. Karen is first in her class of 245 at **Plainedge High School** in North Massapequa, and has received numerous honors including a Bausch & Lomb Honorary Science Award and the gold medal in the Long Island Math Fair. She enjoys ballet and playing the clarinet, and hopes to pursue a career in public service after receiving her degree. Her parents are Steven Geringer and Janet Wanderman.

Aaron Sargent Goldin
San Dieguito High School Academy

CALIFORNIA

Aaron Sargent Goldin, 17, of **Encinitas**, designed, built of scavenged parts and ocean-tested a new technology that converts the energy of surface waves directly into electricity for his Intel Science Talent Search project in **engineering**. Aaron's invention, the Gyro-Gen, uses a gyroscope's tendency to react to disturbing torque by precessing – turning of the axis of spin – to move a crank arm and turn a generator. When it is sealed in a buoy, wave action provides the disturbing torque, and the Gyro-Gen can generate enough electricity to run itself and an additional load. Aaron has applied for a patent for his invention, which he believes can be the basis of a practical, nonpolluting, renewable energy source. Aaron attends **San Dieguito High School Academy** where he is editor of the school literary magazine and plays trombone in a student jazz group, Band in Black. He has performed with the North Coast Symphony Orchestra and enjoys improvisational piano composition. Aaron's many honors include the Rensselaer Medal and a First Place Grand Award for Engineering at the 2004 Intel ISEF. The son of Michael and Linda Goldin, he plans to study physics or engineering and become a college professor.

Abhi Gulati

Illinois Mathematics & Science Academy

ILLINOIS

Abhi Gulati, 18, of **Bloomington** submitted a **mathematics** project in the Intel Science Talent Search that involves algebra and combinatorics, and extends his earlier work on the SET card game. In SET, three cards are a *set* if they are all the same, or all different, with regard to certain attributes. This translates in the setting of groups to a condition of the form $x_1 + x_2 + x_3 = 0$ where the x's come from copies of the cyclic group of order 3. Abhi develops a general version of this condition in the language of groups and hypergraphs. A hypergraph is like a graph, but the sets of vertices with a common edge are replaced by k-element sets of vertices for some fixed k e•2. Abhi applies combinatorial results to prove that certain colorings of a hypergraph on a finite abelian group can have no monochromatic edges. Abhi is a violinist and student council member at the **Illinois Mathematics and Science Academy** in Aurora and has perfect SAT scores. Born in India, he is the son of Rakesh and Radha Gulati. He hopes to attend Harvard and go on to receive his graduate degree in mathematics. Abhi plans to become a professor, so that he can continue his research while teaching.

Lyra Creamer Haas

Illinois Mathematics & Science Academy

ILLINOIS

Lyra Creamer Haas, 17, of **Wheaton**, studied the characteristics of ancient textiles unearthed in the Norte Chico Region of Peru for her Intel Science Talent Search project in **behavioral and social sciences**. While working as a crew chief at an archeological site north of Lima, Lyra sought to discover a way to determine the inhabitation dates of preceramic sites (3000-1800 B.C.) without using radiocarbon dating techniques. By analyzing fabric swatches found in the area, Lyra developed a way to categorize them using the yarn's twining type, twist direction and the direction in which each warp yarn was plyed. Her resulting checklist allows researchers to identify the time period for civilizations in the region. Lyra has presented her research at the American Junior Academy session at AAAS. At the **Illinois Mathematics and Science Academy** in Aurora, Lyra was MVP of the JV soccer team and captain of the varsity cross-country team. She was selected as a peer counselor by her classmates and enjoys Greek, Roman and medieval philosophy. Lyra, who has perfect SATs, is the daughter of Dr. Jonathan Haas and Dr. Winifred Creamer. She hopes to attend Yale and study anthropology.

Ian Robert Haken

Texas Academy of Mathematics & Science

TEXAS

Ian Robert Haken, 18, of **Plano**, submitted a **chemistry** project to the Intel Science Talent Search. Computational chemistry is a new and growing field of study that determines chemical properties and atomic structures by investigating solutions to the Schrödinger equation, a wave equation used to describe the behavior of atomic particles in quantum mechanics. One common use of computational chemistry is to observe the vibrational frequencies of various molecules and apply density function theory (DFT), which typically overestimates fundamental frequencies. Ian developed multiplicative scaling factors to counteract this overestimation and to reduce the overall error in the approximations made when solving for these chemical properties. Ian is a member of the math club and band at **Texas Academy of Mathematics and Science** in Denton. A flute player and former drum major, he is interested in music theory which he pursues along with an interest in cryptology. As a sophomore, he participated in the National Anti-Defamation League's Youth Leadership Conference in Washington, D.C. The son of Fiona Haken and the late Dr. Roger Haken, Ian hopes to study math at Stanford.

Kelley Harris

C.K. McClatchy High School

CALIFORNIA

Kelley Harris, 17, of **Sacramento**, researched double-stranded RNA (dsRNA)-dependent protein kinases (PKRs) and inhibitory viral proteins that bind to Z-DNA for her Intel Science Talent Search project in **biochemistry**. PKRs combat viral pathogenesis by deactivating the self-replicating cellular equipment of the virus. E3L, an inhibitory protein expressed by the poxvirus, binds exclusively to Z-DNA where it disables the antiviral mechanism of PKRs. Abolition of the E3L protein would inactivate the poxvirus, making it unable to infect the host organism. Additionally, Kelley's research of the molecular structure can contribute to the relatively unknown evolution of Z-DNA binding proteins. Kelley, who has perfect SAT scores, is a senior at **C. K. McClatchy High School** where she is first in her class of 533. The daughter of Glenn Harris and Anne Katten, she toured Brazil with the Sacramento Youth Orchestra as a violinist and earned regional awards for her Scottish Highland dancing. She also enjoys backpacking, white water rafting, and sewing. A bronze medalist in the 2003 International Biology Olympiad, she plans to attend Harvard, study biophysics and pursue a doctorate.

Ryan Marques Harrison

Baltimore Polytechnic Institute

MARYLAND

Ryan Marques Harrison, 17, of **Baltimore**, submitted a **bioinformatics and genomics** project to the Intel Science Talent Search, which he believes will open new possibilities in the field of computational proteomics, the study of proteins expressed by the genome of a cell. He developed and implemented pH-sensitive protein region modeling in Rosetta, an algorithm that predicts the structure of proteins. Of the nearly one million proteins encoded in the genes recently sequenced by the Human Genome Project, the structure and function of over 95 percent of them are unknown. Many are believed to have pH-sensitive regions that are fundamental to their structure and function. Ryan's work extends Rosetta's modeling capabilities and could play a role in applications of proteomics ranging from biomolecular engineering to drug delivery systems. A published poet and a trumpet player, Ryan attends **Baltimore Polytechnic Institute**. He is a volunteer at the National Aquarium in Baltimore, and, in addition to awards for science and poetry, he earned the Outward Bound Youth Leadership award. The son of Robert and Sharon Harrison, he hopes to study engineering and economics at Johns Hopkins.

Amber Victoria Irish Hess

Robert Louis Stevenson School

CALIFORNIA

Amber Victoria Irish Hess, 18, of **Carmel**, presented one route to more affordable thin-layer chromatography (TLC) in her "poor man's" spectrophotometer for an Intel Science Talent Search **chemistry** project. She believes that using digital photography in combination with her TLC Analyzer software could improve fluorescence-based *qualitative* analysis for compound identification. Amber's approach was to make the far costlier *quantitative* analytic methods easier and more affordable. Her digitally-enhanced measurements, for which she generates a numerical matrix-based system with exportable spreadsheet files, might provide an alternative to the costly industry-standard TLC scanners and bring quantitative methods to results- and budget-conscious scientists and students everywhere. Amber attends **Robert Louis Stevenson School** in Pebble Beach and supports junior high school scientists through Science Buddies, an online mentoring program that encourages their science fair project research. A two-time recipient of the Best Poster Award at a regional meeting of AAAS, she hopes to study engineering in college. Amber is the daughter of Kenneth Hess and Constance Irish Hess.

Shan Yuan Huang

Longwood High School

NEW YORK

Shan Yuan Huang, 17, of **Coram**, entered the Intel Science Talent Search with a **physics** project that reflects his fascination with the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory. Ben's research there focused on the PHENIX experiment, an international collaboration of more than 400 scientists probing nuclear matter under extreme conditions comparable to the state of the universe a few microseconds after the Big Bang. Ben's work resulted in a new technique to measure the number of particles of a given type produced during high energy nuclear collisions that is simpler, more reliable and less time-consuming that methods previously used in the PHENIX experiment. His technique is expected to supplant older methodologies for all future analyses. At **Longwood High School** in Middle Island, Ben is captain of the varsity math and academic bowl teams and captain and co-founder of the varsity chess team. An accomplished pianist and trombonist, he has received numerous awards for his musical abilities. Other interests include origami and horticulture. He is the son of Tien-Wei Huang and Mei-Mei Huang and hopes to continue his studies at Harvard.

Pooja Sunil Jotwani

Charles W. Flanagan High School

FLORIDA

Pooja Sunil Jotwani, 17, of **Pembroke Pines**, researched the effects of a quark matter core on neutron star cooling for her Intel Science Talent Search in **physics**. Her observations of cooling neutron stars, as well as their physical properties such as neutrino emission processes and the heat quantities of the interior and exterior, provide information about the states of matter at supernuclear densities. She describes how cooling curves allow theoretical physicists to better predict the stars' internal composition. When cooling curves are combined with the recently discovered Gapless Color-Flavor Locked (gCFL) quark matter, the surprising results show old stars with gCFL cores cooling more slowly than nuclear matter stars. The discovery of gCFL has motivated astronomers to search for quark matter in aged neutron stars, a category that is seldom studied. A student of **Charles W. Flanagan High School**, Pooja is active in both the math club and debate team. The daughter of Sunil and Kiran Jotwani, she was born in India and is head of the youth group in the Sindhi Association of South Florida. Pooja plans to attend MIT where she can pursue a career in astrophysics.

June-Ho Kim

Monta Vista High School

CALIFORNIA

June-Ho Kim, 17, of **Cupertino**, studied the ability of antibodies to reduce the symptoms of experimental autoimmune encephalomyelitis (EAE), a murine model of multiple sclerosis (MS) for his Intel Science Talent Search project in **medicine and health**. In MS, the body's T cells use molecules CD44 and $\alpha_4\beta_1$ to infiltrate the central nervous system and attack neurons. Based on their ability to ameliorate EAE, June-Ho theorized that the antibodies anti-CD44 and anti-$\alpha_4\beta_1$ would inhibit the proliferation of T cells and suppress secretion of pro-inflammatory cytokine. Among his findings was that anti-CD44 promoted secretion of pro-inflammatory cytokines and must be inhibiting EAE through a yet unknown mechanism. June-Ho hopes to study biochemical science at Harvard and become an MD. He is on the debate team and co-president of the Future Physicians of America Club at **Monta Vista High School**. An accomplished pianist, June-Ho is a founding member of both the Perfect 5th Ensemble and the Appassionato Club, which entertains senior citizens, and he is Youth Committee co-chairman for the Santa Clara Valley Red Cross. June-Ho is the son of Dr. Youngbae and Jiyeon Kim.

Justin Alexander Kovac

Montgomery Blair High School, Silver Spring, MD

FLORIDA

Justin Alexander Kovac, 17, of **Miami**, investigated the ocean's role in hurricane intensification for his Intel Science Talent Search project in **earth and planetary science**. He studied warm pools of water in the Gulf of Mexico, known as warm core rings (WCRs), and researched WCR-hurricane interactions. In the process, he conducted the first census of WCRs using satellite altimetry and tracked a new statistic: tropical cyclone heat potential. In matching WCR locations with the tracks of tropical cyclones traveling through the Gulf during an 11-year period, he identified an average 1.9 interactions annually. His findings also indicate that tropical cyclones passing over WCRs intensified by an average of 13.4 knots. Justin believes his work is a first step toward better predictions of hurricane strength. He reports that another benefit of his STS project was learning "that iguanas will creep up on you when you least expect it!" Justin, who has perfect SAT scores, attends **Montgomery Blair High School** in Silver Spring, Maryland, where he competes in track and field. He also enjoys snorkeling, cycling, and swing dancing. The son of George Kovac and Holly Davis, he plans to study engineering in college.

Stephen Curt Kramer

Byram Hills High School

NEW YORK

Stephen Curt Kramer, 17, of **Bedford**, expanded the concept of animal-assisted therapy to include a robotic alternative for his **behavioral and social sciences** project submitted to the Intel Science Talent Search. His 2.5-year study evaluated the social behaviors of geriatric dementia patients in long-term care during three types of one-on-one visitations: Stephen alone; in tandem with friendly "Freddie," his golden retriever; or accompanied by a small robotic dog that turns, dances and waves its front legs. Interviews were videotaped, and behaviors were coded and analyzed, using two methods of statistical analysis. Stephen's findings show that all three types of visits stimulated social interaction, and he believes that because of its success, a computerized canine could be an acceptable substitute for a real dog, providing measurable patient benefits without the drawbacks of live animal visits. Stephen is a peer tutor at **Byram Hills High School** in Armonk and plays on the lacrosse team. He also enjoys ice hockey, snowboarding and golf, but working with animals is "a true passion." Stephen, the son of Andrew and Amy Kramer, hopes to attend Cornell and is considering a career in veterinary medicine.

Sarah Rose Langberg

Canterbury School

FLORIDA

Sarah Rose Langberg, 18, of **Fort Myers**, submitted an **earth and planetary science** project to the Intel Science Talent Search, examining volcanic indicators of seafloor formation on and off the Juan de Fuca Ridge axis, a continuous mid-ocean ridge (MOR) in the Pacific. Using samples taken at the ridge and at farther distances, she learned that the on-axis magma source can often produce new volcanic additions to the seafloor much farther off-axis than previously thought. Using X-ray fluorescence to identify the trace mineral content in the magma and cumulative sediment, Sarah suggests it is the identical geochemical signature in magma samples, rather than their location, that indicate the common volcanic parent on the Juan de Fuca Ridge for these new, off-axis additions to the Earth's crust. Captain of the mock trial team at **Canterbury School**, Sarah also founded its Science National Honor Society. An avid sailor, runner and researcher, she received the Intel Foundation Young Scientist Award at the 2004 Intel ISEF in Portland, Oregon. The daughter of Dr. Gerald and Phyllis Langberg, Sarah hopes to make discoveries in our underwater world after college.

Yingquiqi Lei

Robert F. Kennedy Community High School

NEW YORK

Yingqiuqi Lei, 18, of **Flushing**, researched trace element geochemistry in fossil teeth from 57 archaeological sites for her **earth and planetary science** entry in the Intel Science Talent Search. Chelsea developed and manipulated a database with 48 different variables and analyzed 14 elements in 1,560 fossil teeth and sediment samples. Her neutron activation analyses (NAA), revealing fossil paleoenvironmental conditions, have broad application in both geoarchaeology and paleontology. A paper based on her work is being prepared for publication in a peer review journal. Chelsea is first in her class of 111 at **Robert F. Kennedy Community High School**, and hopes to continue her studies at Harvard. Her many honors include a Third Place Grand Prize Award in the 2003 Intel ISEF. Chelsea is a pianist, tennis player, reporter for the school paper and special overseas correspondent for *China's Youth Daily*. The daughter of Xiaoming Lei and Jie Liu, she is a recent emigrant from her native China, where an Eightfold Maze she designed – consisting of massive circular concentric walls programmed to open and close at random – will be a future installation in Kumming, the City of Spring.

Po-Ling Loh

James Madison Memorial High School

WISCONSIN

Po-Ling Loh, 18, of **Madison** worked in finite group theory for her Intel Science Talent Search project in **mathematics**. The group H is said to be a *closed* subgroup of a finite group G provided any homomorphism of H into G extends uniquely to all of G. Po-Ling studies the group D_{2p} of symmetries of a regular polygon with p sides, where p is an odd prime number. She shows if D_{2p} is closed and properly contained inside a finite group G, then G must be rather complicated. In particular she proves that G cannot be solvable. She further conjectures that for any $p > 3$ there exist such G whose commutator subgroup is nonabelian finite simple. Ranked first in her class of 523 students at **James Madison Memorial High School**, Po-Ling has perfect SAT scores. She has been a gold prize winner in the USA Math Talent Search for three consecutive years, has won awards in music and forensics and is copy editor of the school newspaper. She hopes to pursue a career in teaching after receiving her degree in mathematics from the University of Chicago. The daughter of Dr. Wei-Yin Loh and Theresa Loh, she enjoys singing, cross-stitching and playing frisbee.

Sagar Viplov Mehta

The Wheatley School

NEW YORK

Sagar Viplov Mehta, 17, of **Roslyn Heights**, focused on wound healing and tissue engineering for his Intel Science Talent Search project in **materials science**. Intrigued by the possibility of a "smart matrix" that could heal chronic wounds more effectively, he intended to optimize the properties of hyaluronic acid (HA) hydrogels (gels in which water is the dispersion medium) used for wound healing and tissue engineering applications. He developed methods to control the elasticity and morphology of cells on HA hydrogels by modifying the mechanical and chemical properties of the hydrogel itself. He believes his methods will be used in future attempts to create an ideal wound-healing scaffold based on HA hydrogels and also to replicate human tissue *in vitro* on HA hydrogels. He hopes his findings will ultimately benefit millions of burn victims, diabetics and surgery patients. Recipient of numerous awards for math and science, Sagar has perfect SAT scores and is first in his class of 138 at **The Wheatley School** in Old Westbury. He captains the varsity tennis team, competes in track and field and is lead clarinetist in the jazz band. The son of Drs. Viplov and Falguni Mehta, he plans to attend Harvard.

Ling Pan

The Brearley School

NEW YORK

Ling Pan, 18, of **New York**, submitted a **biochemistry** project to the Intel Science Talent Search researching opioid receptors and ways of increasing drug effectiveness. Ling studied the *Oprm* gene, the only gene for the *mu* opioid receptor that has been isolated across the mouse, rat and human species. These *mu* opioid receptors are essential in mediating the ability of opium-derived drugs, such as morphine and heroin, to manage pain. Ling isolated six new splice variants from the human *Oprm* gene and explored their abilities to absorb drugs into the body based on their differing intracellular structures. Ling's efforts may ultimately assist in developing drugs that control pain and control opioid addiction. Ling is co-first author of a paper published in *Journal of Neurochemistry.* At **The Brearley School**, Ling participates in the Asian Awareness club, the service committee and the art club and has studied drawing at the Metropolitan Museum of Art. She has played the violin for a dozen years and performed as a solo pianist with the school orchestra, where she serves as concert mistress. A native of China, Ling is the daughter of Dr. Yingxian Pan and Dr. Jin Xu and hopes to attend Harvard.

Olga Pikovskaya

Midwood High School

NEW YORK

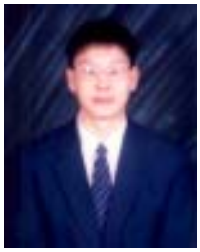
Olga Pikovskaya, 17, of **Brooklyn**, submitted a **biochemistry** project for her Intel Science Talent Search that focused on the synthesis, purification and crystallographic identification of recently discovered metabolite-binding mRNAs (riboswitches) that are responsible for gene activation. Her research was made more challenging given the size of the RNA and the requirements for diffraction quality crystals. This subject is a highly competitive one due to the international interest in elucidating the principals used by mRNA to target metabolites with high affinity and exquisite specificity. First in her class of 756 at **Midwood High School** at Brooklyn College, Olga, who was born in Russia, enjoys rhythmic gymnastics and plays violin in the orchestra and quartet. Eleven years ago, when Olga and her mother, Irina Pikovskaya, arrived in America from Belarus, neither spoke English. Olga is now fluent in English, Russian and French, and she plans to attend Columbia. When asked to name the most influential person in her scientific career, Olga cites her grandmother, who died of cancer, perhaps from Chernobyl radiation. One day, she hopes her research will help stop the progression of such terminal diseases.

Karl James Plank

Squalicum High School

WASHINGTON

Karl James Plank, 17, of **Bellingham**, developed a method for depositing an ordered assembly of nanometer-sized particles on surfaces for his Intel Science Talent Search **chemistry** project. Karl attempted to create a self-assembling nanocircuit by suspending nanorods of zinc oxide (ZnO) in a liquid crystal solvent and placing the solution onto a polycarbonate membrane substrate so the solution could drain through the pores of the membrane, thereby depositing ordered ZnO nanorods onto its surface. In the course of his research, Karl examined the use of at least four types of particles and several liquid crystal solvents before arriving at the system he describes in his paper. Because there are currently few good methods for orientationally ordering semiconductor nanoparticles, Karl's work holds promise for the eventual construction of nanoscale electronics. First in his class of 297 at **Squalicum High School**, Karl is co-captain of the varsity swim team, three-time class vice president and a finalist in the state bridge-building competition. He enjoys model building and computers in his spare time. The son of James and Kristan Plank, Karl hopes to attend Stanford in preparation for a career in medicine.



Albert Tsao

Brookline High School

MASSACHUSETTS

Albert Tsao, 17, of **Brookline**, designed, fabricated and studied the optical properties of silicon nanofiber ring resonator loops that are thinner than the wavelength of light and almost long enough to fit around a strand of human hair for his Intel Science Talent Search **materials science** project. Albert is one of only a handful of researchers worldwide who can pull ultrathin silica nanofibers with a diameter smaller than 100 nanometers. Albert's fibers are so narrow that light does not fit inside them and must travel along their exterior surfaces, a phenomenon known as the evanescent field. When the fiber forms a loop, it selectively filters out certain colors of light through interference, a property that may be used in future applications as optical logic gates for super-fast computers. He hopes one day to find a way to manipulate nanofibers using magnetic bacteria. Last summer, Albert transferred to **Brookline High School** from his Maryland school to continue his summer research at Harvard. He hopes to attend Caltech. His hobbies include football, violin and reading. The son of Dr. Thomas Tsao and Susan Chung, Albert cites his sister as the most influential person of his scientific career.

Neal Wadhwa

Ward Melville High School

NEW YORK

Neal Wadhwa, 18, of **East Setauket** studied the relationship between topology and geometry in Calabi-Yau supermanifolds, which are special subspaces of *n*-dimensional space over the complex numbers, for his **mathematics** project in the Intel Science Talent Search. These manifolds, of special interest to string theorists, arise in theoretical physics as well as mathematics. Neal shows that a natural generalization to supermanifolds of a result of Yau's on Calabi-Yau manifolds is false. He also considers notions of distance, called *metrics*, which can live on the manifolds in question. At **Ward Melville High School**, Neal is both president of the math team and captain of the science bowl. He has also dedicated more than 150 hours of community service at the Stony Brook University Hospital. An avid pianist and trumpeter, he has performed in multiple concerts since 2001. He is an author of a paper on Super Calabi-Yau manifolds, which has been submitted to the journal *Advances in Theoretical and Mathematical Physics*. The son of Drs. Nand and Nandita Wadhwa, Neal hopes to attend MIT and pursue his interests in mathematics, computer science and engineering.

Jimmy Chen Yang

Plano Senior High School

TEXAS

Jimmy Chen Yang, 17, of **Plano**, studied the potential ability of combination therapies to improve cancer treatment for his Intel Science Talent Search project in **medicine and health**. His two-part study examined the effects of combination therapy on breast and cervical cancer cells. Telomerase is an enzyme that gives cancer cells the ability to divide indefinitely. Jimmy demonstrated that long-term inhibition of telomerase in combination with radiation and/or chemotherapy increases the cancer cell kill rate and reduces treatment time, and that treatment order may change the number of cells killed. He believes combination therapies could lead to better treatment for cancer. First in his class of 1,122 at **Plano Senior High School**, Jimmy is active in Key Club and LASER (Learning About Science and Engineering Research). He participates in Plano Teen Court, plays violin in the All-Region Philharmonic Orchestra and raises orchids. Jimmy placed second in the 2000 Discovery Channel Young Scientist Challenge, and he is listed as an author on a paper published in *Rejuvenation Research*. The son of Dr. Juei-Mao Yang and Li-Shang Chen Yang, Jimmy is eager to study biology at Harvard.

David Qianli Ying

Coral Reef Senior High School

FLORIDA

David Qianli Ying, 16, of **Miami**, was named a finalist in the Intel Science Talent Search for his **botany** project on fortifying a sweet potato cultivar, the purple-skinned Picadita, against viral infection, which could improve yield in this staple crop of southern Florida. Initially begun three years ago in his garage lab, his research focused on a novel process for propagating sweet potato plants using the topmost meristematic portion that outgrows its own existing pathogens. Using this pathogen-free meristem-tip insures that the new plants will be virus-free, thereby reducing susceptibility to pests, fungal and bacterial attacks. Implementing David's methods could benefit sweet potato agriculture worldwide, improving the quality of the global diet. First in his class of 700 at **Coral Reef Senior High School** and founder of its peer tutoring program, David began his first math lessons with another's help: his grandmother in their native China. He also cultivates a passion for his Asian roots as president of the Asian Heritage Society and is an award-winning table tennis player. The son of Dr. Zhentu Ying and Lisa Wang, he would like to attend Harvard and conduct cancer and AIDS research after medical school.

2005 Intel Science Talent Search
Finalists Listed by State

Arizona	James Andrew Cahill, *Flagstaff High School*	7
California	Aaron Sargent Goldin, *San Dieguito High School Academy*	12
	Kelley Harris, *C. K. McClatchy High School*	14
	Amber Victoria Irish Hess, *Robert Louis Stevenson School*	15
	June-Ho Kim, *Monta Vista High School*	17
Florida	Pooja Sunil Jotwani, *Charles W. Flanagan High School*	16
	Justin Alexander Kovac, *Montgomery Blair High School, Silver Spring, MD*	17
	Sarah Rose Langberg, *Canterbury School*	18
	David Qianli Ying, *Coral Reef Senior High School*	23
Georgia	Sisi Monica Chen, *Northview High School*	7
Illinois	Timothy Frank Credo, *Illinois Mathematics & Science Academy*	9
	Stephen Jacob DeVience, *Notre Dame High School for Boys*	9
	Abhi Gulati, *Illinois Mathematics & Science Academy*	13
	Lyra Creamer Haas, *Illinois Mathematics & Science Academy*	13
Maryland	Michael Andrew Forbes, *Montgomery Blair High School*	10
	Abigail Ann Fraeman, *Montgomery Blair High School*	11
	Sherri Yifan Geng, *Montgomery Blair High School*	11
	Ryan Marques Harrison, *Baltimore Polytechnic Institute*	15
Massachusetts	Albert Tsao, *Brookline High School*	22
Michigan	Samuel Mohun Bhagwat, *Winston Churchill High School*	6
Minnesota	Michael Jeremy Barany, *Roseville Area High School*	4
New Mexico	Robert Thomas Cordwell, *Manzano High School*	8
New York	David Lawrence Vigliarolo Bauer, *Hunter College High School*	5
	Ailish Elizabeth Bateman, *Pierson High School*	4
	Justin Scott Becker, *Hendrick Hudson High School*	5
	Bruce Xiangji Brewington, *Fairport High School*	6
	Stanley Shang Chiang, *John L. Miller-Great Neck North High School*	8
	Karen Lynn Geringer, *Plainedge High School*	12
	Shan Yuan Huang, *Longwood High School*	16
	Stephen Curt Kramer, *Byram Hills High School*	18
	Yingquiqi Lei, *Robert F. Kennedy Community High School*	19
	Sagar Viplov Mehta, *The Wheatley School*	20
	Ling Pan, *The Brearley School*	20
	Olga Pikovskaya, *Midwood High School*	21
	Neal Wadhwa, *Ward Melville High School*	22
Ohio	Joline Marie Fan, *Upper Arlington High School*	10
Texas	Ian Robert Haken, *Texas Academy of Mathematics & Science*	14
	Jimmy Chen Yang, *Plano Senior High School*	23
Washington	Karl James Plank, *Squalicum High School*	21
Wisconsin	Po-Ling Loh, *James Madison Memorial High School*	19

2005 Intel Science Talent Search

Finalists Listed by Last Name

Barany, Michael Jeremy	Roseville, MN	4
Bateman, Ailish Elizabeth	Sag Harbor, NY	4
Bauer, David Lawrence Vigliarolo	Bronx, NY	5
Becker, Justin Scott	Cortlandt Manor, NY	5
Bhagwat, Samuel Mohun	Livonia, MI	6
Brewington, Bruce Xiangji	Fairport, NY	6
Cahill, James Andrew	Flagstaff, AZ	7
Chen, Sisi Monica	Duluth, GA	7
Chiang, Stanley Shang	Great Neck, NY	8
Cordwell, Robert Thomas	Albuquerque, NM	8
Credo, Timothy Frank	Highland Park, IL	9
DeVience, Stephen Jacob	Chicago, IL	9
Fan, Joline Marie	Columbus, OH	10
Forbes, Michael Andrew	Silver Spring, MD	10
Fraeman, Abigail Ann	Olney, MD	11
Geng, Sherri Yifan	Rockville, MD	11
Geringer, Karen Lynn	Massapequa, NY	12
Goldin, Aaron Sargent	Encinitas, CA	12
Gulati, Abhi	Bloomington, IL	13
Haas, Lyra Creamer	Wheaton, IL	13
Haken, Ian Robert	Plano, TX	14
Harris, Kelley	Sacramento, CA	14
Harrison, Ryan Marques	Baltimore, MD	15
Hess, Amber Victoria Irish	Carmel, CA	15
Huang, Shan Yuan	Coram, NY	16
Jotwani, Pooja Sunil	Pembroke Pines, FL	16
Kim, June-Ho	Cupertino, CA	17
Kovac, Justin Alexander	Miami, FL	17
Kramer, Stephen Curt	Bedford, NY	18
Langberg, Sarah Rose	Fort Myers, FL	18
Lei, Yingquiqi	Flushing, NY	19
Loh, Po-Ling	Madison, WI	19
Mehta, Sagar Viplov	Roslyn Heights, NY	20
Pan, Ling	New York, NY	20
Pikovskaya, Olga	Brooklyn, NY	21
Plank, Karl James	Bellingham, WA	21
Tsao, Albert	Brookline, MA	22
Wadhwa, Neal	East Setauket, NY	22
Yang, Jimmy Chen	Plano, TX	23
Ying, David Qianli	Miami, FL	23

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