US HIGH SCHOOL TEAM GARNERS GOLD AND TOP SCORE IN PHYSICS OLYMPIAD

Steven Gubser, a 17-year-old from Denver, Colorado, was the winner of the XX International Physics Olympiad, held in Warsaw, Poland, in late July. This is the first time any US contestant has won a gold medal in the four years that American teams have competed in this contest, and the first time an American has achieved the highest point total to win the Olympiad. (Gubser earned $46\frac{1}{3}$ points out of a possible 50.) "We had seen that Steve had a good chance at winning a gold medal, but we did not anticipate that he would have the highest score and win the Olympiad," said Arthur Eisenkraft of the Fox Lane High School in Bedford, New York, one of the team's academic directors. "We were just delighted." In addition to securing the top prize, the US team won two bronze medals and an honorable mention.

The Olympiad has long been recognized as a high honor in Europe and some Far East countries, but it wasn't until 1986 that the United States took part in the competition (see PHYSICS TODAY, September 1986, page 51). It was feared at that time that science education in the US was not producing students who would be able to compete with those coming from the rigorous scientific curricula typical of European schools. A leading physics educator went so far as to say he "could see them being clobbered." Despite such fears, the first US team won three bronze medals.

Eisenkraft noted that the success of Gubser and his teammates "is surely indicative of the fact that our very best students are as good as the very best students in the rest of the world." This "doesn't at all detract from the need to improve science education . . . in America," he hastened to add.

The US government has taken special note of the team's success: The five students and the three team directors—Larry Kirkpatrick of Montana State University, Eisenkraft and Jack Wilson, the executive officer of the American Association of Physics Teachers—were invited to meet the President of the United States at the White House on 15 September.

The victorious US team in the XX International Physics Olympiad poses in Warsaw, Poland, on 24 July 1989. From left: James P. Sarvis, Derrick Bass, Larry Kirkpatrick (academic director), Jason Jacobs, Arthur Eisenkraft (academic director), Jessica Millar and Steven Gubser.

Eisenkraft hopes this meeting will serve as inspiration to other students in the US by showing them that it is possible to achieve national recognition through academic endeavor. "I don't think the US does enough to let students know they're special . . . and crucial to our future," he said.

In Poland, the US team learned firsthand that news of the Olympiad plays to a receptive audience. A reporter from Polish national television interviewed Gubser after the physics match, and the interview ran nationally that evening. When the US team got on the plane the next morning to go back to New York, someone on the plane recognized Gubser and asked if he was *the* Steve Gubser from the Olympiad. "I believe it was a Polish physicist," Gubser told PHYSICS TODAY. "He spoke with us for about ten minutes."

The final exam

The Olympiad was the final test in a long series of examinations for the students. Potential team members were nominated by their high school teachers, who sent AAPT records of the students' grades, achievements and test scores, along with letters of recommendation. After completing an exam consisting of multiple-choice and open-response questions, graded by the teachers and by AAPT, 60 of the original 330 students (all those who achieved 65% or better on the test) became semifinalists. The semifinalists completed a longer, open-response test that was graded by the academic directors of the team (Eisenkraft and Kirkpatrick), who then chose 20 team members. These students attended a nine-day training camp (run by AAPT) at the University of Maryland, where they underwent intensive training sessions and completed more tests. The final five-member team that traveled to Poland was selected at the end of the camp.

The Olympiad competition consists of a five-hour theoretical examination that accounts for 60% of the score and a five-hour experimental examination that counts for 40%. This year the questions were written by two

Polish teachers, Waldemar Gorzkowski and Andrej Kotlicki, and apparently they succeeded in producing a test that did not discriminate against or in favor of any particular country: The ten gold medal winners came from nine countries; only West Germany produced more than one gold medalist.

The experimental problem required the students to measure the velocity of sound in liquids using piezoelectric crystals. The theoretical section's three problems focused on the boiling points of liquids, gravitational forces between three bodies and the properties of electron microscopes.

Gubser had a near-perfect score on the theoretical problems. "I'm really just more of a theorist," he said. "It was my unusually high theoretical score that got me into first place." His background in chemistry also worked to his advantage in solving the first theoretical problem, which involved Dalton's law of partial pressures. (Gubser had turned down an invitation to participate in the US training camp for the International Chemistry Olympiad when he was told he would be representing the American physics team in Poland.)

The following example, the second problem from the theoretical section, reflects the level of proficiency required of the students:

"Three known masses m_1, m_2, and m_3 located at noncollinear points P_1, P_2, and P_3 interact with each other through their mutual gravitational forces only; they do not interact with any other bodies. Let σ denote the axis through the center of mass of the points P_1, P_2 and P_3 and perpendicular to the triangle $P_1P_2P_3$.

"What relations should be satisfied by the distances $P_1P_2 = a_{12}$, $P_2P_3 = a_{23}$, $P_1P_3 = a_{13}$ and the angular velocity ω of the system (with respect to the axis σ) to allow the shape of the triangle $P_1P_2P_3$ to remain unchanged during the motion of the system, i.e., under what conditions will the system rotate around the axis σ as a rigid body?"

The team members

Derrick Bass, who won a bronze medal in the competition, unraveled this problem in a way the Polish professors had not anticipated, with an elegant solution of only seven or eight lines. Bass later revealed that the coordinate system he settled on for the problem was "about the 25th one" he tried. Jason Jacobs, who also won a bronze medal, ran into difficulties with the same question. "He ended up with an equation with no less than 42 terms," said Eisenkraft. The caliber of the members of the US team is evident both in their work at the Olympiad and in their activities outside physics.

Bass is a junior at North Miami Beach High School in Florida, where he has already taken an advanced placement chemistry course and two years of advanced placement calculus. (These courses are usually offered to junior and senior students only.) He has been honored by the Dade County school board for his achievements in local, state and national math contests, and is an avid reader of science and astronomy magazines.

Jacobs, who now attends Harvard University, chose honors classes in all the subjects in which they were offered at Baldwin Senior High School on Long Island, New York. He has won a long list of mathematics and physics awards, including top honors at the Long Island Physics Teachers Association Competition, and a summer scholarship to Stanford University to study computers. Jacobs was a member of the debate team and the newspaper staff at his high school.

James Sarvis, who was awarded an honorable mention, now attends MIT. During the trip to Poland, Sarvis was in the process of deciding whether to accept a sizable scholarship from the National Security Agency to study engineering at MIT or to study "physics for the love of physics." As a senior at Thomas Jefferson High School for Science and Technology in Alexandria, Virginia, he was a member of the math team, the computer team, the debate team and the Junior Engineering Technical Society team. Jarvis was also a member of the National Latin Honor Society and was in the Leadership Corps of the Boy Scouts of America.

Jessica Millar, the youngest competitor in this year's Olympiad (she will be 16 in December), fell just short of an honorable mention. A junior at West High School in Madison, Wisconsin, Millar left the Physics Olympiad training camp at the University of Maryland for 13 hours to fly home for Wisconsin's 1989 state track meet, in which she won a gold medal in the 1600-meter race. She plays the violin in the Wisconsin Youth Orchestra, and traveled to Edinburgh, Scotland, with the orchestra for a competition in August.

Gubser is a senior at Cherry Creek High School in Denver, Colorado (a school that produced a bronze medalist in the first Olympiad in which Americans participated, in 1986). Gubser is taking advanced placement courses in French and English, and he plays piano. Because he has run out of physics courses at his high school, Gubser plans to pursue math more aggressively in his senior year, with independent study in linear algebra and differential equations.

The American Institute of Physics organized the funding for the 1989 US Physics Team. Sponsors giving $5000 or more included AAPT, AIP, The American Physical Society, the AT&T Foundation, Eastman Kodak Company, Ford Motor Company, Hewlett–Packard, IBM, the Office of Naval Research and Xerox.

The XXI International Physics Olympiad will be held 5–13 July 1990 in Groningen, the Netherlands.

—PAT JANOWSKI

SOVIET MAGAZINE FOR HIGH SCHOOLERS TO APPEAR IN ENGLISH

The National Science Teachers' Association has acquired the English-language rights to *Kvant*, a Soviet physics magazine for high school students that has appeared for 19 years. A grant from the National Science Foundation will enable NSTA to publish *Quantum*, a translation of the magazine, for the next two years. The grant "will allow us to initiate publication to see if it's viable," said Bill Aldridge, executive director of NSTA.

Kvant, written by Soviet physicists, contains problems for students to work out, some research articles, occasional news stories, and contests (such as the one whose winners participated in an exchange program with American students last summer—see PHYSICS TODAY, August, page 59). *Quantum* "will be an English-language version of *Kvant*, containing much of the same material with some additional material," said Aldridge.

The American Association of Physics Teachers and The National Council of Teachers of Mathematics are sharing editorial responsibility for *Quantum* with NSTA. Jack Wilson, executive officer of AAPT, notes that the translation will retain the unusual illustrations from *Kvant*, which he describes as strange and wonderful—"*Alice in Wonderland* stuff."

Sheldon Glashow of Harvard Uni-