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Prospects for Soviet Cooperation on the U.S. Super Collider Project: Moscow  
More Willing Than Able

Summary

*Soviet officials probably would respond favorably to US requests for support for the US Superconducting Super Collider (SSC)--the eight billion dollar project in Texas to build the world's largest accelerator. Soviet participation in this undertaking would be consistent with President Gorbachev's efforts to increase S&T cooperation with the United States and it would boost Soviet high energy physics, which Moscow has established as one of 15 priority S&T programs.*

*At the same time, concern about costs in view of the large Soviet budget deficit, growing competition for resources from other scientific areas, and technology limits faced by Soviet industry will likely reduce Moscow's ability to provide substantial support for the SSC. In our judgment, Moscow's support of the SSC probably will be limited to providing selected components for detector systems; their ability to provide many of these components is likely to depend on collaboration with and assistance from US industry, which could raise technology transfer issues. [*

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This memorandum was prepared by \_\_\_\_\_ of the Office of Soviet Analysis, Office of Scientific and Weapons Research, and \_\_\_\_\_ and questions are welcome and may be directed to \_\_\_\_\_

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Scope Note [

Reporting on Soviet willingness to cooperate on the US Superconducting Super Collider (SSC) is limited [

[ We do, however, have extensive leadership statements and [ that indicate Soviet views on scientific and technical collaboration with the United States. We have relied substantially on this reporting to form our judgments on the likelihood of Soviet participation in the SSC. Our judgments about the likely extent of Soviet participation in the SSC are based on our understanding of Moscow's economic problems and their likely impact on basic science and on selected statements by Soviet officials about difficulties with some of the technologies associated with the SSC.

The discussion about technology transfer is general in nature and is intended to illustrate potential problems associated with Soviet participation in the SSC [

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The Superconducting Super Collider (SSC) project--which will include a 86 kilometer-long circular tunnel in Texas and which will be completed around the year 2000--will accelerate counter-rotating beams of protons to an energy level 20 times greater than that now possible. This facility, which will be the world's largest accelerator, should enable scientists to explore aspects of matter that are unreachable using any existing facility. The US Government is seeking to enlist international participation in and support for the SSC--in part, to defray some of the costs of its construction and operation. The Soviet Union is a potential participant and contributor

#### Benefits of Participation

Participation in the SSC would provide Moscow with a key opportunity to advance bilateral scientific and technical (S&T) cooperation. During the past five years, President Gorbachev has vigorously pressed for increased S&T interaction with the United States as part of his larger effort to integrate the USSR more closely into the world economy and scientific mainstream. A number of Soviet officials are angling to conclude "big science" joint projects to symbolize the new spirit of cooperation and serve as a centerpiece of S&T cooperation in the 1990s. The leadership might view the SSC as such a project.

Moscow also sees participation in the SSC as an opportunity to boost Soviet basic science. The Gorbachev leadership has become increasingly aware--and concerned--that basic science stagnated under Brezhnev. Moscow sees the USSR as trailing the West in several critical areas--including high energy physics (HEP). In 1987, the Politburo adopted a series of measures to rejuvenate HEP research, including the construction of new Soviet particle accelerators and experimental facilities. In December 1988 the Soviet Government approved HEP as one of the USSR's 14 national priority S&T programs that will receive the lion's share of Soviet S&T funding into the 21st Century.

Soviet physicists, for their part, want the technical and professional interaction--and the prestige--of working at one of the world's frontier science laboratories. Collaboration on the SSC would provide unique technological and educational opportunities for Soviet scientists and experience that could be of direct value in advancing their own accelerator facilities and research programs. Moreover, Soviet S&T officials have observed that joint projects could provide major savings and have implied that such projects would help ensure that Soviet funds are spent wisely.

At the same time, some Soviets are concerned that participation in the SSC's experimental programs could contribute further to a scientific "brain drain"--a problem noted also by Gorbachev in a June speech on national television. Like Soviet scientists in other disciplines, many high energy physicists are dissatisfied with living and working conditions in the USSR and are seeking opportunities to leave for the West. The departure of Soviet physicists--both on a permanent basis and on long-term assignments abroad--is likely to be a continuing problem as Soviet scientists participate in Western programs. Most Soviet S&T policy officials, however, recognize that restrictions on scientists working abroad is not a sensible way to deal with this problem

1. With the subsequent addition of fusion research to the national priorities list, the Soviets now have 15 priority program

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Moscow's economic problems and the technology limits faced by Soviet industry will reduce the Soviets' ability to contribute technologically and economically in a big way.

Moscow's measures to reduce its budget deficit--which could total as much as 90 billion rubles in 1990--probably will result in increased competition for funding for basic research. Soviet researchers, and even some high energy physicists, may see the SSC as a threat that will draw manpower, materials, and money away from their own projects. Physicists associated with Soviet HEP super collider projects will want to ensure that cooperation with the SSC does not undercut support for their programs.

At the deteriorating economy and budget problems already are having an impact on Moscow's ability to support basic science in general and the SSC in particular. Some Soviet academicians estimate that overall funding for basic research has been cut by as much as 50 percent during the past year. That severe domestic economic problems were reducing the USSR's ability to participate in the SSC because the Soviet public wants "better housing, better food, and better health care."

Furthermore, there is some question that the Soviets will be able to meet the technological demands posed by the SSC. Because almost all SSC components will require going beyond what is now state-of-the-art in any country, much R&D will be required to enable the production of most components.

Competition With Other Projects

Supporters of a substantial Soviet contribution to the SSC will face stiff competition from other HEP programs. The Gorbachev leadership already has commissioned an intensified effort to build new Soviet high energy accelerators along with other ambitious priority projects for the 1990s and beyond. Soviet physicists also are heavily involved in the operations and plans at the European Center for Nuclear Research (CERN) and for the International Thermonuclear Experimental Reactor (ITER), a large international fusion program. At the same time, the regime continues to pursue additional multilateral and bilateral cooperative S&T ventures.

Soviet Large Accelerator Projects

The Soviets have embarked on two major projects to build new large accelerator facilities--both less powerful than the SSC--designed to advance their capabilities in

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particle physics research. At the MAEP's Institute of High Energy Physics in Serpukhov--the USSR's national center for high-energy physics research--they are constructing an Accelerating and Storage Complex (UNK) and they are planning another project--the Large Linear Electron-Positron Collider (VLEPP) (See Box). Soviet plans call for these facilities to be completed by about the turn of the century. Because the scheduled time frames for construction of these projects and the SSC overlap, there could be a potential competition for limited resources

The Soviets may not be as committed to the VLEPP, which is still in its initial stages and involves large technological challenges. Moscow's support of the VLEPP project might in fact be diminished by a major participation in the SSC. However, a decision to cancel or curtail the VLEPP in favor of participation in the SSC would be vigorously opposed by officials associated with the Soviet project, who would argue the virtues of a domestic accelerator facility and of an electron-positron collider over a proton-proton collider.

#### The Large Hadron Collider (LHC)

The Soviets may view cooperation on the proposed LHC at CERN as an alternative to participation in the SSC. Like the SSC, the LHC would also be a proton-proton collider and would have a maximum energy equal to 40 percent of the design energy of the SSC.

The Soviets have been extensively involved in CERN activities for years and recently contributed detector components to its Large-Electron Positron (LEP) collider. Almost all of the key advisers and administrators in Soviet high energy physics today have worked at CERN facilities at some time; one-third of Soviet particle physicists are currently registered to work at CERN in the future. Because of their past and present commitments to CERN, along with strong personal ties, the Soviets will be under great pressure to support the LHC. However, given the uncertainty about the Europeans' ability to complete the LHC by the end of the decade, as planned, and the technological superiority of the SSC, we believe Moscow will strongly resist having to choose between the LHC and SSC, and will try to provide some support to both to avoid being shut out of either

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Soviet Super Collider Projects

The Large Colliding Linear Electron Positron Beam Accelerator (known by the Russian acronym VLEPP) is designed to be built in two stages. In the first stage, two linear accelerators (linacs), each 5 kilometers long, would be built facing each other. Electrons from one linac would collide at a central point with positrons from the second linac. In the second stage—scheduled for 1998—the lengths of both linacs would be increased to 10 km and the beam energies to 1 TeV.

The first stage of the VLEPP would have useful energy capabilities exceeding those of Fermilab and approaching those of the SSC and the proposed LHC, while the second-stage would have energy capabilities about 30 percent those of the SSC.

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### The International Thermonuclear Experimental Reactor (ITER)

Economic austerity could place the Soviet HEP program in competition with other science-oriented programs, such as those on superconductivity and fusion. The main Soviet effort in the fusion area is the ITER, a joint research program with the United States, Western Europe, and Japan. Both the SSC and ITER fall into the same Soviet administrative and decisionmaking channels, and both have appeal as "big ticket" efforts with prestige and scientific potential.

### Likely Participants in a Soviet Decision Concerning the SSC

At the leadership level, the current turbulent internal situation in the USSR introduces great uncertainty into the Soviet decisionmaking process. While we believe that Gorbachev, who once considered becoming a physicist, and his closest science advisers are favorably disposed toward cooperation on the SSC, we are uncertain about the views of others among the top leadership and the mechanisms for making the decision.

Until recently, the issue would have gone to the Politburo, but the party's role in decisionmaking is declining. Now it is likely to go to the Presidential Council, Gorbachev's new handpicked cabinet. Questions about the decisionmaking process aside, however, the issue of science and technology policy has dropped down on the agenda of a Soviet leadership increasingly preoccupied with economic deterioration, consumer discontent, and ethnic unrest. Over the past year, Soviet press articles have criticized all the top decisionmaking structures--the party Central Committee, the Council of Ministers, and the Supreme Soviet--for neglecting S&T issues. In this atmosphere, Soviet supporters of SSC participation could find it difficult to move the issue through the Soviet bureaucracy for prompt resolution by the political leadership.

At the Presidential Council level, Academician Yuriy Osipyan, who holds the S&T portfolio in this body, probably will play a key role in determining the outcome. At the recent Washington Summit, Gorbachev touted Osipyan as one of his top science advisers. Many observers have noted Osipyan's meteoric rise in both political and Academy forums during the past two years, and some of them consider him now to be the most powerful of the Academy's 12 vice presidents. He has been an ardent supporter of international cooperation in science and education and, we believe, favors SSC participation. However, he will be weighing SSC against other high priority S&T programs that have constituencies closer to home. In fact, Osipyan himself heads one of the 15 national S&T programs--superconductivity research.

Below the highest political levels, we can identify a relatively stable core group in science and industry who will most likely influence Soviet decisionmaking on SSC participation. The group includes key nuclear ministry officials, top Academy of Sciences leaders--besides Osipyan--who serve as government science advisers, and the heads of

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major research institutes and Soviet accelerator programs. While only a few have made known their views on the SSC, we believe that most would be essentially supportive of participation. Their agendas differ in terms of what they want from cooperation and what they can give. Among this group, two men will have the most influence in determining Soviet policy on SSC participation--Minister of Atomic Energy and Industry Vitaliy Konovalov and Academy of Sciences Vice President Yevgeny Velikhov. See Biograph Appendix and Snapshot Career Comparison.

With respect to participation in the SSC, Konovalov has stated that the USSR would not be content to serve only as a "banker" or "parts" supplier but intended to be involved throughout the project. However, given his position as head of MAEP--the organization that administers and funds Soviet accelerator programs and commands the organizations (the main research institutes and industrial facilities) that would participate in the SSC--he will probably be cautious about committing scarce resources needed for domestic accelerator projects or promising more than MAEP can deliver in equipment and technology. At the same time, he is under the gun to reallocate resources being freed by cutbacks in defense and may look to route resources toward the SSC. In addition, his ministry has been tasked to earn hard currency, and he will probably be eager to sell the United States specialized equipment produced by MAEP or its close industrial associates. Such sales might be pushed as a requirement for Soviet contributions to SSC detector systems.

Velikhov has been the leadership's window on the Western S&T community since the mid-1970s. For many years he has fostered joint research in S&T areas, where he has devoted most of his efforts to cooperative research in fusion. Velikhov has headed the national fusion program since 1973. He convinced the leadership of fusion's potential benefits at least a decade ago, and has been the driving force behind Soviet participation in the International Thermonuclear Experimental Reactor. It was probably because of his influence with the top scientific and political leadership that the fusion program was recently added to the original list of 14 priority S&T programs. He is less likely than Osipyanyan to try to balance all the competing programs and would be more likely to push for his own pet project.

Among the institutional actors, the Ministry of Atomic Energy and Industry will play a key role in negotiating SSC cooperation. MAEP is the parent organization for three of the four main institutes that would be involved in the SSC--the Institute of High Energy Physics (IFVE) in Serpukhov and the Moscow-based Institute of Theoretical and Experimental Physics (ITEP) and Kurchatov Institute of Atomic Energy (IAE). Below Konovalov, in protocol order, are Boris Nikipelov, one of two MAEP first deputy ministers, who is probably Konovalov's designee for cooperative activities with the United States, and Anatoly Vasil'yev and Nikolay Cheverev, chief and deputy chief respectively of the MAEP department that oversees R&D in accelerator and fusion installations throughout the USSR.

The Academy of Sciences will wield particular influence in reaching a Soviet decision on whether and how much to participate in the SSC. Its importance derives, in large measure, from its status and influence as an advisory body to Gorbachev and the government. The Academy oversees the fourth major Soviet institute likely to participate in the SSC--the prestigious Institute of Nuclear Physics (IYaF) in Novosibirsk. In addition to Osipyanyan and Velikhov, another vice president, Anatoliy Logunov, will have a major

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voice in a Soviet decision on the SSC. He heads the national high energy physics program and oversees the country's premier accelerator facility and research center.

Below the top tier of Academy and MAEP leaders is a second echelon of scientific administrators who will also likely weigh in on a decision concerning the SSC. They head the major MAEP and Academy facilities engaged in high energy physics research and directly manage Soviet accelerator programs. All are established scientists known within the international high energy physics community and most have been strong supporters of cooperative HEP research. We believe most, if not all, favor participation in the SSC to gain access to the Texas complex and participate in the SSC's experimental program. Many have made it a point to keep pace with innovations in leading Western facilities like CERN and the German Electron Synchrotron Laboratory (DESY) that may be useful to their own accelerator projects. Some institute directors probably will be concerned that support for the SSC not crowd out or inhibit their own research and super collider projects, and they will try to use SSC cooperation to develop US scientific and industrial contacts that can advance their own programs. This group includes Ivan Chuvilo, director of ITEF, Lev Solov'yev, director of IFVE, and Aleksandr Skriinskiv, director of IYAF, as well as UNK accelerator project leader Viktor Yarba.

Soviet scientists already have visited the SSC laboratory in Texas and probably anticipate participating in the SSC's experimental programs even if Moscow does not make a contribution to the SSC. Over the past year, several scientists from the ITEF, who have worked on one of the teams at CERN, have begun to visit the SSC laboratory and would probably like to follow the American team leader to the SSC. The team leader's close contacts with his Soviet colleagues and his active encouragement of their participation in the SSC have probably raised expectations among some Soviet high energy physicists about their future role in the Texas project. ITEF's Lev Okun, who serves on CERN's Scientific Policy Committee, has already been elected to the SSC's Committee for Scientific Policy. An ITEF deputy director is reportedly coordinating all proposals from Soviet institutes interested in participating in the SSC's experimental programs.

#### Moscow's Likely Position

Ideally, Moscow would like to be involved in all aspects and phases of the SSC, in our view. Konovalov's advocacy of a wide role for the USSR may be echoed by other Soviet officials in their discussions. The Soviets would like to be on-site in Texas, benefiting from the technical interaction, during the construction of the accelerator complex as well as later having full access to the SSC's experiments and research results. Moreover, a number of Soviets would hope to gain US assistance in building Soviet large accelerators if they could make that part of the package.

In the final analysis, however, we believe the Soviets will settle for a more modest role and presence in the US project. We believe that Moscow's competing priorities and other commitments will severely limit its willingness and capability to contribute either funding or high-tech components. In order to ensure its influence in the SSC research program, Moscow probably will offer detector components, such as superconducting magnets, that will require US collaboration in design and construction. The Soviets also may offer to contribute less sophisticated equipment and material.

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Technology Transfer Considerations

Like other potential participants in the SSC, the Soviets stand to gain advanced technology--including possibly COCOM-controlled technology--should they participate in the construction phase of the project. However, the amount of technical know-how the Soviets gain will vary, depending upon whether they build components for the SSC in isolation or whether they construct and assemble subcomponents in cooperation with the West

We believe, however, that actual participation in building the SSC could result in the transfer of COCOM-controlled technology. While such transfers could be minimized if they agreed to build specified components for the SSC in the USSR and then ship the components to Texas for final assembly and incorporation by Western scientists, the Soviets will probably push for technical interaction at the Texas facility

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## APPENDIX\*

### Key Soviet Players in SSC Decisionmaking

#### Nikolay Semenovich Cheverev

Influence and access: Has major planning, management, and funding responsibilities for fusion research in both Ministry and Academy institutes in his post as deputy chief of MAEP Department (or predecessor) for Nuclear Physics and Fusion since 1974

Views on SSC cooperation: Not known.

Expertise, professional status: Affiliated with Kurchatov IAE from 1964 until 1969, prior to posting elsewhere in ministerial apparatus, rising rapidly to high administrative posts...during early career carried out applications-oriented work as an experimental physicist and wrote a series of monographs on high-energy gyrotrons that eventually earned him a State Prize in 1983...led delegation to 1986 meeting of US-USSR Joint Fusion Program Coordinating Committee...participant in conference on East-West cooperation in S&T at US National Academy of Sciences in May 1990...serves on ITER Council (senior governing body of ITER)...speaks English...age 61.

#### Ivan Vasil'yevich Chuvilo

Influence and access: As director of ITEF since 1968, has emphasized the institute's accelerator programs and studies in superconductivity.

Views on SSC cooperation: Not known---as participant in joint US-USSR HEP research negotiations since early 1970s and Soviet chairman of the JCC-FPM during 1975-88 could be expected to support SSC.

Expertise, professional status: After serving in World War II, studied at MGU...joined Academy's Lebedev Physics Institute in late 1940s...transferred to JINR in Dubna in 1954, headed its high energy physics laboratory during 1966-68...served in Vienna during 1972-73 as member of IAEA Scientific Advisory Committee---State Prize laureate and judged by US colleagues to be a first rate experimentalist...excellent administrator and hard-driving manager...doctor of physical mathematical sciences...speaks English...age 65

#### Vitaliy Fedorovich Konovalov

Influence and access: As MAEP Minister since July 1989, runs the government apparatus that manages high energy physics research and accelerator development...oversees redistribution of MAEP resources freed by defense conversion

\* A glossary at the end of this appendix explains the acronyms used herein as well as in a following foldout career comparison chart

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Views on SSC cooperation: In favor, but claims economic problems will force Soviets to cut back on participation in SSC...says much of remaining contributions would be in hardware

Expertise, professional status: Graduated from Ural Polytechnical Institute in 1956 and immediately entered the Ministry of Medium Machine Building (MSM), the defense-related predecessor of MAEP...worked his way up administrative ladder, serving during 1975-86 as director of several plants, subsequently as directorate chief...in 1988 became deputy to then MSM Minister (and now Deputy Premier for Fuel and Energy) Lev Ryabev...age 58

Anatoliy Alekseyevich Logunov

Influence and access: Academy vice president since 1974...holds both science and government directorships of high energy physics program...former director and now scientific director of IFVE...first supervisor for development of the UNK accelerator complex at Serpukhov...since 1977 has been rector (president) of Moscow State University, which has its own Institute of Nuclear Physics

Views on SSC cooperation: Not known...has spoken out for increased international S&T cooperation.

Expertise, professional status: MGU-trained theoretical physicist...spent early career at IINR in Dubna

He and associates received Lenin and State Prizes for work on Serpukhov accelerator...doctor of physical and mathematical sciences...tough negotiator...speaks some English...age 63

Boris Vasil'yevich Nikipelov

Influence and access: One of two MAEP first deputy ministers...supervises deputy ministers responsible for mining, metallurgy, materials, nuclear fuel fabrication, instrumentation, international commercial dealings, and defense applications...more directly controls R&D relating to nuclear fuel cycle, isotopes, and fundamental studies in nuclear physics and fusion...probably MAEP Minister Konovalov's designee for cooperative activities with the United States

Views on SSC cooperation: Presumably supportive...has commented that prospects would be improved if US bought scientific equipment from USSR...has said he will pursue joint ventures in high technology in appropriate fields and will work to strengthen US-Soviet relations in science, technology, and economics

Expertise, professional status: Has published since at least 1971 on fissionable materials, spent fuel, and radioactive waste...Ministry's spokesman at recent Supreme Soviet hearing on 1957 nuclear accident in Kyshtym (chemical explosion of radioactive waste storage tank)...age 59

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**Yuriy Andreyevich Osipyan**

Influence and Access: Touted by Gorbachev at May 1990 Summit as a top science adviser...as a member of Presidential Council, is sole representative of S&T community at cabinet level...Academy vice president...cofounder and director, Academy's Solid State Physics Institute...has headed national superconductivity effort since 1988

Views on SSC cooperation: Not known, but has consistently supported increased scientific and educational collaboration with the West

Expertise, professional status: Brilliant applied physicist renowned for discoveries of the effect of light on semiconductors...doctor of physical mathematical sciences...State Prize winner...professor, dean at prestigious Moscow Physical Technical Institute...served on committee to streamline Academy procedures and reduce bureaucracy...prepared Academy's 1989 budget and presented it to the government...chaired Teller Commission (vote tabulation) of USSR Congress of People's Deputies...President, International Union of Pure and Applied Physics (IUPAP) speaks English...age 59

**Aleksandr Nikolayevich Skrinskiy**

Influence and access: As director of IYaF since 1977, oversees the Academy's premier high-energy physics research facility and largest institute in its Siberian branch...in 1989 became academician secretary for nuclear physics department, a post that usually entails residency in Moscow, but has stayed on in Novosibirsk as IYaF director...has set up a Serpukhov branch of IYaF to collaborate with IFVE on building Soviet electron-positron super collider...he was in charge of the entire collider project for the USSR.

Views on SSC cooperation: Not known...said in 1986 that US decisions on SSC would speed up Soviet decisionmaking on their own accelerator programs.

Expertise, professional status: Judged by many US experts to be best accelerator physics scientist in the USSR...after graduating from MGU in 1959, entered IYaF, where he earned acclaim as a topnotch high energy physicist...awarded Lenin Prize in 1967 for work on colliding beam accelerators...became academician at remarkably young age of 34...since 1983 has been a member of International Committee for Future Accelerators...since 1985, a member of CERN Scientific Policy Committee...said in 1987 that collaboration between Academy and Ministry laboratories to build Soviet super collider was major venture because of bureaucratic hurdles and traditional antipathies...doctor of physical mathematical sciences...speaks English...age 54.

**Lev Dmitriyevich Solov'yev**

Influence and access: Director of IFVE since 1975...as of 1982 was chairman of IUPAP Particles and Fields Commission--the body recommended by an international study group in 1975 to spearhead multilateral collaboration on development of new accelerators

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Views on SSC cooperation: Not known

Expertise, professional status: Trained at MGU and Steklov Mathematics Institute...by his late twenties had published numerous papers on high energy physics...member of JINR staff 1958-64, with 6-month stint at Niels Bohr Institute in Copenhagen during 1962...probably joined IFVE at its establishment in 1965...lauded in Soviet press in 1970 for developing theory of elementary particles that made it possible to experimentally check out theoretical ideas...received State Prize in 1973...has attended numerous international conferences throughout his career...speaks English...age 56

Atlant Anatol'yevich Vasil'yev

Influence and access: Soviet cochairman of JCC-FPM since 1988...heads Department of Fundamental Studies in Nuclear Physics and Fusion in MAEP or its predecessor since about 1976...reports directly to First Deputy Minister Nikipelov...portfolio includes supervising and setting research priorities for IFEF and IFVE...controls liaison between Ministry and Academy physics institutes

Views on SSC cooperation: Not known

Expertise, professional status: Pioneer in developing electronic systems for accelerators, where his major contribution was in automatic beam control...early career at Academy's Lebedev Physics Institute, followed by about 15 years at Radiotechnical Institute (deputy director by 1967), with stints at JINR and CERN...has attended conferences in United States and Europe...chaired session at 11th National Particle Accelerators Conference in Dubna, USSR, 1988...doctor of technical sciences...speaks English...age 61.

Yevgenly Pavlovich Vellkhov

Influence and Access: Close adviser to Gorbachev...Academy vice president since 1977...academician secretary for computers and information science...director, Kurchatov Atomic Energy Institute (IAE) and the Academy's Nuclear Energy Institute since late 1988...Supreme Soviet deputy and subcommittee chairman

Views on SSC cooperation: Longtime supporter of collaborative high energy research, but cautious about commitment of resources.

Expertise, professional status: Probably the best known Soviet scientist in the international S&T arena...trained as a nuclear physicist at MGU and IAE...became deputy director of IAE in 1971 and headed its Troitsk branch during 1971-78...specialist in magnetohydrodynamics...has pushed hard since early 1970s for international cooperation on fusion research...doctor of physical mathematical sciences...holder of Lenin and State Prizes...president, USSR Nuclear Society...speaks English...age 55.

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Viktor Aleksandrovich Yarba

Influence and access: First deputy director of IFVE in Sepukhov...head of the UNK particle accelerator project

Views on SSC cooperation: Not known

Expertise, professional status: Began career in late 1950s as a member of JINR...in 1963 was one of the discoverers of phenomenon involving pi mesons...has participated in international conferences and joint accelerator research throughout career...by 1969 was scientific secretary of IFVE, became deputy director by March 1975, promoted to first deputy director probably in 1981...speaks English...age 55. (

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## GLOSSARY

<u>Acronym</u>	<u>Expansion</u>
Academy	USSR Academy of Sciences
CERN	European Center for Nuclear Research, Geneva
IAE	Institute of Atomic Energy <del>imenj</del> Kurchatov, Moscow
IFVE	Institute of High Energy Physics, Protvino/Serpukhov
ITEF	Institute of Theoretical and Experimental Physics, Moscow
ITER	International Thermonuclear Experimental Reactor, Garching, West Germany
IUPAP	International Union of Pure and Applied Physics
IYaF	Institute of Nuclear Physics, Novosibirsk
JCC-FPM	Joint Coordinating Committee on the Fundamental Properties of Matter, under US-USSR Agreement on the Peaceful Uses of Atomic Energy
JINR	Joint Institute for Nuclear Research, Dubna, USSR
LHC	Large Hadron Collider, CERN, Geneva
MAEP	Ministry of Atomic Energy and Industry, Moscow
MGU	Moscow State University, Moscow
SSC	US Superconducting Super Collider, Dallas
UNK	Accelerating and Storage Complex, IFVE, Protvino/ Serpukhov
VLEPP	Large Linear Electron-Positron Collider, IFVE, Protvino/Serpukhov

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**A SNAPSHOT CAREER COMPARISON  
OF SOVIET LEADERS IN COLLIDER DEVELOPMENT**

	Ministry of Atomic Energy & Industry	Academy of Sciences	Positions in International & National Forums
N. CHEVEREV ▼	Dep. Chief, Dept. for Fundamental Studies of Nuclear Physics and Fusion		ITER Council; Head, delegation to JCC for Fusion Power Program
I. CHUVELO ★ ● ▼	Director, Inst. of Theoretical and Experimental Physics		Past chairman (1976-88), JCC-FPM
V. KONONALOV	Minister		
A. LOGUNOV ★ ● ▼	Scientific director, Inst. of High Energy Physics	Vice president	Head, National High Energy Physics Program; Rector, MGU
B. NIKIPELOV	First deputy minister		
Yu. OSIP'YAN ▼		Vice president; Director, Inst. of Solid State Physics	Member, Presidential Council; Head, National Superconductivity Program; President, IUPAP
A. SKRINSKIY ★ ■ ▼		Acad. secretary for nuclear physics; Director, Inst. of Nuclear Physics	Member, CERN Scientific Policy Cttee.; Member, Intl. Cttee. for Future Accelerators
L. SOLOV'YEV ★ ● ▼	Director, Inst. of High Energy Physics		Chairman, IUPAP Comm. on Particles and Fields (as of 1982)
A. VASIL'YEV ● ■	Chief, Dept. for Fundamental Studies of Nuclear Physics and Fusion		Chairman, JCC-FPM
Ye. VELIKHOV ★ ■ ▼	Director, Kurchatov Atomic Energy Inst.	Vice president; Acad. secretary for Information and Computers; Director, Nuclear Safety Inst.	Head, National Fusion Program; Deputy, Supreme Soviet
V. YARBA ●	First deputy director, Inst. of High Energy Physics		Project leader, Accelerator and Storage Complex

★ MGU GRADUATE  
● JINR EXPERIENCE  
■ CERN EXPERIENCE  
▼ LENIN OR STATE PRIZE WINNER