providing jobs for US scientists are ways to pay back the US, at least in part.

Ironically, this too has drawn fire. For the Japanese, who are nothing if not status-conscience, have been hiring top researchers from US universities and from industrial labs such as IBM, AT&T Bell Labs and Bellcore. Most of the Japanese-supported labs are by design within easy commutes to leading research institutions. Canon's Palo Alto lab, for example, has cultivated close ties to Stanford, from which both of its two top-ranking Americans were recruited. Kahng and Joseph A. Giordmaine, vice president for the physical sciences at NEC Research Institute, both had long careers at Bell Labs before coming to NEC; the institute's vice president for computer sciences C. William Gear was formerly head of the computer sciences department at the University of Illinois, Urbana-Champaign.

The thought of Americans working for Japan leaves many folks within the US research and business communities uneasy, even when the promise is made that all results will be published. It's been characterized as "econonomic warfare," with some speculating that the quality of research at universities may decline as a result.

Not surprisingly the Japanese see things in a different light. "It's just business," says Matsushita's Yokoi. "We do recruit good people from other companies, and we hire people from good schools. But that's what everybody does." —JEAN KUMAGAI

MINNESOTA LURES TOP THEORISTS FROM LEADING SOVIET INSTITUTES

Four years ago the University of Minnesota announced that it was establishing, with the support of Minneapolis real estate developer William I. Fine, an institute for theoretical physics (PHYSICS TODAY, February 1987, page 99). Two years later, after a difficult search, Larry McLerran, a theoretical physicist at Fermilab, joined the institute as its director. Now the news is that five appointments have been made to the institute's permanent faculty—and that all five professorships will be held by distinguished Soviet scientists.

Describing the background to the five appointments, Marvin L. Marshak—the head of Minnesota's school of physics and astronomy—said that university recruiters discovered four years ago when they first were trying to staff the institute that they were suffering a severe geographical disadvantage. "Theoretical physicists, like Bose particles, tend to cluster," Marshak said, "and this was not a part of the world where they had been clustering much." So when the University of Minnesota started to talk with potential recruits for the institute, Marshak said, it soon was found that candidates fell into two mutually exclusive categories: those who were qualified and those who were willing to settle in Minneapolis.

The crucial breakthrough occurred when the university's recruiters hit upon something entirely unsuspected: There are highly qualified theoretical physicists from the USSR who *like* Minneapolis. They'd say things like, "It isn't too hot here, the way it is in California."

Soviet recruits

All five of the Soviet appointees initially came to Minneapolis as visitors to the theory institute. Marshak says—seriously—that one thing keeping some of them there now is concern about whether their children would be able to readjust to the USSR's more rigorous schools after spending a year or two in US schools. Most of the Soviet appointees have chosen to retain joint appointments with their home institutions in the USSR, reserving the option to eventually return home. All five are concurrently members of the Theoretical Physics Institute and tenured faculty of the Minnesota school of physics and astronomy.

Boris Shklovskii, who has joined the Theoretical Physics Institute as associate director for condensed-matter physics, will continue to be a member of the Ioffe Leningrad Physical Technical Institute. Shklovskii has been given a chair at Minnesota that has yet to be named.

Arkady Vainshtein, a particle theorist, has a joint appointment as a professor of physics at Minnesota and as a staff member of the Institute for Nuclear Physics in Novosibirsk, where he was a full-time employee until recently. Vainshtein will hold the Gloria Becker Lubkin professorship of theoretical physics at Minnesota, named for the editor of PHYSICS TODAY, who played an important role in the conception and planning of the institute.

Mikhail Voloshin, also a particle theorist, has a joint appointment with the Institute for Theoretical and Experimental Physics in Moscow. He serves as associate director for particle physics at the Theoretical Physics Institute.

Mikhail Shifman, the third particle physicist to be recruited by the institute (not counting McLerran, a seminal figure in the development of quark–gluon plasma theory), left Moscow's ITEP to become a professor of physics at the Minnesota institute.

Leonid Glazman, who most recently worked at the Institute for Solid-State Physics and Microelectronics in Chernogolovka, has become an associate professor at Minnesota.

Marshak, wary of making claims about individuals working in fields that are not his own, declined to rank the Soviet recruits. It bears noting, however, that physics generally is considered to be at the top of Soviet science, and that Soviet theoretical physicists are especially highly prized worldwide for their skills at analysis, computation and approximation techniques.

In a survey conducted last year by the Institute of Scientific Information and described in *The Scientist*, a weekly newspaper published in Philadelphia, two of the Minnesota recruits were on a list of 10 Soviet scientists most frequently cited in the world's scientific literature between 1973 and 1988—Shifman ranked third and Vainshtein fourth. It may be risky to base an estimation of an individual's scholarly achievements solely or even primarily on numbers of citations, but the appearance of Shifman and Vainshtein on *The Scientist*'s list does provide at least a clue to their eminence. (Alexander M. Polyakov, who left the Landau Institute two years ago, first for MIT and then for Princeton, ranked sixth on *The Scientist*'s list.)

'Moscow on the Mississippi'

Referring to the startling concentration of Soviet physicists at the University of Minnesota, Marvin Goldberger, the director of the Institute for Advanced Study at Princeton and a member of the Minnesota theory institute's oversight committee, has dubbed Minneapolis "Moscow on the Mississippi"—a joking play on the movie, *Moscow on the Hudson*, in

which a Soviet emigré experienced amusing difficulties adjusting to life in New York.

A couple of the Soviet physicists have complained that faculty seminars in the US are too polite, saying that seminars in the USSR tend to be raucous affairs, with scientists wresting chalk away from each other and pushing their way to the blackboard. "It is considered a good habit to end the discussion in one hour," Voloshin said of seminars here. "In the Soviet Union, we sometimes go on for four hours."

Marshak says that the Soviet physicists may also have to get used to dealing with students more gently than is considered necessary or appropriate in the USSR. They are expected to assume teaching responsibilities at the university, and Marshak hopes that the theory institute will obtain more faculty, rather than a larger number of temporary visitors, so that it can make a substantial contribution to education at the university. The institute currently is searching for a person to fill an endowed chair in condensed matter theory, and plans call for an additional regular position in condensed matter as well.

In hiring the Soviet physicists, did the university worry about an appearance of staging a hostile raid on a weakened adversary? And how do the Soviet physicists feel about the appearance of deserting their homeland at a time of national crisis?

McLerran, who first made extensive contacts with Soviet scientists as a visiting professor at the University of Helsinki in 1982–83, points out that the theory institute did not start with the intention of hiring a group of Soviet physicists. What happened, initially, is that Shklovskii, Voloshin and Vainshtein came to the institute as visiting faculty and liked it. Voloshin and Vainshtein worked out arrangements permitting them to return each year to their home institutes in the USSR for periods of about three months. Their acceptance of the appointments at the institute was approved by leaders of the Soviet Academy and the USSR's atomic energy commission.

Once some eminent Soviet physicists had joined, other Soviets naturally were more interested in joining or visiting Minneapolis too. McLerran says it became clear about a year ago that Shifman, a close friend of his for years, intended to leave the USSR at least for some period of time, and so the institute (and several other institutes as well) made him an offer. Shifman accepted the offer from TPI and resigned his position at ITEP.

McLerran says he has encountered little or no resentment among Soviet scientists about the institute's hiring of the five physicists, though he concedes it may cause some feeling of frustration among young US scientists. He says it is a sad thing that many Soviet institutes are depleted of their theorists. But he feels that most Soviet scientists believe letting people do what they want to do is consistent with the future their country is trying to build—that what they want to have is a free society.

Addressing the question of how the Soviet physicists at the theory institute perceive their situation, Voloshin points out that the kind of arrangements they have made with Minnesota are commonplace in international science. "If, say, an Italian physicist holds joint positions in the US and in his home country, this has never been a surprise and is considered to be beneficial for the development of science in both countries. The present unprecedented involvement of Soviet scientists in the US universities can be viewed as a first important step toward establishing such a normal style of international collaboration with the Soviet scientific community too.

"As long as the door for a free exchange of researchers between the Soviet Union and the West is open," Voloshin continued, "there is hope that after some time the exchange will go in both directions. After all, the Soviet scientists who are now being enthusiastically hired by American universities have come from a great and original scientific environment in their homeland and from scientific schools that are recognized and highly esteemed throughout the scientific world. Those schools are still there, and it may become quite appealing for both young and experienced researchers from the West to spend some time at Soviet universities and institutions to diversify and deepen their own understanding of science."

Shifman adds: "The scientific atmosphere in the theory department in Moscow that I belonged to was exceptionally fruitful—one of the best in the world as I understand it now. If I could confine myself to life in that theory department building in Moscow, I would never leave it."

Role of committees

The bureaucratic background to the hiring of the five Soviet physicists, according to all involved, did not deviate from the standard one. All candidates were reviewed on an equal basis; the only unusual details were that Soviet scientists were included in a list of candidates during the search and that those responsible for the search were ready to contend with special problems arising from the consideration of Soviet physicists.

After some initial work by a search committee established at the time the institute was founded, it was decided to set up a scientific advisory committee and an oversight committee—essentially a board of directors that would act on recommendations from the scientific advisory committee and make decisions concerning the staffing and budgeting of the institute. The scientific advisory committee has been chaired by Leo P. Kadanoff of the University of Chicago, and the oversight committee by Fine and Lubkin.

The potential Soviet recruits "all passed with flying colors," says Lubkin, when they were evaluated by the scientific advisory committee. All five also had to pass muster with the oversight committee.

Other beneficiaries

There are of course a great many Soviet physicists whose work is well known throughout the world, and Minnesota is not the only university in the United States to be benefiting from the new freedom Soviet scientists have to travel.

For example, even before Polyakov accepted a position on Princeton's faculty, the university had lured Alexander Migdal from the Landau Institute. A famous theorist in his own right, Alexander is the son of another famous theorist, A. B. Migdal, who was a member of Landau's original group. Andrei D. Linde and Renate Kallosh, distinguished theorists from the Lebedev Institute in Moscow, have accepted positions on Stanford's faculty. Other US recruits from the USSR include A. L. Efros of the Ioffe Institute, who has a two-year appointment at the University of California, Riverside; Roald Sagdeev, director emeritus of the Institute for Space Research (IKI), who has accepted a position as a Distinguished Professor at the University of Maryland; and Boris Alt'shuler, who is a full professor at MIT.

Altogether, according to a compilation made by the US Information Agency in Washington, 154 Soviet physicists and 46 Soviet mathematicians came to the United States to spend at least one semester at a US university between July 1989 and June 1990. Since July 1990, 87 Soviet physicists and 47 mathematicians have come for at least three months or longer. —WILLIAM SWEET ■

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