Superconducting Superscramble

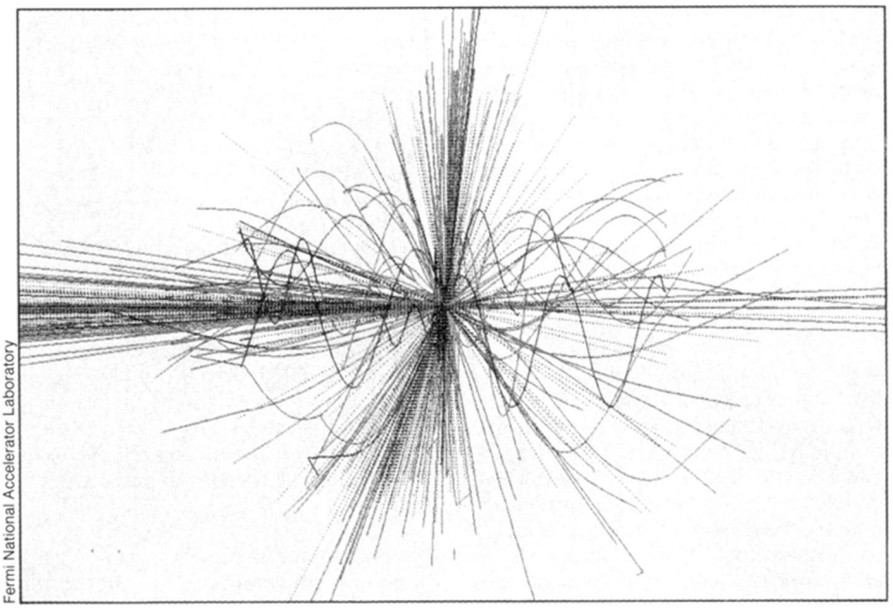
Winnemucca is a small town by the railroad tracks in the middle of Nevada, somewhat removed from the state's main centers of glitz and gambling. Winnemucca is one of the places proposed as a site for the Superconducting Super Collider (SSC) – at least according to gossip heard in California. Winnemucca is surrounded by wide-open space, and the SSC, the world's most energetic particle accelerator, will require a ring tunnel 52 miles in circumference. The gossiping Californians, who tend to be partisan about their own state's effort to get the SSC, doubt that Winnemucca can handle it. Still, one of them muses, it could be the making of the University of Nevada at Reno, which, as the nearest university, would stand to gain many research and other advantages from its presence.

The SSC will collide protons against protons with a total energy of 40 trillion electron-volts to study the most microscopic structures of matter. It will bring a bit of urban glamour and intellectual ferment to the (possibly remote) region that gets it. It will bring billions of dollars to the local economy – the estimated $4.4 billion cost of the SSC plus who knows how much in secondary business attracted by the installation – and thousands of jobs in every skill category from pick-and-shovel to theoretical physicists.

"We're talking about 4,000 to 7,000 scientific and technical jobs, plus all the support people," Rep. Dennis Hastert (R-Ill.), whose district includes most of one proposed site, told the Associated Press. It is an utterly peaceful project; there are no weapons, no nuclear explosives and a vanishingly small danger of escaping radiation. It could provide a tremendous boost to a small neighborhood university.

The line for submission of site proposals is forming at the Department of Energy. For some time the politicking has been intense, although up to now "all of the state efforts have proceeded at their own risk," says Stanley G. Wojcicki, one of the members of the central planning group that has been making preliminary plans for the SSC. Now the states have something of a commitment from the federal administration, and their effort and the involvement of their politicians has intensified.

Governors and lieutenant governors from many states came to Capitol Hill in mid-April to testify before the Energy Subcommittee of the House of Representatives Committee on Science and Technology. As of now the governors' strategy seems to be for all to pull together to get a congressional endorsement of the project. Then they can start to fight over who gets it. According to the Associated Press, 20 states have appropriated or spent more than $22 million in their efforts to get it. Roy Romer, governor of Colorado, has called the SSC "the largest commitment to basic research in the history of man."



Fermi National Accelerator Laboratory

Physicists expect the SSC to make Higgs particles, as this computer simulation shows. Discovery of a Higgs particle would confirm the existence of the Higgs mechanism, which is theorists' understanding of how different kinds of particles get the different amounts of mass that they have. Mass is perhaps the fundamental quality of material, and so in a sense the Higgs mechanism tells how material particles become material.

Opposition comes from a number of scientists who believe that the SSC will take too much of the government's science budget and so starve other branches of science. Some editorial writers agree with them. The New York Times, for example, has been quite huffy. In an editorial published April 28, it recommended waiting until magnets can be made of some of the newly developed high-temperature superconductors. Such a wait, the Times believes, would make the project smaller and less expensive. However, it would also mean redesigning magnets that are now largely designed and waiting an unknown period of time. As the history of other superconducting materials has shown, it could be a long time from the first wires and films that are just now being made from the new materials to the development of extrusions reliable enough, workable enough and constant enough in thier properties to make large magnets.

Congress will have to approve the SSC and appropriate the funds, but the administration would like to keep Congress out of the site selection procedure. As he announced the site selection procedure, Energy Secretary John S. Herrington said it was designed to keep politics, and especially Congress, out. He said what he had to say and what he undoubtedly wants to be the fact, but it is likely to be as difficult to keep Congress out of this as it is to keep them out of the site selection for a new Air Force Base. They are likely to try to create pressure where they can. Already there is talk of a senator trying to tie this site selection to that for a nuclear waste repository. Herrington objected to

this, saying the projects are separate.

The site selection procedure, as Herrington outlined it, stresses scientific, technological and logistic criteria. States have until August 1987 to submit proposals. A first screening by a committee of the National Academy of Sciences – National Academy of Engineering, to be finished by the end of 1987, will narrow the field. Then the Department of Energy's Energy System Acquisition Advisory Board, chaired by Under Secretary Joseph Salgado, will choose a finalist. Herrington will confirm the final site and announce it by January 1989. After that, seven years' construction time is expected.

State by state, the public relations blitz is already well under way. The day before Herrington's announcement, Illinois issued a glossy 95-page brochure detailing geological, environmental, economic, sociological and historical surveys of its proposed site, which lies in Kane, Dekalb and Kendall Counties to the west of the Fermi National Accelerator Laboratory. The plan would use Fermilab's Tevatron as a proton injector for the SSC. The April 15 Chicago Tribune reports that a poll taken by Northern Illinois University shows that people living in the area strongly favor the project. Already regional coalitions seem to be forming. The Tribune reports that the governor of Wisconsin, Tommy Thompson, and the governor of Ohio, Richard Celeste, have both said that if their states lose their bids, they will support Illinois.

California offers two sites in its Central Valley. One lies between Stockton and Modesto. This could provoke a new version of an old joke:

"If I go through this tunnel, will I come up in Modesto or in Merced?"

"Can you tell the difference?"

"Yes. Merced is the one with the banner stretched across the main street. – No, that's Modesto."

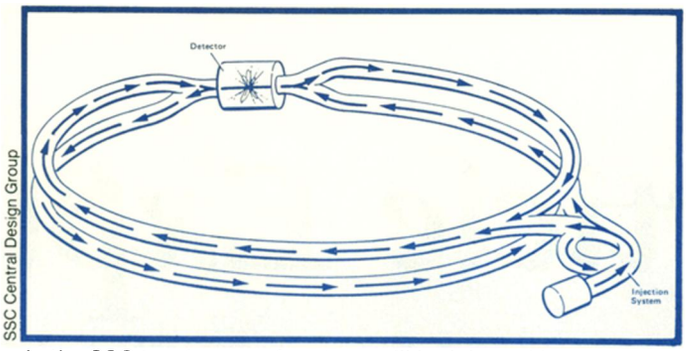
The other California site, called Yolo-Solano, lies just west of the state capital, Sacramento. Smack in the middle of the SSC ring would be Davis, site of a campus of the University of California.

Texas has mentioned a location near San Angelo. Colorado is looking at its eastern plains, doing surveys of geology, seismicity, transportation, even cultural and sporting facilities – the brochure contains pictures of Winter Park and Snowmass, and it says: "This Executive Report is to inform Coloradans about the immense potential of the SSC while demonstrating that Colorado is ideally suited to host this significant project."

"We believe North Carolina has an excellent geological site for the SSC which is enhanced by the proximity of Research Triangle Park, North Carolina State University, Duke University, the University of North Carolina at Chapel Hill and the Raleigh-Durham Airport," says a statement from Earl R. Mac Cormac, science adviser and executive director of the North Carolina Board of Science and Technology. Paul H. Frampton, recently appointed as North Carolina's SSC project director by Gov. James Martin, ended a speech with: "My job description . . . is to oversee the quality of the technical and scientific content of the proposal which we shall submit in August to the DOE. I leave it to others to establish the strong political base in Washington necessary for the final victory."

Some suggest that certain large states (Illinois, Texas, California) can offer the federal government cost-cutting or cost-sharing inducements. Under the sponsorship of Sen. Pete Domenici (R-N.M.) the Senate has amended the DOE appropriations bill to forbid the department to take such inducements into account. As of June 1, the House was considering similar legislation, but according to some reports, that legislation has little chance of approval. Says Rep. Terry Bruce (D-Ill.), "Obviously Domenici is saying that states that have the resources to bring in the SSC ought not to be able to use those resources. I think that's a poor way to run the shop around here."

– D. E. Thomsen



SSC Central Design Group

In the SSC two beams of protons will be injected into separate pipes, in which they will circulate in opposite directions while being accelerated to energies up to 20 trillion electron-volts. When they reach the desired energy, the beams will be switched to a collision course and meet inside the detector.