

known to be," says Richter, "to believe that SLC will come close to its design luminosity in its first year." LEP, on the other hand, with its essentially traditional technology, should reach its design parameters more promptly. But Richter is confident that the SLC detectors will see at least a hundred thousands Z^0 's in the first year.

Two detector systems have already been selected for the early operation of SLC. The first to go into the collision area will be the seven-year-old Mark II detector, veteran of the SPEAR and PEP e^+e^- rings at SLAC. For its new role at SLC, the Mark II will be extensively upgraded. It will get a new drift chamber and end-cap detectors that will permit the detection of particles within 5° of the beam direction.

Because the SLC beam width at the collision point is much narrower than that of storage rings such as PEP or LEP, one has the opportunity to begin tracking charged particles very close to the collision point. This is particularly important for the direct observation of bottom- and top-flavored heavy mesons (see August, page 17), whose lifetimes are as short as 10^{-12} or 10^{-13} seconds. To exploit this closer access to the collision point, the Mark II will get a small, moderately high-resolution vertex detector, which will permit tracking within 1 cm of the e^+e^- collision point. Whether this vertex detector will employ charge-coupled-device elements or silicon microstrips has not yet been settled.

The second detector, called SLD, is being built from scratch by an 18-group consortium headed by Charles Baltay (Columbia) and Martin Breidenbach (SLAC); it will not be ready until 1988. This state-of-the-art detector, costing \$50 million (twice what it would cost to build the Mark II today), "will have all the bells and whistles needed to do a complete Z^0 physics program," Richter told us. Breidenbach hastened to assure us that these "bells and whistles" are to be accomplished within a reasonably austere budget.

Whereas Mark II has no hadron calorimetry, SLD will have a "fission-compensated" hadron calorimeter—alternating layers of uranium and liquid argon. Bill Willis (CERN) has demonstrated that replacing the traditional iron by uranium in a hadron calorimeter permits one to exploit fission processes to improve the energy resolution by a factor of two. SLD will also have a Cherenkov ring-imaging detector for particle identification, and an ultra-high-precision vertex detector with a resolution of 10 or 20 microns.

The two detectors will reside on opposite sides of a "push-pull" platform in the experimental area, devised so that one can switch detectors at the collision point with relative ease. In

addition to Z^0 physics, it now looks as if the new Stanford collider will be doing extensive top-quark spectroscopy. Richter stresses the fact that the single-pass collider, unlike e^+e^- storage

rings, can provide polarized-electron collisions. Even though it cannot offer polarized positrons, the polarized electrons will greatly facilitate the study of electroweak processes at SLC. —BMS

Nova nears completion



Inertial-confinement fusion experiments at Livermore's 10-armed Nova laser are expected to begin early next year. With the capacity to deliver 100-kilojoule, nanosecond pulses of 1.05-micron infrared light, Nova will have the highest peak power (exceeding 100 terawatts) of any laser yet built. In July, eight of the ten Nova beams were fired, delivering a 57-terawatt, nanosecond pulse. Eventually such pulses will be directed at millimeter-sized deuterium-tritium pellets, exploring the density and temperature region of D-T fusion ignition.

The photo shows the optical switchyard, through which the ten 74-cm-diameter beams are transported from the laser room (rear left) to the evacuated target chamber room, where they are focused and made to converge on the pellet. The large aluminum tubes (5 of the 10 are visible here, in various stages of completion) assure the cleanliness and thermal uniformity of the air through which the beams travel. Baffles on the inner tube walls remove stray light from the beam.

The lasing medium is neodymium, doped into a special phosphate glass designed to tolerate the extraordinary light-density levels of Nova. KDP crystals will be incorporated to provide second-harmonic (green) and third-harmonic (ultraviolet) output in addition to the fundamental infrared neodymium lasing frequency. Experiments on Novette—an experimental setup employing the two arms still to be transferred to Nova—have shown that the coupling of the laser light to the pellets is enhanced at these shorter wavelengths.