superconducting coil at its economical limit and puts inside it a conventional coil for the advantages of both.

A hybrid system chosen for initial development will have a water-cooled insert producing 165 kG from a 5-MW input surrounded by a 40-cm-bore 60-kG superconducting coil. The combination will make 225 kG for half the power now required. The laboratory expects to see it in operation this year.

Forces between the two coils make matters difficult. An axial displacement from equilibrium would produce 3600 kg/cm of displacement. The makers must prepare also for an unstable radial force of 550 kg/cm of displacement. Moreover the system must withstand any displacement of the equilibrium caused by partial failure of either coil.

According to plan the superconducting booster for the first system will have 24 double pancakes wound of 2 × 10-mm rectangular conductor that consists of many strands of niobium-titanium in a pure-copper matrix. 5000 meters of conductor will make a coil weighing 700 kg. In usual operation the superconducting coil will produce a constant field, and sweeping will be accomplished with the conventional insert.

Cooling is expensive, too, and the laboratory has plans to make it no more expensive than need be. The cryostat will have 35-cm inner bore, 100-cm outer diameter and 90-cm height. After the coil is installed, the cryostat will be welded closed and supported by spokes like a bicycle wheel. Helium losses will be about 1 liter of liquid per hour with current leads removed and 4–5 liters per hour at full field. When the coil is not in use, helium will be transferred to a 100-liter storage vessel, and a regenerative refrigerator will keep the coil at 20°K.

International Program on Solar-Terrestrial Physics

With the sun waxing out of its quiet years into a period of maximal activity, an international program on solar–terrestrial physics is replacing IQSY, the International Quiet Sun Year program of, 1964–65. Herbert Friedman, head of atmospheric and astrophysics at the US Naval Research Laboratory, is president of the organizing commission, and Edward R. Dyer, a National Academy of Sciences astronomer, has recently taken over secretary duties. 12 projects are in progress under 12 chairmen. Ten nations are represented by the 29 commissioners and two alternates.

The International Council of Scientific Unions has chartered the Inter-Union Commission on Solar–Terrestrial Physics. IUCSTP, as it is called, has the following membership: a seven-member bureau, 18 discipline representatives, two administrative consultants and two representatives (with two alternates) of SCAR (Scientific Council on Arctic Research). Four ICSU unions are involved in the program: the International Astronomical Union, the International Union of Geodesy and Geophysics, the International Union of Pure and Applied Physics and the International Union of Radio Sciences. The bureau consists of a representative from each of these four plus the president, the secretary and a representative of COSPAR (Scientific Committee on Space Research). Its members come from Czechoslovakia, US, USSR and UK. Other members of the council extend national representation to Canada, France, India, Japan, the Netherlands and Norway.

Solar–terrestrial physics is defined to include solar activity, its influence on interplanetary space and its influence on the earth, its atmosphere and its magnetosphere. Within this subject the following 12 projects have been defined: monitoring of the solar–terrestrial environment, proton flares, disturbances of interplanetary magnetic fields, magnetosphere diagnostics, conjugate-point experiments, electric fields in the magnetosphere, magnetic storms and polar disturbances, low-latitude auroras, basic upper-atmosphere structure, atmospheric dynamics, ion chemistry of D and E regions, sudden ionospheric disturbances.

Talking recently with PHYSICS TODAY Dyer explained that the studies are expected to involve several hundred scientists in about 50 countries. It is, he said, a "lower-key IQSY," and it will use many of the observing stations that remain in operation from IQSY. Solar activity appears to be approaching a maximum that will probably occur in late 1968 or early 1969. Meanwhile IUCSTP is making plans to use satellites, rockets, balloons and observations from the ground to pursue its 12 projects. □