The scientists were interested in learning how ocean tides affect earth tides. These interactions are among the least-understood aspects of earth tides.

On the Pacific Coast, they found, the earth tides were about four percent lower than they were in the middle of the continent; at the Atlantic Coast they were about four percent higher than in the continental interior.

On the Pacific Coast, the high ocean tide and the high solid-earth tide generally occur at about the same time. Thus although the land at the coast is being pulled toward the moon, there is an additional large mass of water along the coast. The weight of this additional water tends to depress the edge of the continent, negating a portion of the tidal effect on the solid earth. Instead of a 12-inch high solid-earth tide, for example, there is one of about 11.5 inches.

On the Atlantic Coast the geographical situation is different. The solid earth still responds almost instantaneously to the gravitational attraction of the moon. But because of such factors as the shape of the North Atlantic Basin and the circulation of Atlantic waters, the ocean tide lags about eight hours behind.

As a result, the two kinds of tides are out of phase. High earth tide coincides with low ocean tide. Instead of a surplus of water weighing down the coastal land, there is a deficiency of water, allowing it to rise even higher than normal. The average solid-earth high tide is about 12.5 inches, instead of 12.

"The results shed direct light on the long-standing problem of the indirect influence of ocean tides on the earth tide," say the Columbia scientists. "By taking into account the influence of ocean tides, the gravimetric variations of solid-earth tides for the first time can be brought into a consistent system."

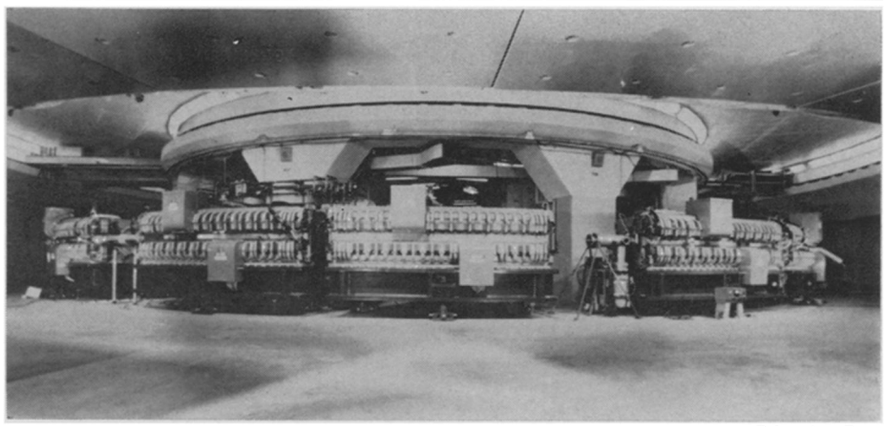
The majority of the previous work on solid-earth tides has been done in Europe. The ocean tides are more complex there, and Dr. Kuo plans to make a few measurements to tie into the new United States data during a sabbatical at Cambridge University starting this fall.

In the meantime he and his colleagues have reinstalled the tidal gravimeters along a north-south line from North Dakota to Texas. The last one went in place in Waco on New Year's Day.

"In the first study we tried to check the longitudinal dependence," says Dr. Kuo. "Now we hope to find what the latitudinal effects are." The perturbations caused by the Gulf of Mexico and the lakes in the northern United States and Canada are among the factors they hope to sort out.

PHYSICS MANPOWER

The squeeze gets personal



Princeton-Penn

Budget cuts may force shutdown of the Princeton-Pennsylvania Accelerator.

"If you know someone who is looking for a job, tell him to go to Blank. They are really hiring; they actually have six positions to fill." Advice of this sort was going the rounds of the corridors in Chicago's Palmer House during the recent joint annual meeting of the American Physical Society and the American Association of Physics Teachers. Jobs were on physicists' minds this year as they never were in the past. After years of shortage there now seem to be too many physicists, at least for some kinds of jobs.

The crisis, which has been developing since about 1967, is linked to Federal money just as was the previous boom. Since World War II physicists have been major beneficiaries of public interest in the atom and the post-Sputnik space race. Students rushed to become physicists, and it seemed the future was assured. Then Government support slowed down, and, immediately, so did the jobs.

The figures for 1970 are not completely in, but, reports the American Institute of Physics placement service, between 800 and 850 physicists registered as job-seekers during the recent meeting. They confronted 101 employers. How many jobs each employer fills, says Dr. Arnold Strassenburg, director of AIP's Division of Education and Manpower, can vary depending on the qualifications of the prospects he meets, but the total number of jobs is probably not more than twice the number of employers.

Before the Government downturn began, in 1963 for example, there were 449 registrants to 257 employers.

The character of the employers has changed, as well as their number. In 1963 there were 116 academic institutions, 107 industrial companies, 26 Government agencies and 8 nonprofit research organizations. In 1970 there were 82 academic institutions and only 17 industrial companies, one Government agency and one nonprofit research institution.

As yet there is virtually no actual unemployment among physicists; most of the job-seekers are employed somewhere. A survey of 1,200 physicists who received Ph.D.'s in the last three years, says Dr. Strassenburg, found only 17 who were actually out of work.

But the disturbing thing in the survey, he says, is the number who have not found permanent jobs. Of the Ph.D. class of 1969, almost half are in temporary postdoctoral fellowships. Formally funded postdoctoral fellowships account for only 20 percent, so it appears, says Dr. Strassenburg, that for the moment institutions are finding some way of keeping people on for a year or so, rather than throwing them out into the cold. Such solicitude is unlikely to be possible for long. "We are building an increasing backlog of people with no apparent way of absorbing them into the physics community," he says.

Statistics by specialty are not available, but it appears that particle physicists are doing especially badly. Most of the laboratories where they work are directly supported by the Government, and they are the only ones faced so far with the actual closure of a large laboratory. "There is no disenchantment with physics," says Director William D. McElroy of the National Science Foundation, "but where high-energy physics is concerned, there isn't the machine time available to absorb any more researchers."

As part of the trend, particularly in particle physics, cuts in this year's budget for the Atomic Energy Commission have forced the AEC to discontinue funding for the Princeton-Pennsylvania Accelerator. The acceler-

ator, the fiirst national laboratory to face a shutdown since the postwar boom, has enough money to see it through the coming year. But if no alternate source of funds is found, it will have to close by 1972.

Dr. Milton G. White, the accelerator's director, is searching for such sources at the same time as he is trying to persuade the AEC to change its mind. His prospects include the states of New Jersey and Pennsylvania, various foundations and private donors. But persuading any of these to take a significant part in the support of particle physics would be a new departure in American science funding, and he is not overly hopeful.

The grim employment situation is bound to have some effect on physics students. Dr. Strassenburg says that all over the country professors are meeting to try to decide what to do. Restrictions on the input of physics students are likely to be the outcome, and Dr. Strassenburg is afraid there may be an overreaction. If too few new students are admitted and if the smaller graduate physics departments are dropped entirely, he fears, output of physicists could come down too drastically. In six years, the employment crisis could again be too few physicists for too many jobs. ☐

NEWS BRIEFS

MHD; pollution standards

Magnetohydrodynamics, a method for producing electricity from the burning of coal, got a boost last year when an Office of Science and Technology panel recommended $2 million in research and development funds for it (SN: 7/5, p. 8).

At least some of the message has rubbed off on the Nixon Administration, whose 1971 budget has requested some $900,000. George Fumich Jr., director of the Office of Coal Research, describes it as "a foot in the door. We think it is significant progress," he says. ☐

Backing up President Nixon's environmental message to Congress, the Department of Health, Education and Welfare this week issued stringent new auto-exhaust standards. The standards attack the big three of auto-exhaust emissions: nitrogen oxides, hydrocarbons and carbon monoxide. The new standards are respectively: 0.9 gram, 0.5 gram and 11 grams per vehicle mile.

The nitrogen oxide standard, the first of its kind, goes into effect in 1973; the hydrocarbon and carbon monoxide standards are for 1975. Present standards are 2.2 grams and 23 grams. ☐