Taking up the SLAC in nuclear physics

Particle physics was begotten out of nuclear physics. As physicists raised the energies of the probe particles—primarily electrons and protons—that they used to study the structure of atomic nuclei, they found that they were generating particle phenomena that had little or nothing to do with nuclear structure. So particle physics was born and went on to ever higher energies: From the few hundred million electron volts typical of nuclear studies to the billions, hundreds of billions and now almost trillions, of electron volts.

Now the circle has come round. Nuclear physicists, wishing to study a new level of nuclear structure, find that they need electrons with energies characteristic of particle physics, a few billion electron volts, and they are coming to particle physics installations to get them. A major example is a program of nuclear structure experiments now added to the operations of the Stanford Linear Accelerator Center (SLAC), for twenty years a single purpose particle physics laboratory. The program, called Nuclear Physics at SLAC (NPAS) involves both the formal dedication of some of the linear accelerators' time and the construction of equipment, primarily a $1.65 million electron injector. Construction started in October, when appropriated funds became available.

What the nuclear physicists want to study is the distribution and behavior of quarks in the nucleus. Ray Arnold of American University in Washington, D.C., who is now working at SLAC as technical coordinator of NPAS, describes it as the distribution of quarks in the nucleus and the currents, that is, interactions and forces, among them. Particle physicists have long studied quarks as constituents or building blocks out of which individual particles are made. The question now is: How do quarks affect nuclear structure? And how does nuclear structure affect quarks? The results are likely to be enlightening for both nuclear physicists and particle physicists.

To do this kind of study requires electrons with energies between 0.5 billion and 6 billion electron volts (0.5 to 6 GeV). It does not take the whole four kilometer length of SLAC, which can produce 30 GeV electrons, to get those energies, so the nuclear physicists will use only the last 20 percent of it. The injector for the nuclear work will be put 20 percent of the distance back from the high energy end. Using the short end gives a gain in intensity. Electron bunches naturally lose members as they fly the length of the accelerator. The shorter the flight, the fewer lost.

The project took about six years to get started, Arnold says. "It kept falling into the cracks between nuclear and particle physics." At last both SLAC management and the nuclear physics advisory committee, which advises the Department of Energy (DOE) on nuclear physics, became enthusiastic and DOE included the project in its fiscal 1984 budget. The injector is the design of a group from the American University, The University of Virginia, The University of Bonn in West Germany, The Max Planck Institute for Nuclear Physics at Heidelberg, West Germany and the Physical Institute of the University of Heidelberg. The first beam from the new arrangement is expected in January 1985.

Despite the lack of a formal program, nuclear physics experiments have been done from time to time at SLAC. One recently completed builds on a surprising result found at the CERN laboratory in Geneva last year. The CERN experiment found that quarks behaved differently in nuclei of helium than they do in deuterium. Theory had not provided for such an occurrence. The SLAC experiment was intended to confirm and extend this result by investigating nuclei of deuterium, helium, calcium, carbon, gold and aluminum. The results, which are likely to prove exciting, are nearly ready to be made public. *—D.E. Thomsen*

Smoking hazardous to your heart

If you want to reduce drastically your chance of dying from coronary heart disease, don't smoke. This message conveys the essence of the strongest warning yet delivered by the U.S. Surgeon General, who last week released a report stressing that cigarette smoking causes heart disease. Surgeon General C. Everett Koop said that overall, cigarette smokers have a 70 percent greater death rate due to coronary heart disease than nonsmokers, and that the risk of people who smoke two or more packs per day is two to three times greater. Of all the ways in which risk of heart disease can be modified, he said, cessation of smoking is the most powerful.

In recent years, Americans have grown well-acquainted with the relationship between smoking and cancers, especially lung cancer. In this country, "smoking actually causes more deaths annually from coronary heart disease than from all cancers," Koop said. According to the report, the risk of developing coronary heart disease, and dying from it, is greatest if the person takes up smoking at a young age, continues smoking frequently for a long time and inhales cigarette smoke deeply.

The report also highlights smoking as one of the three major risk factors for coronary heart disease. The other two factors are elevated cholesterol and hypertension. When any two, or all three, of these conditions are present, the risk of heart disease increases exponentially. The report also states that women who smoke and use oral contraceptives are 10 times more likely to suffer a heart attack than women who use neither.

The report was released on the day of the Great American Smokeout, an annual event in which smokers are urged to forfeit cigarettes for at least a day. Thirty percent of all deaths due to coronary heart disease each year are caused by cigarette smoking, the report notes, adding, "Unless smoking habits of the American population change, perhaps 10 percent of all persons now alive may die prematurely of heart disease attributable to their smoking behavior." *—C. Simon*

Quaaludes no longer 'made in U.S.A.'

The last legal domestic manufacturer of Quaaludes (methaqualone) ceased producing this once widely abused sedative-hypnotic last week and announced plans to stop distributing it on Jan. 31, 1984. "The increasingly adverse legislative climate surrounding the product and the resulting unjustified negative publicity" forced the decisions, says a spokesman for Lemmon Company of Sellerville, Pa.

Also last week the House of Representatives passed H.R. 4201, a bill that would make all use of methaqualone illegal, except for experimentation approved by the Food and Drug Administration. The drug is already banned in eight states. Before methaqualone becomes illegal nationally, an equivalent bill would have to pass the Senate. This bill, S. 1236, remains in the Senate Judiciary Committee's Subcommittee on Criminal Law, which has not decided what to do about it yet, according to a subcommittee staff member.

Deputy Assistant Administrator of the Drug Enforcement Administration (DEA) Gene Haislip says that he hopes that Lemmon's actions will cut down on the illegal use of Quaaludes, which has decreased substantially over the last two years. The majority of illegal Quaaludes have been counterfeit ones that look like Lemmon's Quaaludes but contain methaqualone produced outside of the United States, as well as Quaaludes made by Lemmon but distributed illegally through "stress clinics" set up by physicians, according to Haislip. The DEA has for the most part controlled these sources, he says, and has reduced the legal quota of Quaaludes by 70 percent. Now another problem exists—a pill that looks like "real Quaaludes" containing no methaqualone at all but other depressant drugs in 10 to 30 times their regular dosages. But Haislip says, "If Lemmon Company is discontinuing Quaaludes there is nothing left to counterfeit. It is like counterfeiting confederate money. Hopefully the people on the streets will know this."

— J.C. Amatniek