# Behind the front lines in particle physics

One of the problems of a blitzkrieg campaign is that the tanks may run far ahead and leave in their rear uncaptured cities and uninvaded territory. In the last few years, particle physics has been engaged in such a campaign in which the objective has always been the next quark (and maybe the next Nobel prize). Theorists have a theory in which most of the structure of matter can be explained by the existence of six kinds of basic building units called quarks. (What isn't explained by quarks is explained by a matching set of six leptons.) Having found evidence of the existence of four kinds of quarks — and, many believe, of five—physicists are gearing up for a rush at the sixth to see if they can round out the set experimentally as well as theoretically.

But when you have taken the capital of a province, it pays to make a systematic occupation of the surrounding territory. Such a purpose is evident in plans to construct a new, extremely sensitive detector to go around one of the colliding beam intersection points of the SPEAR storage ring at the Stanford Linear Accelerator Center in California. The detector, called Mark III, is being built by a group of physicists from the University of California at Santa Cruz and Stanford University.

The intersection points of SPEAR are where accelerated electrons going in one direction strike accelerated positrons going in the other to perform a matter-anti-matter annihilation and to see what the photon of energy produced in the annihilation will yield. About four years ago it yielded the psi particles. According to the orthodox interpretation, the psi particles are the first evidence for the fourth or "charmed" variety of quark.

The discovery of charm set off a race for the fifth and sixth quarks. Since there is an energy hierarchy in these things, it takes more energy to get the fifth and more still to get the sixth, and so more energetic storage rings are now building — one is already being run in Hamburg (SN: 7/29/78, p. 69).

The six-quark theory has such a good reputation nowadays that physicists tend to assume it works and to push on toward the confirmation of its next major point. But experimentally we don't really know very much about the detailed behavior of charm, says David Dorfan of UCSC, one of the members of the Mark III group. There could be surprises. "I'm a little loath to suppose that everything will go as predicted," Dorfan says.

One of the things the Mark III installation will do is a systematic study of the spectroscopy of D mesons, the charmed mesons that are made when psi particles decay radioactively. The idea is to get statistics on how the D's are produced, and how they decay — the ratios of the different routes are particularly important for an understanding of the behavior of charm. One thing that Dorfan is particularly interested in is the possibility of a violation of CP symmetry in the behavior of D mesons.

There used to be certain symmetry principles in physics that were held to be inviolate. Parity, or space-reflection symmetry, was one; nature was supposed to be indifferent to left- or right-handedness in things that had handedness. Charge symmetry meant that nature always produces equal amounts of positive and negative electric charge. Parity is now known to be violated in a number of particle procedures, and the combination of parity and charge conjugation is violated in the behavior of K mesons. Dorfan thinks it may turn up in D-meson behavior and more visibly than in the K-meson case. If it does, it could be an embarrassment for the six-quark theory.

In addition to the D's, there is another class of charmed mesons, more massive and less familiar, the F mesons. These, too, will be investigated. Another thing to look for is charmed baryons. None are now known. (Mesons are made of two quarks each; baryons of three). "Nobody knows why there are no charmed baryons," says Dorfan.

Like its predecessors, Mark I and Mark II, Mark III will be built in layers of different kinds of detector wrapped around each other and the cylinder in which the annihilation of matter and antimatter takes place. It will cover almost 100 percent of the volume around the annihilation point — its predecessors covered 40 or 50 percent — in order to measure directly as much of what comes out of the annihilation photon as may be geometrically possible. □

# Venom therapy takes the sting out

In 1930, a journal for allergists reported successful immunization of a bee keeper against his bees using ground up bodies of the insects. Since then, though some researchers favored using insect venom — a logical approach similar to other immunization methods — the method has been used regularly to prevent reactions to the stings of bees and related insects. For the estimated 1.7 million Americans who suffer sometimes-fatal allergic reactions to stings, the whole-body extract was believed to be their only protection.

Now, a controlled study at Johns Hopkins University School of Medicine comparing venom therapy with the whole-body extract method shows the traditional treatment to be little more effective than a placebo. According to the report by Kevin J. Hunt and co-workers in the July 27 NEW ENGLAND JOURNAL OF MEDICINE, only one out of 18 patients on venom therapy had a serious sting reaction compared with seven out of 12 treated with whole-body extracts and seven out of 11 treated with a placebo.

Patients were selected based on a history of reactions to insect stings and sensitivity as judged by skin tests and antibody production. After six to ten weeks of immunization against the insect to which they tested most sensitive, patients were stung. Seventeen patients in the whole-body extract and placebo groups were not stung following severe (anaphylactic) sting reactions by two patients from those groups. Later, the 14 patients who showed sting reactions after whole-body extract and placebo treatment and the 17 who were not originally stung were given venom therapy and stung. One patient reacted adversely.

The whole-body extract has been used on the assumption of a cross reactivity between the body and venom proteins. However, treatment with the extract does not increase IgG antibody level against venom proteins as would be expected if such cross-reactivity did occur. But immunization with venom does increase the antibody level. Venom would therefore be expected to prevent an allergic reaction. The researchers expect the venom to be approved by the Food and Drug Administration by this fall and available for use next summer. □

# DNA guideline changes

Revisions to the National Institutes of Health guidelines on recombinant DNA research were officially proposed by NIH last week. Guideline revisions have been under consideration since last September. Joseph A. Califano Jr., Secretary of Health, Education and Welfare, said that before the changes become effective he will have all public comments reviewed by a high-level committee, which will hold a public hearing in Washington on September 15. The final revised guidelines will be issued promptly following the hearing, Califano says.

Some of the key points in the revisions, which were published in the July 28 Federal Register, are:

- Exemption of five classes of recombinant DNA experiments now generally considered safe and provision of means for exempting others.
- Placement of primary responsibility for assuring guideline compliance on the institutions where research is done.
- Dropping the requirement for prior NIH approval of changes in ongoing experiments at P1 to P3 levels.
- Allowing private companies to voluntarily register their recombinant DNA activities with NIH. □