spin correlations as a function of reduced temperature (which is measured relative to where the system would have ordered if it were three dimensional). In a three-dimensional system you would see a critical scattering peak above the critical temperature, which becomes a Bragg peak below the critical temperature. In two-dimensional systems, instead of seeing a peak you see a line in the direction of disorder, which is perpendicular to the plane of the magnetic correlations.

In the one-dimensional system the experimenters find that the scattering cross section has the form of planes of critical scattering, which peak about antiferromagnetic positions relative to the chain coordinates, that is, there is no dependence on the two coordinates perpendicular to the chain. As the temperature is lowered the scattering both grows in intensity and continuously narrows at positions that correspond to where Bragg planes would occur if the system ultimately ordered. The narrowing corresponds to the growth of the correlations, whose range becomes longer and longer.

The thermal evolution of the correlation agrees with a theory developed by Michael Fisher[4] (Cornell) for a linear magnetic chain type crystal with classical spins and no quantum mechanics.

When the experimenters studied the time behavior of their system, they found that although it had no long-range order, it appeared to sustain propagating spin waves. They found sharp peaks corresponding to very long-lived spin waves over almost the entire Brillouin zone. The width of the peaks at low temperatures was essentially that of the instrument. These spin waves have a dispersion curve (variation of energy with wave vector) that is a simple sine wave. The experimental curve agrees with simple spin-wave theory for an ordered state.

Martin Blume and Barry McLean (Brookhaven)[5] have developed a theory for classical spins that indicates the existence of the spin-wave peaks in the disordered state and gives roughly the dispersion curve found by the experimenters. The evolution of the peaks as a function of temperature also agrees qualitatively with experiment. —GBL

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"Minirings" would allow many pi-pi collisions

A storage device in which particles collide over their entire orbit can be used for pi-pi collision experiments, according to Paul L. Csonka of the University of Oregon.[1,2] Such devices have been talked about for several years. Csonka's apparatus, which he calls a "miniring," could, for example, be used with a proposed proton storage ring at the Los Alamos Meson Physics Facility, to give 10 to 70 events per hour. Doing a conventional colliding-beam experiment with two pion beams, one would have to wait ten million years to see an event.

During the last four years Csonka has been studying a variety of miniring configurations.[3] One design would place the target inside a 400-kG pulsed magnetic field. Robert Macek (Los Alamos Meson Physics Facility) and Bogdan Maglic (Rutgers)[4] have discussed an arrangement in which pions are contained in a magnetic field shaped so that the pion orbits precess. Their proposed "precetron" would put a metal target in a 400-kG pulsed magnetic field and could produce about 10^4 events per hour (PHYSICS TODAY, July 1970, page 57).

Csonka says that two serious difficulties arise with such arrangements: It is not easy to generate such high fields, and considerable background is produced in or near the target. A more favorable solution, he feels, would be to place the target outside the miniring. In one such design 1-GeV protons hit the external target, are guided down a narrow channel section and into a wider interaction region, both of which have a predominantly longitudinal magnetic field along which the pions will spiral. Inside the interaction region the pions are contained long enough to interact before they decay (in about 50 nanosec). A 150-kG pulsed field would be used in the channel and a 50-kG pulsed field in the interaction region. Csonka says one could detect scattering solid angles almost as large as 4π.

Csonka and Laszlo Gutay (Purdue) are now studying questions related to target design, the magnetic channel and background. —GBL

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JPL opens facilities to qualified researchers

Some facilities at the Jet Propulsion Laboratory are now opened to qualified investigators from the academic community. Researchers are expected to provide whatever funding they have, especially if projected laboratory costs are substantial; JPL is cooperating with these investigators in seeking funding. If a researcher has no source of funds and if laboratory costs are low, JPL can provide limited funding.

JPL is making these facilities available on condition that the "outside" work does not interfere with the laboratory's own research programs. Among the instruments and techniques offered are: high-resolution mass spectrometer; nuclear-magnetic resonance spectrometers; scanning electron microscope; 20-inch supersonic wind tunnel; 21-inch hypersonic wind tunnel; hypervelocity laboratory; molecular sink vacuum facility; low-energy electron-impact spectrometer; image processing laboratory; a 24-inch reflecting telescope with f/16 Cassegrain focus and f/36 Coudé focus, and a 16-inch telescope with an f/50 Cassegrain focus. For further information contact Hadley W. Ford, University Relations Office, JPL, 4800 Grove Drive, Pasadena, Calif. 91103.

Convention established for spin-polarization effects

A convention governing nomenclature, normalization, notation and coordinate systems to be used in reporting results on spin-polarization effects in nuclear physics was adopted at the Third International Polarization Symposium held in September at Madison, Wisc. The Madison Convention is designed to eliminate most of the ambiguity and confusion that has existed in some of the deuteron polarization literature as a result of authors using different normalizations, notation and coordinate systems. It is expected that journals publishing nuclear-physics papers will encourage authors to follow the convention.

Copies of the text of the Madison Convention are available from H. H. Barschall and W. Haeberli, Physics Department, University of Wisconsin, Madison, Wisc. 53706. ▫