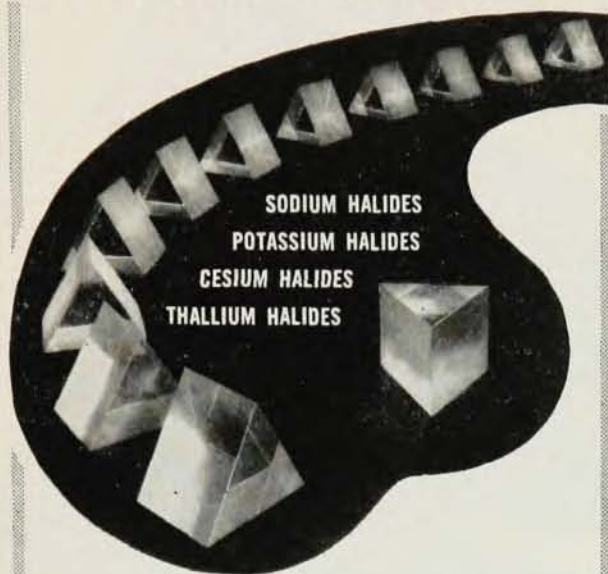


OPTICAL CRYSTALS



Special crystals grown to order, optical blanks cut to specifications, finish polishing as required.

123 WOODLAND
AVENUE
WESTWOOD
NEW JERSEY

CRYSTALS DIVISION
ISOTOPES, INC.

THIN FILM LUBRICATION RESEARCH OPPORTUNITY FOR A PHYSICIST

Ph.D. with 0-5 years experience to do basic research on the physics of thin film lubrication. Candidate would have knowledge of molecular physics of condensed phases and surfaces and would conduct research on the resultant effects of environment, stresses, high temperature and high pressure. Early in 1963, location will be at new Central Research laboratories near Princeton, N. J. All qualified applicants will receive consideration for employment without regard to race, creed, color or national origin. *Please send resume to:*



Dr. R. W. Schiessler, Manager
CENTRAL RESEARCH DIVISION
Socony Mobil Oil Company, Inc.
Paulsboro, New Jersey

pion resonance, or even bound state, must also exist for agreement with experiment. In a talk by W. R. Frazer on the so-called higher resonances in pion-nucleon scattering and in K^-p scattering, it was shown to follow very simply from dispersion relations that a strong, rapidly rising inelastic cross section in a given partial wave would produce a large sharp peak in the elastic scattering. This phenomenon is quite similar to the familiar cusps at thresholds. If the inelastic scattering is calculated from the strip approximation to the Mandelstam representation, some success is attained in explaining the resonances mentioned. G. F. Chew, to paraphrase slightly his own remarks, talked in a spirit foreign to his usual highly pragmatic instincts. He speculated about the future of the theory of strong interactions. So as not to misrepresent him, let us quote a couple of sentences:

So that there can be no misunderstanding of the position I am espousing, let me say at once that I believe the conventional association of fields with strongly interacting particles to be empty. . . . Whatever success theory has achieved in this area is based on the unitarity of the analytically continued S matrix plus symmetry principles. I do not wish to assert (as does Landau) that conventional field theory is necessarily wrong, but only that it is sterile with respect to strong interactions and that, like an old soldier, it is destined not to die but just to fade away.

Needless to say, his talk was listened to very attentively and provoked a great deal of discussion. M. L. Goldberger then described a modification of a form of the Mandelstam representation for potential scattering at high energies. On the basis of this representation he discussed asymptotic behavior in momentum transfer at large energies and its connection to possible resonances in bound states. Concluding the conference, M. Froissart proved several theorems about the spectral functions in the Mandelstam representation. First, he showed that total cross sections cannot increase asymptotically faster than the square of the logarithm of the energy. Secondly, he discussed subtractions in the Mandelstam representation.

The presiding officers at the sessions were G. Wentzel, G. C. Wick, H. Lehmann, J. S. Toll, and S. Mandelstam. The conference was arranged by a steering committee consisting of K. A. Brueckner (chairman), M. Gell-Mann, M. L. Goldberger, R. P. Feynman, and G. F. Chew.

William R. Frazer
University of California, San Diego

ACA Annual Meeting in Boulder

MORE than 280 crystallographers gathered in Boulder from July 31 through August 4 for the annual meeting of the American Crystallographic Association. They brought with them about 130 others to enjoy the climate and scenic surroundings of the University of Colorado. Over 120 papers, covering nearly all phases of crystallography, were presented at the 13

lively and well-attended sessions. Only a few of these will be alluded to below.

After some brief introductory remarks by K. M. Trueblood, president of the Association, the opening invited lecture was presented by D. W. J. Cruickshank, University of Leeds, who spoke on the role of $3d$ orbitals in π bonds between oxygen and the nonmetals of the second-row elements. In this very interesting talk, methods of explaining, discussing, and predicting bond distances in XO_4^{n-} tetrahedral ions ($X = Si, P, S, \text{ or } Cl$) and in related compounds and ions were explored.

During the meeting proper, about a dozen papers were presented on the collection and processing of diffraction data, with special attention paid to the automatic treatment of data obtained from single crystals (an emphasis which suggests that structural crystallography is well into its Tychonic stage), and, in many of the schemes described, the function of the operator is obviated by a computer. This group of papers was complemented by another equally large group dealing with refinement techniques and credibility of results.

Of the usual crop of organic structures, some were of more than usual interest, including such strained molecules as the *cis*-1,2-dihalobenzocyclobutanes and 5-oxo-1,5-dihydrobenz(*cd*)indole, biologically interesting molecules such as asparagine, lysine, and cytosine, and unusual molecules such as the halopirins.

In addition to a number of mineralogical and metallurgical papers, the sessions in the inorganic field included an interesting group on complexes and coordination compounds, especially transition metal carbonyls. Keen interest was displayed in the use of distribution curves in these and related studies. Other papers included one giving the structure of the new compound $B_{10}H_{16}$ and another giving eight structures, all in apparently satisfactory agreement with the diffraction data, for hydrazine.

For many people, the high point of the meeting came at the annual banquet when Professor P. Ewald, president of the International Union of Crystallography, reminisced about the early days of x-ray diffraction, and told how he brought his dynamical theory into its final shape near Tilsit during the winter of 1914-15.

Jerry Donohue

University of Southern California

AAAS Meets in Denver

SECTION B (physics) of the American Association for the Advancement of Science will sponsor a day-long program of papers dealing with physics research in the Rocky Mountain area and will join with Section D (astronomy) in presenting an atmospheric-physics symposium as part of the 128th annual meeting of the AAAS, which will take place in Denver, Colo., during the period between Christmas and New Year's Day.

The Section B program, which will be presented at the Petroleum Club on December 27, has been arranged by a local committee headed by W. B. Hales

PHYSICISTS AND ENGINEERS

*are needed at the BS, MS,
and PhD level with ana-
lytical or experimental
training or experience in
the following areas:*

GHVA, a dynamic leader in unique areas of space technology is offering professional opportunities through its continued growth. We are at the stage where a selected few individuals of the above average ability, from the senior managerial level to recent graduates, may make their contributions felt. To such men, GHVA confidently offers:

- A Dominant Technological Position
- A Vigorous Scientific Climate
- Outstanding Opportunities of Personal Leadership
- Small Company Atmosphere with Strong Backing

ELECTROSTATICS and POWER CONVERSION

Power supplies for space, Electrostatic Generation, Electric Field Problems, High Voltage Insulation, Electric and Magnetic Energy Storage Techniques, Spinning Cathode Development, Thermionic Power Generation, High Speed Rotation in Vacuum.

ION DEVICES, PLASMA PHYSICS

Ion sources and engines for critical applications in space, power supply requirements for these devices including design and execution of experiments leading to practicable systems, experimental studies of plasma phenomena in arc type ion generators and neutralized beam dynamics.

SOLID STATE DEVICES

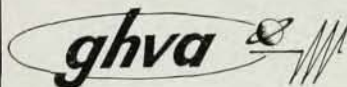
Electron and/or ion beam techniques for radical new approaches to information storage and microcircuitry. Solid state measurements to initiate programs in organic semiconductors and energy storage in insulators.

For a confidential discussion of these positions, please write:

Mr. Louis J. Ennis,

Assistant Personnel Manager,

P. O. Box 98, Burlington, Massachusetts.



Goodrich - High Voltage Astronautics, Inc.

12 Miles North of Boston

BURLINGTON, MASS.

An Equal Opportunity Employer