PHYSICS

Chairman: KONSTANTIN KOLITSCHEW, Indiana Central College

E. C. CRAIG, Ball State University, was elected chairman for 1968

ABSTRACTS

Chemical Effects on Nuclear Transitions. GUY T. EMERY, Indiana University.—Some of the interactions between nuclei and their atomic surroundings are reviewed, especially those in which a change in the chemical or structural form of the surroundings has an influence on the half life of nuclear transitions or on the spectrum of emitted radiation. It is pointed out that such a study of internal conversion spectra can constitute a measurement of the electric charge density, in certain inner parts of the atom, corresponding to individual electronic eigentions. Such measurements may be useful for chemistry and solid state physics.

Strong Coupling Superconductors. J. C. SWIHART, Indiana University. —Most superconductors behave in a similar manner to each other when they are described in terms of the proper reduced variables. That is, they obey a so-called "law of corresponding states." This behavior is well understood in terms of the theory of Bardeen, Cooper, and Schrieffer (the BCS theory). However some superconductors, particularly lead and mercury, exhibit anomalous behavior. These are also the materials for which the electron-phonon interaction (the interaction responsible for superconductivity in the first place) is the strongest. The BCS theory has been generalized to handle the effects of this strong coupling. We shall present the results of calculations applying this generalized theory to models of lead, mercury, tin, indium, and aluminum. Comparisons with experimental results will be made for the critical field, the condensation energy, the thermal conductivity, and other observable phenomena.

NOTES

Planned 200-MeV Indiana University Cyclotron: Properties and Unique Features.[1] M. B. SAMPSON, M. E. RICKEY, B. M. BARDIN, and D. W. MILLER, Indiana University.—The Indiana University Cyclotron group is engaged in the design and development of a unique variable energy accelerator to replace the old C.W. machine which is now at the end of its useful life. The new accelerator will be capable of producing a high quality beam of $10 \sim 100$ microamperes of 200 MeV protons as well as other light and heavy ions to an e/m of 1/6. It will consist of an external ion source and 500 KeV D.C. supply capable of injecting a pulsed beam into a four sector isochronous separated radial sector machine to produce a beam of approximately 10 MeV. This beam is then injected into a second similar 4-sector machine where it attains the

[1] Work supported in part by the National Science Foundation.

final energy. It appears possible to extract nearly all of the beam, well defined in energy, and angular spread.

The fields of research are planned to take advantage of the previously uninvestigated range of energy covered by this accelerator. The reearch areas will be: the extension of our previous nuclear structure and polarization studies to higher energies, the investigation of isobaric analogue states, low energy (p, π) reactions and the use of partially stripped heavy ions to produce beams of the order if 10 to 14 MeV per nucleon.

The building is being designed with optimum flexibility to provide a variety of beams and areas for research.

A computer program of orbit dynamics has been worked out and is giving excellent results.

Model and analogue studies are in progress to measure the magnetic fluids produced by the magnet and coil geometries. Shielding requirements are being studied along with details of the mechanical and electrical design of the accelerator.

Present plans are to construct and test the 10 MeV stage in the old cyclotron wing while the new building is in progress.

Other papers read

A Computer-Controlled Film Scanner. R. R. CRITTENDEN, K. A. POTOCKI, and W. F. PRICKETT, Indiana University.

The Preparation of a Physics Teacher. R. W. LEFLER, Purdue University (by invitation).