In the dissociation $^{36}Ar \rightarrow {}^{32}S + \alpha^*$, the four valence nucleons were assumed to be in the $0d_{3/2}$ orbit and the probability of the α particle being in an excited state was estimated using both the stretch scheme and the simple pairing model. Both calculations indicated that the α particle is more likely to be found in an excited state. The corresponding spectroscopic factors indicate that the transfer of an α particle in its 2^+ state is about five times more likely than the transfer in its ground state for the reaction considered.

The distorted-wave calculations for excited α-particle transfer were carried out in the standard way and used absorbing potentials depending on the orbital angular momentum in the way required by analyses of the elastic scattering of heavy ions by nuclei. The results are shown by the full line in the figure, and agree very well with the experimental data. Similar results are found for the corresponding reaction to the lowest 2^+ state of ^{36}Ar.

This is clearly a significant result that will stimulate many more investigations. In principle, the ground and all the excited states of the α particle should be added coherently to give the distorted-wave amplitude. More detailed analyses of similar reactions on other nuclei should provide further evidence of excited α transfer but the results of Charlton and Robson provide good evidence that such processes can take place.

Synchrotron radiation users meet

from G. V. Marr

THE electromagnetic radiation emitted from high energy electron synchrotrons, as a consequence of radially accelerating the electrons, is now well established as a means of studying the interaction of ultraviolet and X radiation with matter in its various forms. The first international symposium for synchrotron radiation users was held at the Daresbury Laboratory in January 1973 (see *Nature phys. Sci.*, **242,** 1; 1973) following the move of United Kingdom users from the Glasgow synchrotron to NINA in 1972. During the past year, demand for synchrotron radiation has increased and the conference held at the University of Reading from April 1 to 2, under the auspices of the spectroscopy group of the Institute of Physics, provided a means whereby the UK users could discuss the relevance of this source. The contributions covered present and future synchrotron radiation sources, applications to atomic, molecular, chemical and solid state physics, biological studies, chemistry, X-ray optics and radiometry. The conference concluded with an open meeting with Science Research Council representatives to discuss the SRC paper "A Plan for Future Research with Synchrotron Radiation based on a Dedicated Storage Ring".

The main energy loss from the electron synchrotron is in the form of electromagnetic radiation whose spectrum extends continuously from the infrared to the X-ray region. It provides an intense source of high energy photons, predominantly polarised in the plane of the electron orbit and, because of the bunching of the electrons, pulsed at the accelerator radio frequencies. The radiation is emitted under good vacuum conditions and with divergences from the orbit plane comparable with a laser beam (see *Endeavour*, **33** (119) 55–66, May 1974).

Facts and figures for existing synchrotron sources were provided by I. H. Munro (Daresbury and University of Manchester) who outlined criteria for the ideal synchrotron source based on design work for the dedicated electron storage ring now under consideration by the Science Research Council. Progress with existing synchrotrons in atomic and molecular physics was introduced by K. Codling (University of Reading). In addition to energy level analysis, accurate absolute cross-sectional data are being provided on photoionisation processes and new experiments which allow photo-electron analysis to be carried out with respect to the E vector of the ionising radiation are now in progress. Continuous variation of the photon energy is providing data which will extend knowledge of configuration interaction, molecular orbitals and vibronic coupling; a point which was taken up by S. Leach (University of Paris, Orsay) in his review of applications in chemical physics where excited state relaxation processes in molecules and solids can benefit from lifetime studies using the modulated nature of the ultraviolet radiation of the synchrotron.

In the field of solid state physics, A. J. Forty (University of Warwick) reported experiments on absorption and reflectivity measurements which are contributing significantly to knowledge of band structures. Photoemission from surfaces is also providing new possibilities in metallurgy. D. A. Urtch (Queen Mary College, London) said that chemists on the other hand were exploring the possible use of synchrotron radiation to study the atomic components of molecular orbitals by way of X-ray emission spectroscopy. The new ring would allow an extension of current work to the light elements where X-ray emission is less favoured. The polarised nature of the radiation offers a valuable new tool in studies of single crystal structures throughout the ultraviolet and X-ray regions. Of more immediate interest to molecular biologists, however, are the intensities of some 10–10^5 over conventional continuum X-ray sources that could become available. J. C. Hazelgrove (Medical Research Council, Cambridge) discussed advantages of these radiations in studies of transient states where it is important to have detailed short exposure X-ray diffraction pictures of specimens whose decay under normal sources alters vital characteristics during the time of exposure.

On the instrumental side, P. J. Key (National Physical Laboratory) said that the synchrotron, as a standard of relative spectral distribution throughout the near ultraviolet to the X-ray region, is becoming well established and radiometry problems are being studied. A discussion on X-ray optics introduced by M. Hart (University of Bristol) showed that fluxes some 10^5 greater than obtainable with conventional sources can be expected when the polarised nature of the synchrotron radiation is exploited. Quarter wave plates, crystal spectrometers and the development of X-ray diffraction gratings were also discussed.

In spite of the progress made and the enthusiasm of the users, it was evident that NINA and the other synchrotrons, where the users are parasitic to the experiments of the high energy nuclear physicists, are not ideal sources. The parasitic mode of operation is extremely inefficient where users are unable to control the quality and duration of the synchrotron beam. The SRC plan would seem to meet the foreseeable needs of the Reading conference and it was with this in mind that they attended the SRC meeting. Quite properly questions were asked relating to costs, location and long term usefulness of the proposed storage ring. The scientists present were particularly concerned that delays at this stage could result in the United Kingdom being without a source of synchrotron radiation if present plans concerning NINA are adhered to. A preliminary estimate of between 12 and 18 months for the level of funding in the SRC document was given at the meeting. It was agreed that there is every need to impress upon the SRC a sense of urgency in proceeding with the plan beyond the design stage, in order to ensure that the period between the close down of NINA as a synchrotron source and the start up of the new storage ring is kept to an absolute minimum.