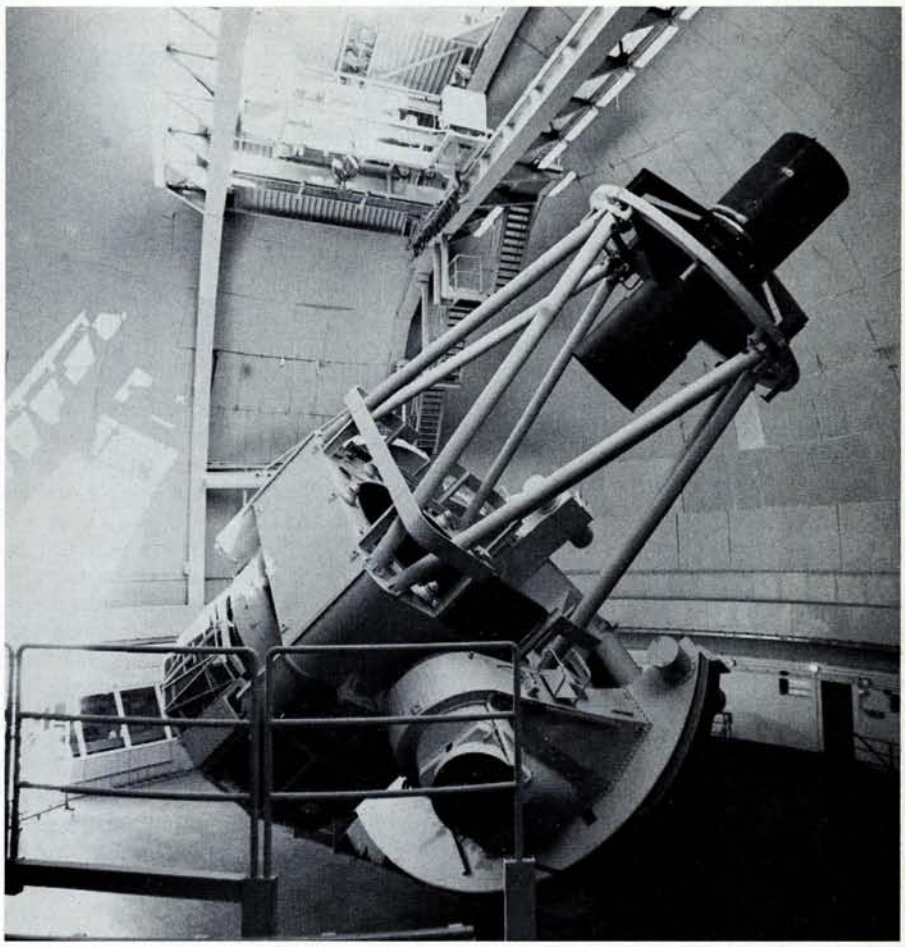
ESO 3·6 m Telescope

(ESO is a collaboration of: Belgium, Denmark, France, the German Federal Republic, the Netherlands and Sweden)



The first pictures have been taken with the 3,6 m telescope of the European Southern Observatory, mounted at latitude 29° 15' S on the edge of the Atacama Desert at an altitude of 2400 m. Earlier in the year the main structural components had followed the mirrors out to S. America and installation begun. In spite of the remoteness of the site and the need for all technical equipment to be brought from Europe, assembly work went smoothly. Tests with an uncoated mirror were made in the autumn and finally in November all was in readiness for the mirror to be taken out and aluminized for the first time. The plant for doing this is inside the telescope building.

Observations with the telescope will be made to start with at the prime focus (f/3) while commisioning of the Cassegrain (f/8) and coudé foci (f/30) will follow respectively in the Spring and Summer of next year. The instrument has still to be fully tuned but the first pictures are of excellent quality and it is already clear that ESO has a very fine instrument in its hands. The viewing programme is evidently not going to be easy to establish as the Organization has already far more requests from astronomers in its six member states than it will be able to cope with. Moreover the Schmidt telescope also mounted at the La Silla Observatory is regularly providing new data which merit study with the big instrument.

Conference Reports

Nuclear Physics with Heavy Ions

More than 300 physicists from 26 countries met in Caen (France) from 6-10 September, at the Third Nuclear Physics Divisional Conference of the EPS, to discuss heavy ion physics. The venue of the Conference — motivated by the site of the future French heavy ion accelerator GANIL — proved to be more than justified by the rich and interesting surroundings, the smoothness of the organization and the interest the local community took in the Conference.

The Conference treated the following main topics :

- nucleon transfer in heavy ion induced reactions ; spectroscopic studies,
- the macrophysics of heavy ion induced reactions : fusion, deep inelastic processes, etc.
- intermediate structure in the continuum
- heavy ion physics at very high energies.

A large fraction of the Conference time was devoted to deep inelastic processes. These processes involve large transfers of energy and mass yet, the identities of the projectile and the target are essentially preserved. The way a deep inelastic collision is believed to proceed is illustrated in Fig. 1. In a classical picture the impact parameters of trajectories leading to deep inelastic collisions are midway between the large values corresponding to distant and grazing collisions and the small, head-on collision values. The contact of the projectile and the nucleus is thus intimate enough to permit a large exchange of mass and energy without losing the characteristic features of a fast peripheral collision. A large

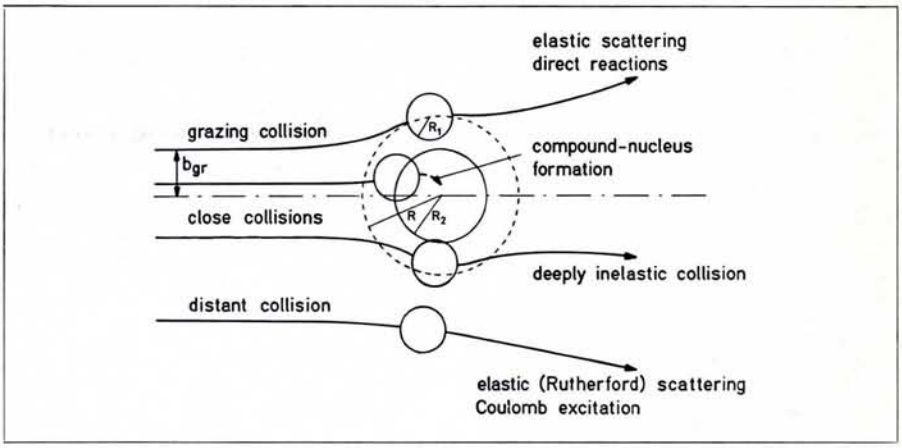


Fig. 1 Classical trajectories of two colliding heavy ions (W. Noremberg).

The abstracts of the papers presented at this conference are published in the first volume of the second series of *Europhysics Conference Abstracts.*

amount of the total relative kinetic energy is dissipated within a relatively short time (10^{-21}s) leading to strongly non-isotropic angular distributions. The theorists are still trying to explain the mechanism responsible for these collisions. Are we facing a new, so far unknown, relaxation phenomenon ?

Related to the above, the subject of resonant states observed in heavy ion collisions was given some attention too. The question to be asked here is the following : Would two colliding heavy ions coalesce immediately, mixing all their nucleons, or would they sometimes keep their identity for a longer time, say 10^{-21} - 10^{-20}s and form a "molecular" state ? Growing evidence exists for the creation of such states ; their detailed structure is still subject to speculations.

Several contributions were dedicated to the subject of collisions of very energetic heavy ions with nuclei. These collisions raise the problem of the passage of nuclei through nuclear matter at speeds higher than the speed of sound (in nuclear matter) and the consequent propagation of shock waves. The speed of sound in nuclear matter is expected to correspond to particles moving with 10-20 MeV/nucleon ; above that energy supersonic phenomena should start. For projectiles below A $\cong$ 100, this is within reach of, e.g. the GANIL accelerator.

It would be difficult to imagine that the discovery of element 126 recently reported by Gentry et al. could have escaped the attention of the Conference. Last minute contributions from Orsay, Darmstadt, Oxford, Heidelberg and Marburg were, however, rather unanimous in reporting no evidence for superheavy elements in monazite (or other materials) within very low limits. The Darmstadt group reported on an experiment performed under conditions similar to that performed with the Florida State proton pencil beam. While bombarding the samples with 7 MeV protons showed the supposed superheavy L_α X-ray shoulder, bombarding with 2 MeV did not, thus strengthening the possibility that the shoulder be of nuclear origin, e.g. from the ^{140}Ce (p,nγ) reaction.

How about producing superheavies in the laboratory? Recent results from Berkeley with a 300 MeV ^{48}Ca beam on ^{248}Cf gave negative results. No trace of superheavy elements in the region of Z = 110 - 116 was observed. Still, theoretical predictions are not that pessimistic. Calculations based on the transport theory for deep inelastic collisions predict a total cross section for the production of 25 superheavy elements around A = 298 to be 0.1 mb for the U + U and 1.5 mb for the U + Cf reactions respectively. It is true that these calculations give the above numbers with a safety factor of 50 ; *Chi vivra, vedra !*

N. Cindro

High Resolution Molecular Spectroscopy

The IIIrd All-Union Symposium on High Resolution Molecular Spectroscopy held in Novosibirsk from 13-16 September 1976, follows in the line of biennial meetings in the USSR. In Novosibirsk, I found that in addition to about 80 participants from within the country there were 13 foreign scientists, including visitors from the USA, France, England, the German Democratic Republic, Czechoslovakia and Hungary. Novosibirsk may then become a truly international forum in the future. Over three days some eighty papers were read on the theory of, and techniques for high resolution spectroscopy and its applications. The apparent goal is to call the attention of physicists and chemists in the Soviet Union to this quickly developing field. Part of the reason for the pace of development is the availability of lasers. Tunable lasers allow the recording of ultra-high resolution spectra whose analysis necessitates a deep understanding of the quantum-mechanical behaviour of molecules. The Hamiltonian function of electronic ground and excited state molecules must be known to a high degree of accuracy requiring corresponding computational techniques.

It appeared that a significant theoretical contribution was the development of algebraic treatments of the higher-order Hamiltonians and the group-theoretical discussion of their symmetry properties. Reported examples of such achievements were in the theory of ro-vibrational spectra of molecules possessing one or two grossly anharmonic vibrational amplitudes, the treatment of asymmetric top rotational Hamiltonians, and scrutinies of the perturbation techniques for the mathematical analysis of high resolution spectra. An example of theoretical developments was connected