

Europhysics Conferences

Reports on Conferences Organized by EPS Divisions & Sections

12th EGAS Conference in Pisa

The 12th Conference of the European Group of Atomic Spectroscopy (EGAS) was held 2-5 September 1980 in Pisa, the city where Galileo Galilei was born and where he made his famous experiment from the leaning tower. This conference, organized by E. Arimondo and A. Gozzini followed the pattern of its predecessors, i.e. emphasis on short contributions and a relatively small number of invited papers.

One invited talk was given by G. Series, Reading, who reviewed 31 years of optical pumping — from the pioneering works of Kastler and Brossel in the late 40's to the present-day research. The field is still very active, although its aims are quite different from those of the early days. In another invited talk, R. Bonifacio, Milan, described a phenomenon which was unknown to most of the audience, namely that of optical bistability. This phenomenon, which was predicted in 1969, can appear in strongly nonlinear materials, and it is expected to have several important applications in the future in connection with various electro-optical devices (see page 3).

Another new and fascinating phenomenon was discussed by F. Laloë, Paris, namely the properties of spin-polarized ^3He and ^1H . Ordinary (unpolarized) hydrogen and helium start to form respectively molecules and clusters, at very low densities. When the spins of the unpaired electrons are aligned, however, these tendencies are drastically reduced, and gas densities up to 10^{16} at/cm³ have been achieved in the spin-polarized form. It is expected that spin-polarized ^1H and ^3He remain in the gas phase also at $T = 0$ K, ^1H as a boson gas, since the total spin (nuclear and electronic) is integer, and ^3He as a fermion gas. Moreover, spin-polarized ^1H is predicted to display Bose-Einstein condensation and superfluidity as a gas. It is very likely that further work on these elementary systems will give important information on the quantum properties of matter in general.

Other invited talks were given by J. Lehman, Paris, about the use of lasers to investigate various types of chemical reaction; by I. Lindgren, Göteborg, who reviewed our understanding of many-body effects in atomic structure; by J. Hansen, Amsterdam, who gave an example of a very strong and not well understood configuration mixing in halogen spectra; and by S. Haroche, Paris, who reviewed the present state of knowledge of the very

highly excited Rydberg states, which have been the object of very intense study in recent years (see for example, S. Feneuille, *EN 10* [1979] 10 and ESCAMPIG page 8).

Atomic spectroscopy is nowadays more diversified than previously, due to the advent of new spectroscopic techniques, notably those based on various forms of laser. With mode-locking techniques very short and highly repetitive pulses can be produced for lifetime and quantum-beat studies. Single-mode lasers can now operate with good stability and high precision over most of the visible region. Several projects with computer stabilization in order to improve the performance further were reported. One report of a successful test with internal frequency doubling was also given. High-resolution laser-spectroscopy is largely used for the investigation of isotope shifts and hyperfine structure, and considerable progress is being made in these fields. As a large number of lines can now be studied, it is possible to interpret the isotopic shift and to extract the nuclear information more reliably than previously. Also the hyperfine results can now be analysed in a more complete way, particularly when data are available from several terms of a configuration. Several reports were concerned with that problem, and in one case significant departure from the otherwise very successful effective one-body interpretation was reported.

The advent of sources for highly ionized atoms has renewed the interest in optical spectroscopy and term analysis of a more conventional type. Highly ionized spectra are now studied in connection with various particle accelerators, while in the Tokamaks it is possible to observe spectra from heavy atoms which have been stripped of most of their electrons. Data of this type are important for fusion work and they have also great astrophysical interest. Furthermore, systematic studies of isoelectronic sequences give important information about relativistic and quantum-electrodynamic effects in atomic systems.

Another new development in atomic spectroscopy, which is given more and more attention at conferences of this kind, is the use of opto-galvanic detection. This technique has several advantages compared to conventional optical detection, particularly as there is no interference with the incident light. The electrical signals can be amplified and processed so that remarkable sensitivity can be achieved. This technique seems to be applicable in most kinds of atomic spectroscopy.

In conclusion it can be noted that the general feeling among the participants was that the conference had been successful and gave a good review of recent developments in atomic spectroscopy. Abstracts to the papers presented have been published as *Europhysics Conference Abstracts*, Series 4, Volume E.

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Europhysics Conference on Computing in High Energy and Nuclear Physics

The 4th conference organized by the Computational Physics Group with the above title, took place at the Physics Institute of the Bologna University on 9-12 September. Co-sponsored by the EPS, the Italian National Institute of Nuclear Physics (INFN) and the Institute of Physics of the University of Bologna, the conference aimed at an exchange of information between physicists and computer specialists in two closely related fields, both of which are heavily dependent on the machinery and methods of computing.

Some 150 participants from 15 countries followed the heavily charged programme,

squeezed into 7 half-day sessions. They were offered 14 invited lectures, 34 short contributions grouped in 4 (parallel) sessions, and a panel discussion on some of the problems which physicists as computer users have to face daily. In addition, the local organizers offered an impressive cultural and social programme.

The *invited papers* reviewed the state of the art in physics and related computing, and attempted an outlook into the future. Thus M. McFarlane (Argonne) and L. Van Hove (Geneva) gave an overview of recent advances in nuclear and high energy physics respectively; K.J.F. Gaemers