less, at least if vessels with a diameter smaller than 1 mm are transected, and this can be a definite advantage.

The CO_2 laser, coupled to an operating microscope equipped with a micromanipulator for beam deflection, has found important applications in microsurgery. In the field of ear, nose and throat surgery for example, CO_2 laser microsurgery provides precise and completely haemostatic incision in the larynx and makes it possible to carry out procedures that could otherwise hardly be performed endoscopically. Similar claims can be advanced in gynaecology and neurosurgery. CO_2 laser microsurgery is now in use all over the world and applications are growing all the time.

Two other lasers, the argon-ion and the Nd-YAG, have also found important applications in medicine. They are used to stop haemorrhages from various lesions in the gastrointestinal tract. Argon laser radiation is well absorbed by haemoglobin, while Nd-YAG radiation penetrates deeply into the gastrointestinal mucosa. These properties make the former more suitable for superficial lesions and the latter for massive haemorrhages. Optical fibres (usually of quarz) are used to transmit the laser beam via one of the channels of a flexible gastroscope. In contrast to other techniques (electrocoagulation, cryo- or heater-probes), laser coagulation allows the energy to be applied without contact and gives better control of tissue necrosis.

A new field of application that uses low-intensity visible lasers is based on the interaction of light with fluorescent drugs, in particular haematoporphyrin-derivative, for the localization and treatment of several types of tumour. This technique is based on the higher accumulation (and/or retention) of the drugs in malignant tissues than in most normal tissues. Thus, proper illumination can cause the tumour area to show up as the fluorescence of the dyes makes them easily visible.

There is also a potential therapeutic effect related to their photodynamic action: the destruction of the tissue where they reside after activation with visible light in the presence of oxygen. The process occurs through energy transfer from the excited dye molecule to endogenous oxygen, with formation of the cytotoxic agent "singlet oxygen".

Several research groups all over the world are at the moment deeply involved in defining the effect of haematoporphyrin and light in cancer therapy. The activation light at the wavelength of 630 nm is provided usually by a cw rhodamine B dye laser pumped by an argon laser. This laser is a very useful tool for two main reasons:

(i) it provides the cw high power needed to treat tumour areas (the average power required is 100 - 200 mW/cm^2);

(ii) via optical fibres it is possible to reach tumours inside the body (as for example in the lung or in the bladder) or to deliver light directly to tumour masses.

Many human patients (~ 400 at the Roswell Park Memorial Institute, Buffalo, N.Y., by T.J. Dougherty) and animals have so far been treated, and the response obtained seems to be very encouraging. In most cases, in fact, the disappearance or a reduction of the tumour has been observed after the treatment. Photochemotherapy thus seems to provide a new promising treatment that may, in some cases, be complementary to current cancer therapies.

In conclusion, we believe that the laser has already made a great contribution to the progress of biomedical research and, in some cases, to current clinical applications. This contribution will certainly increase with a better understanding of the basic photobiologic effects.

REFERENCES

The interested reader is referred to:

1. "Lasers in Photomedicine and Photobiology", *Proc. EPS Quantum Electronics Division Conf., Florence, Italy, Sept. 3-6, 1979*, ed. by R. Pratesi and C.A. Sacchi (Springer-Verlag) 1980.
2. "Lasers in Biology and Medicine", *Proc. NATO Advanced Study Institute, Camaiore, Italy, Aug. 19-31, 1979*, ed. by F. Hillenkamp, R. Pratesi and C.A. Sacchi (Plenum Press) 1980.

First European Conference of the Atomic Physics Division

The first European Conference on Atomic Physics (ECAP) was held in Heidelberg, 6-10 April 1981. The essential idea of this conference was to combine the different annual national meetings in the fields of atomic and molecular physics, into a European conference and, in this way, bring together scientists from all European countries. The scientific scope of the conference was representative of the four Sections of the Atomic Physics Division of EPS: Atomic Spectroscopy, Electronic and Atomic Collisions, Molecular Physics and Chemical Physics. With 900 participants, 33 invited speakers and over 510 contributed papers this first ECAP was a real success, particularly due to the excellent organisation by the Chairman of the conference, Professor zu Putlitz, who supported the idea of a European Conference with strong personal initiative and energy.

It is not possible and also not the intention to review the whole scientific scope of the Heidelberg Conference; rather I shall report on a few invited papers which I believe to be important examples from among the variety of problems currently being investigated in atomic and molecular physics.

In his talk on line widths and line shapes in molecular photoionization, Ch. Jungen showed in a clear and illustrative manner, how effectively multichannel quantum defect theory (MQDT) can be applied to molecular problems, exemplified by the H_2-molecule. Using as input parameters the molecular ionization potential, the potential curve $U^+(R)$ of the molecular ion, the phase shifts $\pi\mu(R)$ of excited electrons in the molecular ion potential and the dipole amplitude $d(R)$, both as functions of fixed R, quantities such as discrete level positions (displaying the effect of vibronic and rotational perturbations), photoionization cross sections (including resonances due to rotational/vibrational preionization), photoelectron angular distribution of resonance states, etc. have been calculated. The essential agreement with high-resolution experimental spectra demonstrated the full power of this theoretical approach.

The study of highly excited Rydberg states (H. Walther) has recently attracted considerable attention. Their investigation provides useful information on atomic structure, e.g., on quantum defects, anomalies in the fine structure splitting, polarizabilities etc. Since the lifetime of Rydberg states increase with n^3, these high-lying levels cannot be observed using fluorescence techniques but only by detecting electrons or ions which are produced by multiphoton or field ionization. Very interesting applications emerge from this field, two of which are the isotope selective ionization with large efficiency and the sensitive detection of infrared radiation. The latter is due to the fact that the highly excited atoms are highly sensitive to infrared radiation because of the huge size of their electric dipole matrix elements. A Rydberg state infrared detection system is at present almost a factor 10 more sensitive than the best available infrared detector (Schottky diode).

I.I. Sobel'man reported on the latest results of an experiment of the Moscow group which is searching for the optical rotation in atomic Bi, caused by the parity nonconserving (PNC) weak interaction between atomic electrons and the nucleus. This effect has been predicted on the basis of the Weinberg — Salam model. According to the results of this experiment, the PNC effect is not observed, although three other groups (Seattle, Oxford, Novosibirsk) in similar experiments found strong evidence for the predicted effects in both sign and magnitude. It is hoped that further improvements of the experiments will remove the inconsistency of the experimental results in order to draw a final quantitative conclusion.

The question "Why measure isotope shifts" was enthusiastically answered by D.N. Stacey in his report. The application of tunable lasers in this field has enormously improved the experimental technique in two ways: Results can now be obtained with very small samples of material (many interesting unstable nuclei can be studied only in this way) and Doppler-free laser spectroscopy provides a most powerful method to study the HFS and their shifts with highest resolution. These new investigations revealed the detailed behaviour of the charge distribution over long sequences of isotopes, e.g. of the elements Na, Ca and Ba.

Much of our present understanding of atomic and molecular structure and of atomic collision processes comes from the use of accelerators in atomic and molecular physics experiments. Excellent reports on the various potentialities and the latest achievements of such experiments were given by I. Martinson (Atomic and Molecular Physics with Accelerators), F.J. Wuilleumier (Synchrotron Radiation in Atomic and Molecular Physics: present status and future developments) and D. Liessen (Excitation Mechanisms in Superheavy Quasiatoms).

Future of ECAP

What will be the future of ECAP? The general consensus at the end of the Heidelberg Conference was that ECAP should be repeated at regular intervals of three to five years. It is now up to the national sections on atomic and molecular physics to make a firm decision on this.

W. Mehlhorn
(Albert-Ludwigs University, Freiburg)

Atomic Physics Division

In the **EGAS** elections which have taken place since the June issue of *EN* went to press, R. Winkler steps down and new members are:

E. Bernabeau, University, Zaragoza
N. Grevesse, University, Liège

Istanbul Programme

Only minor changes in the Istanbul timetable have been introduced since *Bulletin No. 2* was distributed, and very few modifications have been made to the programme that was set out in *Bulletin No. 3.*

The Plenary Sessions are now arranged as follows:

Monday morning, 7 Sept. 1981:
Interstellar molecular clouds / Structure of the Galaxy / Ionospheric research.
Monday evening:
Powell Memorial Lecture.
Tuesday morning, 8 Sept.:
Rydberg atoms / Nuclear matter / Solitons and phase transitions / Towards unification.
Wednesday morning, 9 Sept.:
Plate tectonics / Dirac, Salam, Weisskopf Symposium.
Thursday morning, 10 Sept.:
Optical bistability / Plasma confinement / VLSI technology / Impact of microelectronics.
Thursday evening:
Educational challenge / Physics and Society.
Friday afternoon, 11 Sept.:
Electron states / Photovoltaic conversion.

The General Meeting of EPS Members will be held on Tuesday evening, 8 Sept. (before the banquet). The Agenda is:

1. **Report of the President**
2. **Report of the Secretary**
3. **Report of the Treasurer**
4. **Scientific freedom**
5. **Discussion of general policy and of the future of the EPS.**

Membership Fees

New applicants will be admitted to the General Meeting if they have already paid their dues.

Accepted members are reminded that they will be removed from the membership list if their dues are not paid up.

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Astronomy and Astrophysics Division
Solar Section
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Atomic Spectroscopy Section
Chemical Physics
Electronic and Atomic Collisions
Molecular Physics
Computational Physics Group
Condensed Matter Division
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Macromolecular Physics
Magnetism
Metals
Semiconductors and Insulators
Surface and Interface
High Energy & Particle Physics Division
Nuclear Physics Division
Plasma Physics Division
Quantum Electronics Division

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Editorial and Advertising Office at the EPS Secretariat.
Address: EUROPEAN PHYSICAL SOCIETY
P.O. Box 69,
CH-1213 Petit-Lancy 2
Switzerland
Telephone: Geneva (22) 93 11 30
Telex: 23 455 alarm ch
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