

dence of the reactivity. Also, the anti-correlation between maxima in reactivity and minima in ionization potential curves, found for some systems, ( $\text{Fe}+\text{H}_2$ ,  $\text{Nb}+\text{H}_2$ ,  $\text{Nb}+\text{N}_2$ ), indicated that a simple charge transfer model could explain it. This however does not seem to be general. More recent detailed experiments on chemisorptive systems, such as  $\text{H}_2+\text{NH}_3$  on  $\text{Fe}_n$  and  $\text{O}_2$  on  $\text{Al}_n^+$ , indicate that the interpretation of the products of a chemisorption process can be rather delicate. Lack of theoretical approaches in this field is manifest and contrasts with the growth of experimental data.

Finally, we mention a topic where theory and experiment are progressing in parallel and which is very specific to insulating clusters: the nature of the states occupied by excess electrons. The interest resides in the fact that this can be different from the bulk. For instance, in polar bulk media ( $\text{H}_2\text{O}$ ,  $\text{NH}_3$ ) the electron becomes self-trapped (small polaron), while for small clusters, a diffuse surface state is likely to offer the only bound state. In alkali halide clusters, an excess electron could be localized either on a specific alkali cation or at a lattice site normally occupied by a halide ion (F-centre) or could reside in an extended surface state. The nature of the most favourable state is expected to depend crucially on cluster size and stoichiometry. Electron attachment, detachment, photoelectron spectroscopy, and dissociation spectroscopy are being employed to characterize these systems.

Although we have not been able to cover all the exciting current studies on clusters, we believe that we have given an idea of the richness of the field and of the variety of the methods which have allowed (or will allow) progress to be made.

#### REFERENCES

- [1] *Elemental and Molecular Clusters*, eds. G. Benedek, T.P. Martin and G. Pacchioni, Springer Series in Material Sciences, Vol. VI (Springer, Berlin) 1988; *The Chemical Physics of Atomic and Molecular Clusters*, Varenna 1988, eds. G. Scoles and S. Stringari (Società Italiana di Fisica Publishing) in press, *Z. Phys. D* **12** (1989)1-4; *Ion and Cluster Ion Spectroscopy and Structure*, eds. J.P. Maier (Elsevier, Amsterdam) 1989.
- [2] Car R. and Parrinello M., *Simple Molecular Systems at Very High Density*, Proceedings of the NATO ARW, Les Houches, NATO ASI Series (Plenum, New York) 1988; see also *Europhys. News* **20** (1989) 69.
- [3] Buck U., Properties of Size-selected Neutral Clusters, *Europhys. News* **20** (1989) 41.
- [4] Broyer M., Delacrétaz G., Ni G.-Q., Whetten R.L., Wolf J.-P. and Wöste L., *Phys. Rev. Lett.* **62** (1989) 2100.
- [5] Andreoni W., Pastore G., Car R. and Parrinello M. (to be published).
- [6] Ercolessi F., Tosatti E. and Andreoni W. (to be published).
- [7] Miehle W., Kandler O., Leisner T. and Echt O., *J. Chem. Phys.* (in press).
- [8] Stapelfeldt J., Wörmer J. and Möller T., *Phys. Rev. Lett.* **62** (1989) 98.
- [9] Rademann K., Kaiser B., Even U. and Hensel F., *Phys. Rev. Lett.* **59** (1987) 2319.
- [10] Di Cenzo S.B., Berry S.D. and Hartford E.H. Jr., *Phys. Rev. B* **38** (1988) 8465.

## ATMOSPHERICS

In all sorts of communities, the state of the upper atmosphere is becoming the number one worry. At a meeting of the European Ecumenical Council held in Basel in May on the theme "Peace with Justice" a group of 17 physicists led by the Energy Working Group of the German Physical Society and including eastern European colleagues went so far as to present a manifesto in which they recommended *inter alia* reducing the consumption of fossil fuels in Europe by a factor of 3 1/2 over the next 25 years. The full text of the manifesto is published in *Physikalische Blätter* **45** (1989) 8, p. 340 and an English translation is available from Prof. K. Schultze at RWTH, Aachen. The CNRS in the latest issue of *Nouvelles des Presses du CNRS* announces publication of a book at 150 FF by Marcel Nicolet on *Ozone, l'Equilibre Rompu* in which the author makes a real attempt to collate the information that is available and assess how much is known about this hugely complex system that is the biosphere. The Swiss Physical Society has also just produced a booklet *Vom Menschen verursachte Klimaveränderungen* which gives a lot of data on energy balances,  $\text{CO}_2$  measurements, temperature records and so on concluding with a bibliography of recent relevant literature. This is available from the Society on request.

Meanwhile governments at the highest level are studying the data and possible scenarios. The Intergovernmental Panel on Climatic Change set up about a year ago held its second session in Nairobi in June and the report of this was to be out by the end of September. The full assessment report is scheduled for 1990. The Executive Council of the World Meteorological Office meeting also in June was particularly concerned with possible climatic changes, but then so too was the UN Governing Council of the Environmental Programme and most international bodies like FAO have their specialist groups.

## Finland to Join CERN

Finland has opened negotiations with CERN with a view to its becoming a full member after a transitional period of a few years. Based on its net national income Finland will be required to pay some 1.9% of the overall annual budget presently running at about 825 MSFR. Finnish physicists have for a number of years participated in experiments at CERN and have lately taken part in the design of Delphi, one of the four LEP experiments.

## Amsterdam Pulse Stretcher on its Way

While the bicentennial of the French Revolution was being commemorated in Paris, on 14 July, physicists in Amsterdam were celebrating the formal start of construction of the new Amsterdam Pulse Stretcher (AmPS) at NIKHEF. The ground-breaking ceremony, conducted by B. Veltma, member of the board of the Netherlands' organization for Scientific Research (NWO), involved driving a concrete pile 18 m long into the ground.

AmPS is essentially a storage ring 212 m round which will be used in conjunction with the existing medium energy accelerator (MEA) at NIKHEF to provide the experimenters with "continuous wave" electron beams at energies up to 900 MeV. The duty factor will be 90% compared with 1% at present and a maximum energy of 550 MeV.

The electron beam can either be

extracted from the ring and used in the existing experimental hall for high-resolution coincidence studies or it can be stored in the ring for use with an internal target. In such experiments the electrons interact with target nuclei in a rarefied (possibly polarized) gas stream. A new dedicated experimental hall is being built for this type of experiment. The new facility will be used to study the properties of nucleons in atomic nuclei, and especially the interaction between nucleons at short distances and the role of the first excited state of the nucleon, the delta.

The civil construction of AmPS will be finished next year, the installation of the ring first tests are scheduled for 1991, with commissioning in 1992.

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