representation of SO(10). Thus GUT theories force inter-relations between the quantum numbers of quarks and leptons and explain nicely the different charges for these excitations.

Supersymmetry: I have indicated already how supersymmetry can serve to stabilize the scalar sector of the standard model. In the present context, however, one can think of another role for supersymmetry. Given a symmetry group, the number and kind of gauge bosons is fixed uniquely, since they must transform according to the adjoint representation of the group. If there was a (1/2, 1) supersymmetry which associated the matter fermions with the gauge bosons then, given the forces, the matter would be fixed! However, things cannot be so simple since the adjoint representation is real, so that the fermions will always turn out to be chirally paired, in conflict with the chiral asymmetry needed for the weak interactions. The idea that matter and forces are unified via supersymmetry makes no sense unless the above problem is solved.

Compactification: Physical theories in a spacetime of greater than four dimensions can give rise to sensible 4-dimensional theories if the extra dimensions spontaneously compactify. In particular, in spacetimes with 4n + 2 dimensions one can have fermions which have both reality properties and are chiral. Upon compactification, it is possible that only fermions of a certain chirality survive, with their number in general being determined by topological properties of the compact space. This mechanism can then be used to get rid of unwanted fermionic states.

These three ingredients are present in superstring theories [2]. These theories as we have seen exist in ten dimensions, are supersymmetric and have a fixed gauge group which, for the most promising case, is $E_8 \times E_8$. Besides the fact that superstrings may provide a realistic quantum theory of gravity [1], the excitement surrounding them is connected to the fact that they potentially can explain rather naturally why we have the matter and forces we observe. In the most popular scenario [3] at a scale of $O(M_{Pl})$ compactification is supposed to take place reducing one of the E_8 groups to a subgroup of E_6, which contains the standard model. The emerging fermions are chiral and appear in a number of replicas (families) of the 27-dimensional representation of E_6. Further an overall supersymmetry is preserved.

All these points are very nice. The supersymmetry is useful for the hierarchy problem. Quarks and leptons fit well in the 27-dimensional representation of E_6 and the strong and electroweak interaction emerge naturally. Of course, depending on details of the evolution of the theory below the compactification scale some extra states and/or forces may appear. But to know really whether this happens, one must understand the process by which other scales besides M_{Pl} are generated in these theories. It is thought that phenomena tied to the other E_8 may trigger the breakdown of supersymmetry, which in turn acts as a seed to generate radiatively the breakdown of $SU(2) \times U(1)$. However, no fully convincing demonstration of this has been given. Hence, even though Yukawa couplings can be generated at the compactification scale, it is not clear whether Λ_F will ever emerge from these theories! Here too experiment is needed for illumination. Supersymmetry, although broken, remains a crucial ingredient of these theories. Thus, if this line of speculation is correct, one should expect to observe superpartners of both quarks, leptons and gauge bosons, with masses not much bigger than Λ_F. Results from the next generation of accelerators, probing the 100 GeV energy range, are eagerly awaited.

REFERENCES

1. For a review, see for example Harari H., *Proceedings of the 1985 Erice Summer School.*
M. Green, this issue.
2. For a review, see for example Langacker P., *Phys Rept* **72C** (1981) 185.
3. Candelas P., Horowitz G. and Strominger A., ed E. Witten, *Nucl Phys* **B258** (1985) 46.

1987 Hewlett-Packard Europhysics Prize

The winner of the 1987 prize is:
Professor Igor K. Yanson
of the Institute for Low Temperature Physics and Engineering, Kharkov, USSR, for the discovery and exploitation of point-contact spectroscopy (see February issue).

New Members of the European Physical Society

CATEGORY 4a)
G. Baribaud, Geneva, CH
V.D. Bogert, St. Charles, Il, USA
A. Franz, Geneva, CH
M. Promé, Caen, F
H. Van der Beken, Abingdon, UK

CATEGORY 4c)

Belgian Physical Society
Y. Novis, Namur
J. Ongena, Belsele
D. Roekaerts, Kessel-Lo
F. Wegria, Wandre

Danish Physical Society
J. Nørregaard, Rødovre
E. Schwartz Sørensen, Aarhus

Finnish Physical Society
T.T. Rantala, Oulu
L. Sundström, High Wycombe, UK

French Physical Society
G. Jezequel, Rennes

German Physical Society
E. Dormann, Bayreuth
J. Gutowski, Berlin
C. Heimlich, Göttingen
H.-J. D. Kunze, Bochum
R. Poerschke, Bad Honnef
P. Swiatek, Jülich
H.J. Völk, Heidelberg

The Institute of Physics
J.A. Blackman, Reading
H.P. Hughes, Cambridge
D.G. Pettifor, London
M. Rahnama, Manchester

Israel Physical Society
M. Baer, Yavne
S.I. Ben-Abraham, Beer Sheba

Italian Physical Society
V. Castellani, Rome
E. Rimini, Catania

The Netherlands' Physical Society
S. Radelaar, Delft

Norwegian Physical Society
G.R. Sundt, Trondheim

Physical Section, Union of Czechoslovak Mathematicians and Physicists
I. Zelenay, Bratislava

Physical Section, Union of Yugoslav Societies of Mathematicians, Physicists and Astronomers
R. Brako, Zagreb

Polish Physical Society
R. Iwanowski, Warsaw
J. Lesz, Wroclaw
B. Myslek-Laurikainen, Swierk
K. Sujak-Lesz, Wroclaw

Portuguese Physical Society
C. Fiolhais, Coimbra

Romanian National Committee for Physics
N.-V. Zamfir, Bucharest

Swedish Physical Society
B.-G. Andersson, Göteborg

Swiss Physical Society
J. Schacher, Münsingen
S.G. Steinemann, St. Sulpice

CATEGORY 4d)

American Physical Society
J.R. Manson, Clemson, SC
W. McGrath, Göteborg, S
J.V. Noble, Charlottesville, VA
P.S. Pershan, Cambridge, MA

Physical Society of Japan
T. Yoshida, Fukushima