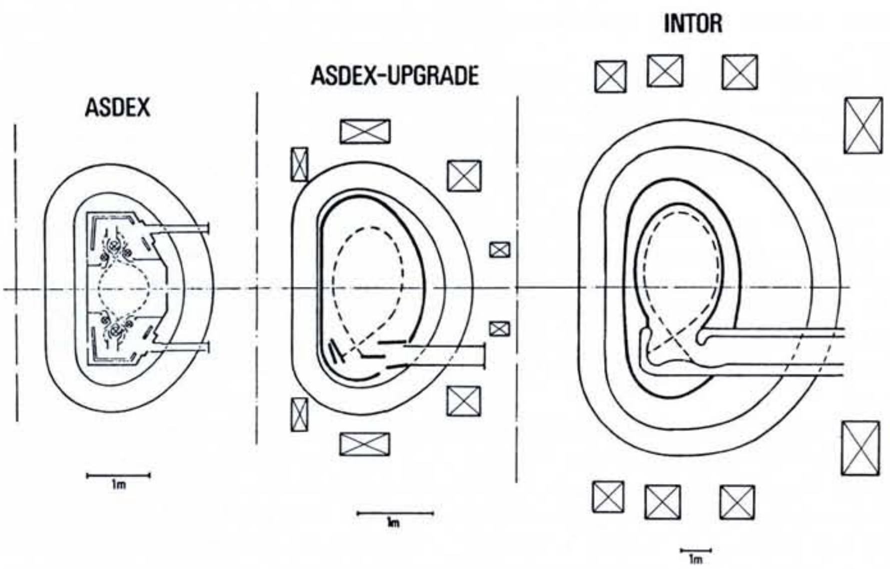

Fig. 4 — Comparison between the Divertor Experiments ASDEX and ASDEX-Upgrade and INTOR which is relying on a functioning divertor. Note the big difference in scale.

concerned but it requires a rather complicated operation scenario and might be rejected finally for this reason. Perhaps, then will come the time when the stellarator's inherent potential of DC operation is given preference if also its other properties have continued to develop favourably in the meantime.

One also has to remember that in all of the world fusion programmes, the development of fusion technologies was set aside initially until sufficient confidence had been developed that all the physics hurdles could be overcome. In view of the large extrapolations required this was a reasonable strategy, but it has created a situation where one now can only screen materials and technologies which have been developed for other purposes and check how they will perform under fusion conditions. It is highly unlikely that the optimum materials and technologies are already among the fully developed ones, considering that the fusion conditions are rather unique. This is not too bad a situation though, because it now allows orienting the various technology development paths with much broader and deeper knowledge on the required properties and achieving a much higher cost-effectiveness than it would have been possible earlier.

Design work for INTOR-like devices will continue to identify the engineering needs in greater and greater detail. The R and D programmes will provide answers to these engineering needs, and one has to be careful not to conclude that the state of the art reached up to now already represented the full potential of fusion technology. Nevertheless, in its deliberations, the INTOR team has stated that solutions have already been found to all engineering problems encountered, although admittedly some of these solutions are of a rather complicated nature. The construction and operation of an INTOR-like machine would therefore serve as an invaluable basis for the development of second generation technologies aimed at further improving fusion reactor engineering.

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4. — M. Keilhacker *et al.*, *Plasma Physics and Controlled Nuclear Fusion Research* (Proc. 10th Int. Conf. London 1984), Vol. I, IAEA Vienna (1985), 71.
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D.N. Stacey writes:

In my article, I referred to the Z^3 law derived by M. and Mme Bouchiat as a major step in stimulating the programme of research on parity nonconservation in atoms. In singling out this contribution for particular mention because of its importance I certainly did not intend to associate M. and Mme Bouchiat with early overestimates of PNC effects, and indeed the article goes on to discuss these in the context of bismuth. I am therefore glad that the Editor has helped to avoid any possibility that readers might be misled on this point by printing the above comment.

LETTER TO THE EDITOR

Parity Violation Predictions

Comments on the Review Article of D.N. Stacey

The uninformed reader may get the impression, from the review article by D.N. Stacey published in *Europhysics News* **16** (1985) 2 (February), that in the early work of C.C. and M.A. Bouchiat [1]) the parity violation effects in heavy atoms were grossly overestimated: "The effects are much smaller than were at first predicted to be". In reference 1, a detailed evaluation was given for the case of atomic caesium only. The results of the Paris experiments can be expressed in terms of the ratio of parity violating 6S-7S electric dipole amplitude $E_1^{p.v.}$ to the spin-independent transition dipole amplitude αE_0 induced by an electric field E_0. The predicted ratio was:

$E_1^{p.v.}/\alpha \approx 2.8 \times 10^{-4}$ V/cm

which is to be compared to the experimental ratio (deduced from reference 2)

$1.56 \pm 0.17 \pm 0.12 \times 10^{-4}$ V/cm.

The parity violation effect was indeed overestimated by a factor 1.8 but the order of magnitude was clearly the correct one. The p.v. electric dipole $E_1^{p.v.}$ is proportional to the weak charge of the nucleus Q_w which depends upon the weak mixing angle θ_w, the only free parameter in the Glashow-Weinberg-Salam electroweak theory. In our 1974 work, we used a preliminary value of θ_w coming from the very early neutrino experiments and got a value of Q_w of about - 100 while the most recent experimental analysis, involving radiative corrections, gives $Q_w = -68.6 \pm 0.3$. In this way, a substantial part of the discrepancy is accounted for. The remaining 20% reduction factor is very likely to be associated with many-body effects not included in our early evaluation. There exist now several calculations of p.v. in atomic caesium, involving a treatment of many-body effects; all the results lie within the experimental error bars [3]).

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2. Bouchiat M.A., Guéna J., Hunter L. and Pottier L., *Phys. Lett.* **117B** (1982) 358, and **134B** (1984) 463, and *Optics Comm.* **45** (1983) 35.
3. Dzuba V.A., Flambaum V.V., Silvestrov P.G. and Sushkov O.P., *J. Phys.* **B18** (1985) 597 and references therein.

M.A. and C. Bouchiat