

PARITY DEPENDENCE IN $^{32}\text{S}+^{34}\text{S}$ AND $^{32}\text{S}+^{30}\text{Si}$ ELASTIC SCATTERING

B. BILWES, R. BILWES

Centre de Recherches Nucléaires-CNRS and Université Louis Pasteur, Strasbourg, France.

J. DÍAZ, J. L. FERRERO, G. ROLDAN and J. A. RUIZ

IFIC-CSIC and Universitat de València, Burjassot, València, Spain.

It has been shown ^{1,2} that the transfer of a valence particle between identical cores can be accounted for by using a parity-dependent real part in the optical potential which includes not only the first order transfer effects but also high-order non-perturbative processes. In fact it has been shown ³ that a parity dependent potential appears not only in the transfer of one valence particle but also for any transfer process although the most important contribution to this potential comes from the term of the wave function antisymmetriser which exchanges the largest possible number of particles between the identical cores. Moreover, shell effects are expected to play an important role.

The use of a parity-dependent potential has been employed in the study of the transfer of a valence nucleon ^{1,2,4} and also of α -clusters ⁵. A realistic potential should be used for the parity-independent part of the optical potential. For the real part we have employed the double-folding model potential, with the M3Y interaction ⁶. This model has proven to describe quite well a large amount of heavy ions scattering data. The densities of the nuclei were taken from electron or proton scattering data ⁷. The Woods-Saxon parametrisation was used for the imaginary part.

The parity-dependent part was taken to be proportional to the folding-model potential

$$V_{real}(r) = V_{Folding}(1 + (-)^l V_{PP})$$

Only the forward part of the angular distributions without interference pattern was used to get the imaginary potential parameters. The best ones are reported in the Table I, as well as the renormalization factors N_R of the real potential which have been proved to be necessary if a good fit in the Coulomb rainbow region is required ⁸. In a second step, the whole angular distributions were used to obtain the parity parameter (V_{PP}). In the Figure 1 are compared the curves without and with the parity-dependent potential.

In both cases the sign of V_{PP} is unambiguously defined as positive. The strength in the ^{30}Si case is found bigger than in the ^{34}S case. These results are in total agreement with the Baye's predictions ⁵.

In conclusion it has to be emphasized that the introduction of a parity-dependent potential with only one parameter allows a very good reproduction of precise interference measurements.

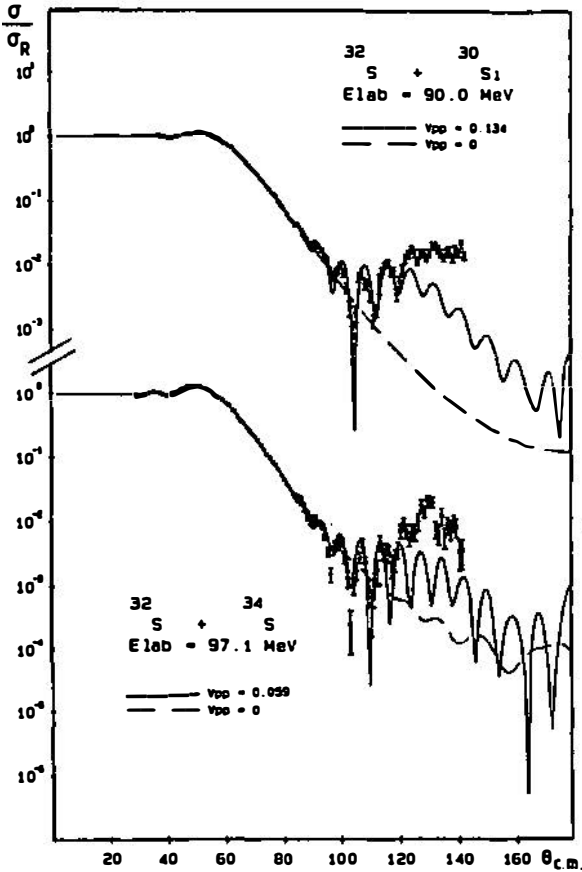


Fig. 1. See text for explanation

Table I
Imaginary potential parameters
and renormalization factor

	$^{32}\text{S} + ^{30}\text{Si}$	$^{32}\text{S} + ^{34}\text{S}$
N_R	1.2	1.3
$W(\text{MeV})$	16.7	27.8
$R_W(\text{fm})$	8.218	8.587
$a_W(\text{fm})$	0.528	0.372

- 1) W. von Oertzen and W. Nörenberg Nucl. Phys. **A207** (1973) 113
- 2) W. von Oertzen and H. G. Bohlen Phys. Rev. **C19** (1975) 1
- 3) D. Baye, J. Deenen and Y. Salmon Nucl. Phys. **A289** (1977) 511, D. Baye Nucl. Phys. **A460** (1986) 581
- 4) B. Bilwes *et al* Nucl. Phys. **A** (1987) *To be published*
- 5) W. J. Naudé *et al* Z. Phys. **A311** (1983) 297, Cheng-qun Gao *et al* Nucl. Phys. **A438** (1985) 281, Y. Kondo *et al* Phys. Lett. **162B** (1985) 39, B. Bilwes *et al* Nucl. Phys. **A463** (1987) 731
- 6) G. R. Satchler and W. G. Love Phys. Rep. **C55** (1979) 183
- 7) G. C. Li *et al* Phys. Rev. **C9** (1974) 151, G. D. Alkhozov *et al* Phys. Lett. **57B** (1975) 47, S. W. Brain *et al* J. of Phys. **G3** (1977) 821
- 8) C. Roldan *Thesis*, University of Valencia, Spain 1987