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STUDY OF $^{12?}$[illegible]

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STUDY OF ^{112}Cd BY INELASTIC SCATTERING OF 30 MeV POLARIZED PROTONS

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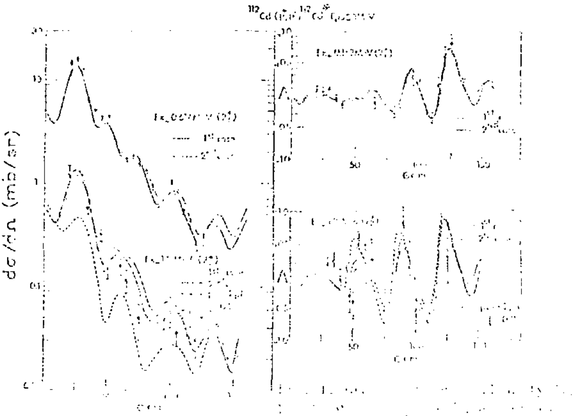
It is known that the harmonic vibrational model does not explain completely the proton inelastic scattering cross sections from [illegible] nuclei like ^{112}Cd [illegible]$^{1)}$. [illegible] fits to the data were obtained by [illegible] in the [illegible] state [illegible] of a [illegible] in this nucleus still remain to be investigated. However, recently, it has been suggested$^{2)}$ that a strong two-phonon mixture should be added also to the one-phonon part of the first [illegible] in ^{112}Cd (Q_x = 0.617 MeV (2_1^+)) to describe successfully this state. With this problem in mind, we have measured cross sections and analyzing powers of inelastic scattering of 30 MeV protons from low lying states in ^{112}Cd. The data taken at the Grenoble cyclotron were analyzed with the program ECIS 74$^{3)}$ by coupling the 0+, [illegible] and the [illegible] (1.31 MeV) using the optical model and deformation parameters of table 1. The calculations for the data are presented on Fig. 1.

We determined for each state the mixture of one phonon and two-phonon components in the vibrational model. In the first case, the 2_1^+ state is considered as a pure one-phonon state and the 2_2^+ state by

$$|2_2^+> = 0.[illegible] |1\text{-ph}> \; 0.5 |2\text{-ph}> .$$



In the second case, the 2_1^+ and 2_2^+ orthogonal states are represented by

$$|2_1^+> = 0.917\ |1\ ph> - 0.3[illegible]\ |2\ ph>$$

$$|2_2^+> = 0.399\ [illegible]$$

The coupling parameters [illegible] β is the same as [illegible] ref. [1].

For the first case (solid lines) we find again that the deformation parameters as well as the [illegible] components are similar to those obtained in ref. [1]. Several [illegible] better agreement with the data is clearly obtained for the second case but this effect is more visible on the [illegible] than on the 2_1. Fig. 2 presents the [illegible] fit obtained for the data of the 3^- state assuming 0^+, 3^- coupling with $\beta(3^-) =$ 0.15.

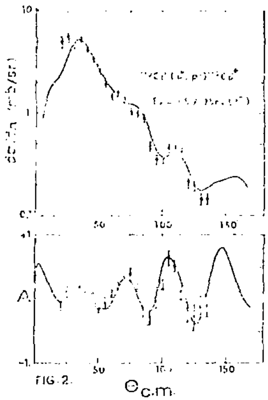


Fig. 2. Cross section and analyzing power of the 3^- state in ^{112}Cd.

Table 1. Optical model and deformation parameters used in the coupled-channels calculations.

	V_0 (MeV)	r_0 (F)	a_0 (F)	W_V (MeV)	W_D (MeV)	r_I (F)	a_I (F)	V_{LS} ([illegible])	r_{LS} (F)	a_{LS} (F)	β_2	β_{02}
1st case	53.59	1.14	0.76	3.60	5.63	1.30	0.65	5.[illegible]	1.01	0.[illegible]	0.20	[illegible]
2nd case	"	"	"	"	4.50	"	"	"	"	"	"	0.050

References

+ Permanent address : [illegible]

1) [illegible] Nucl. Phys. A339 (1980) 14
2) G.G. Shute and [illegible] private communication
3) See paper by [illegible] plete description of the experimental [illegible]
4) [illegible]