Spectroscopy of ^{194}Ir via the $(\vec{d},\alpha)$ Reaction ◇

H.-F. Wirth, Y. Eisermann, R. Hertenberger, G. Graw, S. Christen [a], O. Möller [a], D. Tonev [a], and J. Jolie [a]

[a] IKP, Universität zu Köln

The $(\vec{d},\alpha)$ measurement to ^{194}Ir is part of our program of complete spectroscopy of the quartets of nuclei whose structure might be related by supersymmetry [1].

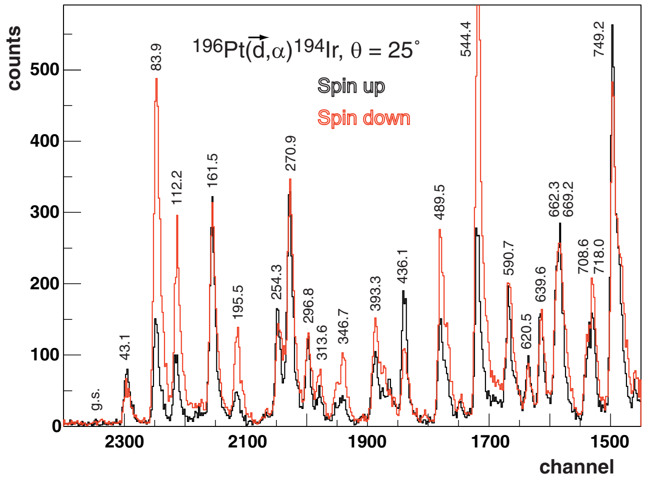

Fig. 1: Spectra of the ^{196}Pt$(\vec{d},\alpha)^{194}$Ir reaction at $E_d = 18$ MeV. Some peaks are labeled with their energy in keV.

We measured the reaction ^{196}Pt$(\vec{d},\alpha)^{194}$Ir at 9 angles between 10 and 60 degrees. At all angles two separate spectra for deuteron spin up and spin down have been recorded. The target consisted of 40 μg/cm^2 metallic platinum (97 % ^{196}Pt), evaporated on a 8 μg/cm^2 carbon backing. The polarized deuteron current on target was up to 3 μA. Figure 1 shows the spin up and spin down spectra for ^{196}Pt$(\vec{d},\alpha)^{194}$Ir at $E_d = 18$ MeV and a laboratory angle of 25 degrees. The FWHM is 8 keV. In Fig. 2 typical angular distributions for this reaction are shown.

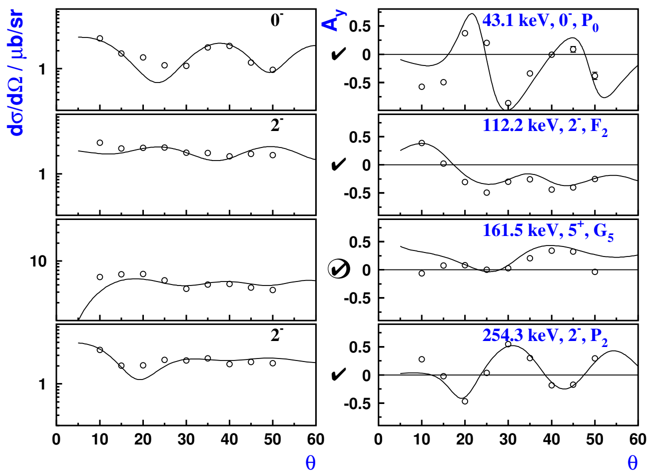

Fig. 2: Typical angular distributions of the ^{196}Pt$(\vec{d},\alpha)^{194}$Ir reaction. The left part shows absolute cross sections, the right part analyzing powers. The lines are results of DWBA calculations.

We observed several so far unknown states like the $J^\pi = 5^+$ state at 161.5 keV and are in close contact to colleagues in Riga who try to confirm these levels with (n,γ) data [2]. A direct comparison between the results of $(\vec{d},\alpha)^{194}$Ir with $(\vec{d},\alpha)^{196}$Au [1] shows less affinity than one might think considering the fact that both nuclei differ only by two protons, see Figs. 3 and 4.

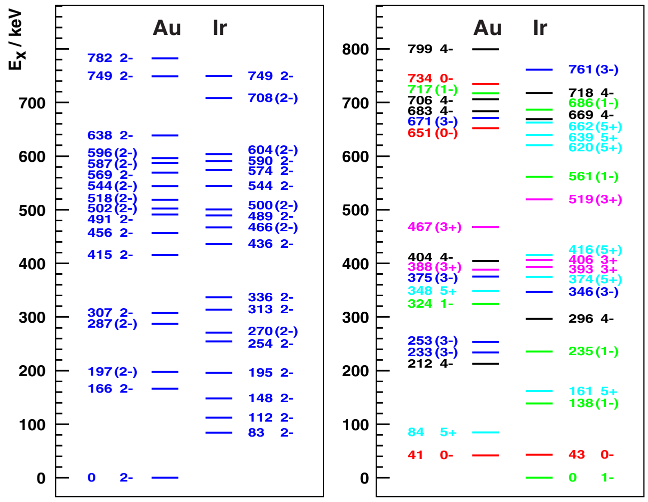

Fig. 3: Comparison of all states observed in the $(\vec{d},\alpha)$ reactions to ^{196}Au and ^{194}Ir up to 800 keV. In the left part of the figure only states with $J^\pi = 2^-, (2^-)$ are shown and in the left part all others. Numbers are excitation energy in keV and J^π from $(\vec{d},\alpha)$.

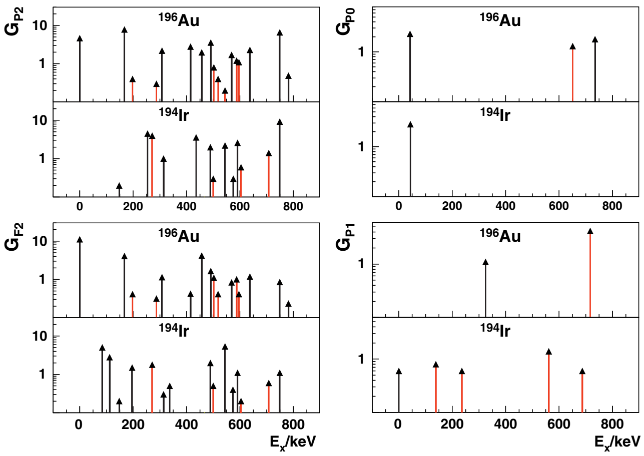

Fig. 4: Comparison of the transfer strengths of $(\vec{d},\alpha)^{196}$Au and $(\vec{d},\alpha)^{194}$Ir. The left part of the figure shows the P2 and F2 strength contributing to 2^- final states. The right part shows the strengths of P0 (0^-) and P1 (1^-) transfers. The colors black and gray distinguish between save assignments and assignments in brackets (see Fig. 3).

The results of this measurement will hopefully be of value to clarify supersymmetry in atomic nuclei. The discussion is in progress.

References

[1] this report, p.12
[2] M. Balodis, private communication (2002).

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