Study of ^{200}Au and ^{202}Au via the (d,α) Reaction ◇

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After a successful study of ^{196}Au via ^{198}Hg($\vec{\mathrm{d}},\alpha$) [1] we measured also angular distributions of the two reactions ^{202}Hg($\vec{\mathrm{d}},\alpha$)^{200}Au and ^{204}Hg($\vec{\mathrm{d}},\alpha$)^{202}Au.

The polarized deuteron beam was produced in the Stern-Gerlach source and accelerated to $E_\mathrm{d} = 18$ MeV. The reaction products were analyzed by the Q3D magnetic spectrograph and detected and identified in our focal plane detector with cathode-strip readout. We measured spin up and spin down spectra for eight [^{202}Hg($\vec{\mathrm{d}},\alpha$)] and nine [^{204}Hg($\vec{\mathrm{d}},\alpha$)] different angles between 10 and 50 degrees.

The achieved resolution was 8 keV FWHM. Low-energy parts of the spectra can be seen in Fig. 1 of Ref. [2]. The Figs. 1 and 2 show typical angular distributions for the both measurements and the results of DWBA calculations.

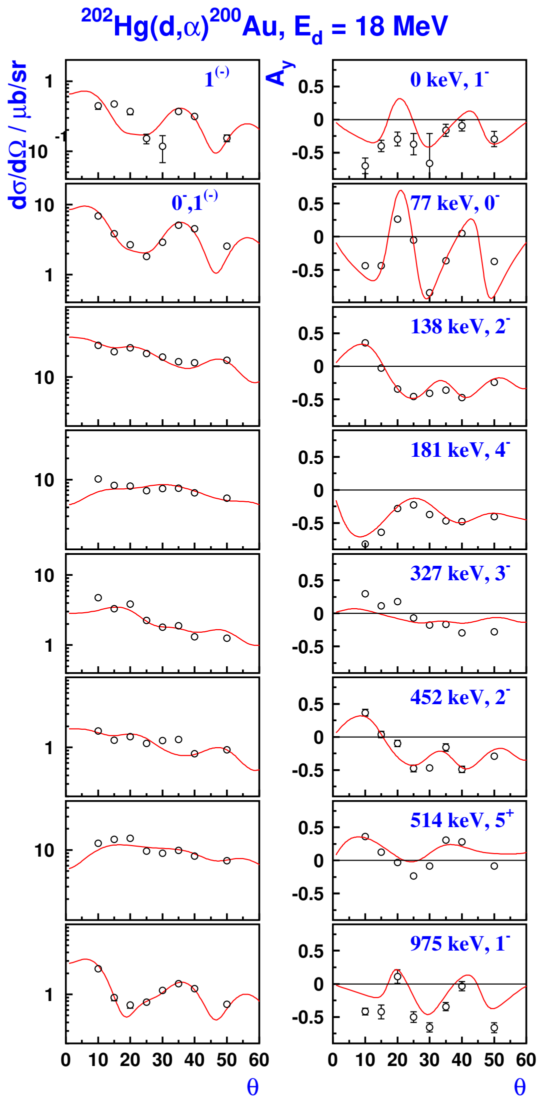

Fig. 1: Typical angular distributions of cross section (left) and analyzing power (right) for ^{202}Hg($\vec{\mathrm{d}},\alpha$)^{200}Au. The solid grey lines are the results of DWBA calculations.

In the case of ^{202}Hg($\vec{\mathrm{d}},\alpha$)^{200}Au 46 angular distributions of cross section and analyzing power could be evaluated up to 1100 keV, in case of ^{204}Hg($\vec{\mathrm{d}},\alpha$)^{202}Au $\sim$80 angular distributions up to approx. 2100 keV. The overall agreement between experimental and calculated angular distributions could be improved compared to our earlier study of ^{196}Au [1] due to a refit of the optical potential parameters for the DWBA. Thus we are able to get unique spin and parity assignments for the majority of the observed levels.

This improves essentially the knowledge about the two nuclei ^{200}Au and ^{202}Au, since the information about the level scheme given in the Nuclear Data Sheets is very poor.

The evaluation is in progress.

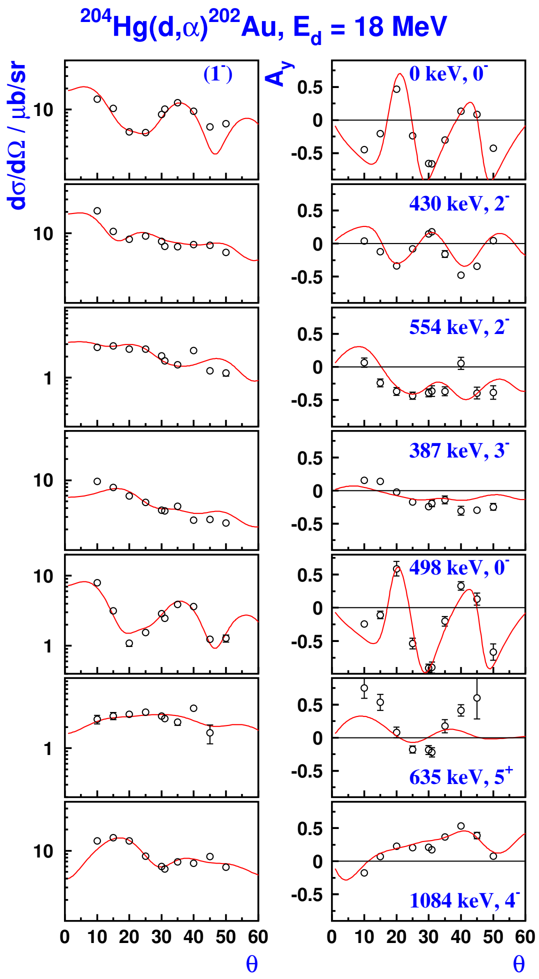

Fig. 2: Typical angular distributions of cross section (left) and analyzing power (right) for ^{204}Hg($\vec{\mathrm{d}},\alpha$)^{202}Au. The solid grey lines are the results of DWBA calculations.

References

[1] H.-F. Wirth *et al.*, Annual report 2001, p. 14

[2] H.-F. Wirth *et al.*, *Q-value determination of (d,α) reactions*, this report p.17

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