Spectroscopy of ^{193}Os with a Polarized Deuteron Beam ◇

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The complex transitional region of the W, Os and Pt nuclei has attracted considerable interest in the past years both to experimentalists and theoreticans. We investigate the heaviest osmium isotope which is accessible in a single neutron transfer reaction: ^{193}Os. Excitation energies are known from ^{192}Os(d,p)– [1] and ^{192}Os(n,γ)–measurements [1,2], but there is limited information about quantum numbers.

After a measurement of the ^{192}Os (d,p)-reaction [3] we took data with the polarized deuteron beam. We have measured the single neutron transfer–reaction $^{192}\mathrm{Os}(\vec{\mathrm{d}},\mathrm{p})$ at the Munich tandem accelerator using the high resolution Q3D magnetic spectrograph and the 1.7m focal plane detector. The 22MeV beam of vector–polarized deuterons was 200nA on target, polarization about 60 %. The target consisted of $170\frac{\mu g}{cm^2}$ of highly enriched ^{192}Os (99%). The ^{193}Os–spectrum (part of which is displayed in fig.1) shows a nice resolution of about 5keV. The ground state is the very weakly populated 3/2-.

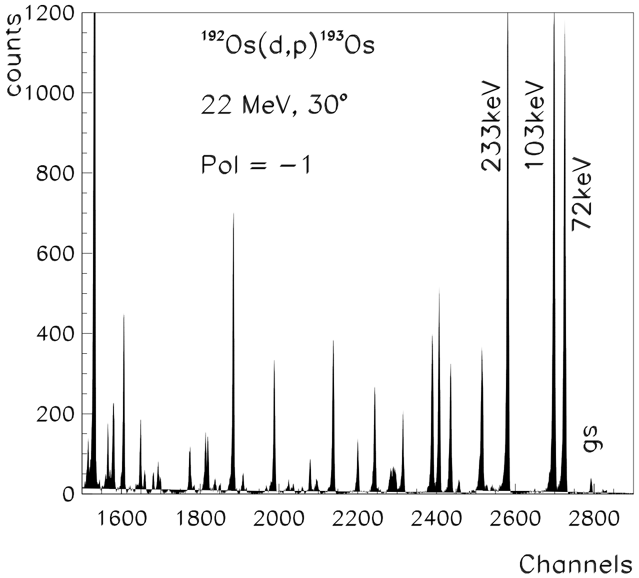

Fig. 1: Displayed is part of the ^{193}Os–spectrum up to an excitation–energy of about E_x=1500keV. Resolution is 5keV FWHM.

Fig.2 shows relative cross sections for the first three low lying l=3 and l=1 transfers (without the groundstate though), and the corresponding asymmetries of these. Nuclear Data Sheets give assignments for the resulting nuclear levels as j=(5/2-), j=(3/2-) and j=(1/2-,3/2-). Our polarised data allow to confirm the first two assigments and to assign the 233.8keV level as j=1/2-.

The dotted curves give a DWBA–calculation (we used the programm CHUCK) with a preliminary set of parameters. l–transfers are described well, asymmetries show, that further adjustment of the parameters is necessary to follow experimental data. Data evaluation is still in progress.

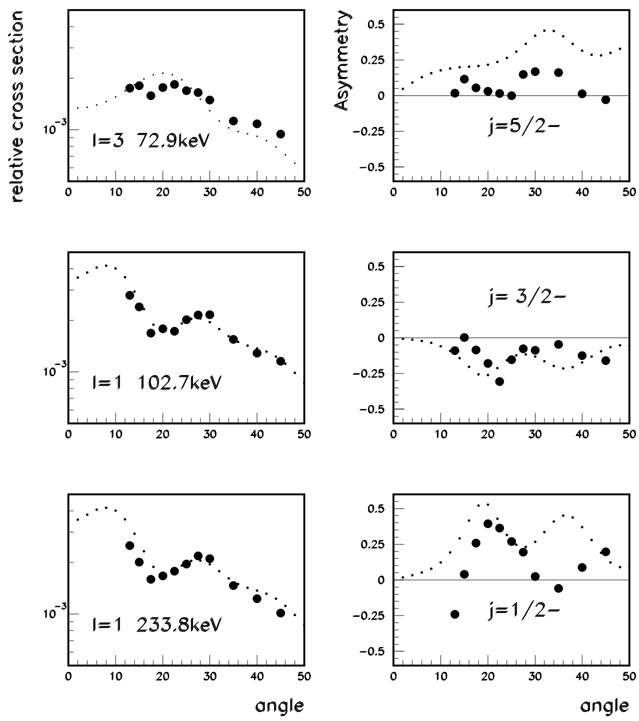

Fig. 2: The figure shows relative cross sections for three low lying ^{193}Os–nuclear levels. Displayed are experimental cross sections for l=1 and l=3 transfers and corresponding asymmetries. (No error bars are given). Dotted curves give a DWBA calculation.

References

[1] D. Benson *et al.*, Z. Physik **A285** (1978) 405
[2] D. D. Warner *et al.*, Nuc. Phys. **A316** (1979) 13
[3] Y. Eisermann, Jahresbericht 1997, p. 27

◇ Work supported by DFG grants IIC4 Gr 894/2 and Gu 179/3-2.