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# III–20 Magnetic Moment of the $13/2^+$, 47 $\mu$s State in $^{207}$Po

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In recent years measurements of pure single particle state $g$-factors around $^{208}$Pb have led to a more basic and detailed discussion of magnetic moments. Whereas high spin proton states are well investigated, more experimental data are needed to analyze the various contributions to the magnetic moments of the neutron states.

We measured the $g$-factor of the $13/2^+$ neutron hole state in $^{207}$Po, populated by the $^{206}$Pb(α, 3n) reaction with 38 MeV α-particles from the cyclotron in Karlsruhe. To prevent relaxation effects, a liquid $^{206}$Pb target was used. The beam was chopped into 3.3 $\mu$s wide pulses every 64 $\mu$s, so that a time-differential spin-rotation experiment was feasible. From phase and frequency the $g$-factor follows as $g = -0.1427 \pm 0.0015$. Corrections for the diamagnetic and Knight shift yield $g = -0.143 \pm 0.002$.

Assuming pure single particle wavefunctions for all states listed in Table I the following conclusions can be drawn: The measured moment agrees well

Table I. Magnetic moments of $i_{13/2}$ neutron holes.

| State | $i_{13/2}^{-1}$, $^{205}$Pb | $[i_{13/2}^{-2}]12^+$, $^{206}$Pb | $i_{13/2}^{-1}$, $^{207}$Po |
|---|---|---|---|
| $\mu$[n.m.] | $-0.975(40)$[1] | $-1.824(50)$[2] | $-0.930(13)$ |

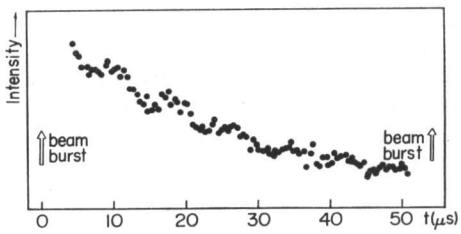


Fig. 1. Spin-rotation pattern of the 814 keV $\gamma$-rays from the $13/2^+$, 47 $\mu$s state of $^{207}$Po seen by one detector in a magnetic field of 596 Gauss.

with the prediction, $-0.91$ n.m., of the empirically derived effective magnetic moment operator given in ref. 1, and agrees too with the results of a similar analysis made by Nakai *et al.*[2] for the $12^+$ state in $^{206}$Pb. Thus an effective orbital magnetic moment $\delta g_l$ of the neutron of about $-0.04$ is confirmed.

## References

1) K. H. Maier *et al.*: Nuclear Phys. **A183** (1972) 289.
2) K. Nakai *et al.*: AFI Report Stockholm 1971, presented at this conference III–16.