SPECTROMETRY OF GAMMA TRANSITIONS FEEDING THE 312 keV ISOMERIC STATE IN ^{198}Au FROM ^{197}Au(n,gamma)^{198}Au REACTION

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Gamma transitions populating the 124ns 5^+ isomer at 312 keV excitation energy in ^{198}Au have been measured in the energy region from 100 to 600 keV using a gamma-gamma delayed coincidence spectrometer.

Löbner et al (1970) measured for the first time prompt and delayed low energy gamma-gamma coincidences from the ^{197}Au(n,gamma) reaction.

A rather complete level scheme of this very complicated odd-odd transitional nucleus, up to an excitation energy of about 1000 keV, is presented in a work of Mirza et al (1975).

Pure gold foil of 100 mg was exposed to an external horizontal filtered neutron beam of the "RA" reactor at Vinča, Belgrade. The thermal neutron flux was 4.2×10^7 neutrons $cm^{-2}s^{-1}$. The coincidences were recorded using a Ge(Li) detector with active volume of 35cm^3 (FWHM resolution of 0.8 keV at 100 keV and 2.1 keV at 1332 keV) and a scintillation detector with thin NaI(Tl) crystal. A close target-detector geometry resulted in coincidence data collection rate of 10% of that in the singles spectrum. Coincidence resolving time of 10ns was obtained. The region (40 to 600 ns) of the delayed curve was used to gate the Ge(Li) spectrum. A twenty fold suppression of prompt and chance events was obtained in the coincidence spectrum.

The preliminary analysis of data has established 113 gamma rays in coincidence. The energies of transitions were identified with those given in the work of Mirza et al (1975). A parameter F, associated with each transition (F is the ratio of coincidence to single intensity, normalized to 100 for a transition feeding directly the isomeric state) is useful in interpretation of such data. Taking the values from about zero (depending on chance events) up to about 100, F indicates the position of the transition in the level scheme. The transitions are grouped according to their F values.

F about zero (transition energies in keV)

101.8707	103.4950	106.850	108.8469	113.448	137.6799	142.8330
144.521	145.0613	146.2584	146.5774	158.3472	168.2365	169.860
180.7588	188.0589	192.2794	192.8345	204.039	206.104	214.8414
224.214	235.916	236.034	247.430	260.734	261.253	277.092
291.555	307.543	328.291	335.060	346.713	350.630	370.865
378.093	380.991	395.860	398.422	402.90	444.150	457.816
490.61	498.584	514.815	528.870	529.624	537.76	539.992
542.063	543.689	552.181				