It was found that the 3 main experimental (γ,f) structures[1], near the threshold, are correlated with 3 bunches of calculated transitional levels at the same energy locations.

We would like to point out that our approach, for the use of the Semi–Microscopic Combined Method, was previously employed with success in the calculation of the transition nucleus levels at saddle points[7], which allowed the identification , for the first time, of a concentration of M1 strength in the electro- and photofission of ^{239}Pu near the fission barrier.

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Energy levels in ^{101}Tc from the decay of ^{101}Mo

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During the last years, neutron rich nuclei near A=100 have been the subject of numerous studies. Experimentally, these nuclei were investigated by beta and gamma decay and also by particle - transfer. At the same time, theoretical studies were devoted to the interpretation of the results. While these investigations resulted in a lot of information on the even-even nuclei, the odd-Z nuclei around N = 60, remained quite unexplored. The odd mass Tc isotopes are situated between the semi-closed Z=40 and the closed Z=50 shells, and this offers an interesting opportunity for the study of multiparticle excitation in these nuclei. The levels structure of the ^{101}Tc has been studied through the beta decay of ^{101}Mo [1], but in the systematic comparison of both level schemes proposed there are various disagreements. In view of these discrepancies, the present work is concerned with a precise measurement of the energy and intensity among the transitions in^{101}Tc, fed through the β^- decay of^{101}Mo in an attempt to clarify and to better understand the trends in nuclear structure of nuclei in this mass-region. The radioactive sources of^{101}Mo ($T_{1/2}$=14.6 minutes) were obtained from the^{100}Mo(n,γ)^{101}Mo reaction. About 5 mg of molybdenum metal, enriched to 99% ^{100}Mo, were irradiated at the IEA-Rm1 reactor, for 5 minutes, at thermal neutron flux of 10^{13} neutrons.cm^{-2}.s^{-1}. The final source (15 μCi) was transferred into a lucite container which was mounted at the center of the γ- spectrometer. The single spectra were taking using a Ge detector of 35cm^3 (FWHM=1.89 keV at 1.32MeV) and 572 ORTEC amplifier in pile-up rejection mode. The background radiation was lowered by using a lead shield. The detector was calibrated for energy and efficiency through the measurements of standard sources. The direct γ-ray spectrum, recorded during $\approx$ 30 hours of live counting, and the spectra of each half-life were analyzed using the PANORAMIX [2] and IDF program [3]. The energy and relative intensity of all γ-rays observed for the first time, are presented in Table I. The intensities were all normalized to 1000 % at 191.67 keV.

To identify the excited levels in^{101}Tc extensive $\gamma\gamma$ coincidence measurements were performed using two 90cm^3 and 45cm^3 HPGe detectors (FWHM < 2.0 keV). The coincidence have been analyzed using the BIDIM program[4]. In this experiment, 185 transitions were definitely attributed to the decay of^{101}Tc. The spin assignment are based on the present log ft values, calculated with the tables by Gove and Martin [5], and on observed decay modes. The intensities of the β feeds were obtained from intensity balance of transitions feeding and dexciting the levels. These results are presented in table II.

The energy and relative intensity of all γ-rays have been determined with a better overall precision than previously [1]. The total of rays observed have been placed in a proposed level scheme containing 42 levels. This includes 4 news levels at, 1323.34, 1422.13, 2252.99 and 2353.72 kev.

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Table I. Energy (Eγ) in keV, relative intensity (Iγ) in %, assignments and coincidences of the γ rays following the ^{101}Mo decay.

Eγ	Iγ	$E_F \rightarrow E_i$	$\gamma\gamma$
402.0 (5)	0.89 (33)	2001.8→1599.5	886.95, 1589.86
411.58 (15)	3.76 (39)	1028.58→616.3	115.48, 221.79, 409.024
484.46 (10)	1.4 (6)	500.8→15.8	115.48, 169.8, 602.38
665.25 (39)	1.4 (5)	1806.9→1141.6	852.73
992.42 (29)	2.2 (6)	1599.5→606.5	591.180
1028.4 (4)	2.8 (7)	2056.9→1028.5	513.152, 1012.703
1345.20 (6)	2.8 (7)	2056.9→711.1	195.935, 695.21
1368.99 (16)	2.6 (7)	*np*	—
1446.68 (24)	2.29 (33)	1962.2→515.6	506.239

Table II. The beta-decay branching ratios and log ft for the decay of ^{101}Mo.

Energy Level (keV)	log ft *	braching ratios
207.539 (19)	6.8	11.83 (13)
288.831 (23)	7.5	2.40 (6)
395.136 (28)	8.3	0.32 (5)
500.765 (31)	8.7	0.093 (27)
515.606 (17)	–	0
533.556 (34)	–	0
606.641 (19)	6.4	10.96 (9)
616.300 (24)	–	0
621.300 (29)	8.3	0.201 (29)
669.697 (31)	8.2	0.210 (38)
676.71 (6)	–	0
711.097 (6)	–	1.07 (7)
887.258 (19)	7.5	0.30 (7)
1026.38 (4)	8.2	0.319 (11)
1028.468 (19)	7.7	11.01 (7)
1103.48 (5)	6.2	0.036 (20)
1141.58 (6)	8.6	0.192 (14)
1187.857 (30)	7.8	0
1319.769 (20)	–	6.41 (8)
1323.34 (5)	6.1	0
1422.13 (5)	–	0.104 (25)
1565.121 (37)	7.8	0.363 (11)
1594.779 (23)	7.0	1.530 (25)
1599.554 (27)	6.4	0
1615.152 (30)	–	1.522 (38)
1678.29 (6)	6.4	0.13 (4)
1775.522 (35)	7.4	1.86 (4)
1806.941 (22)	6.1	3.03 (5)
1893.12 (12)	5.8	0.143 (10)
1898.223 (27)	7.0	2.51 (4)
1929.84 (27)	5.7	0.83 (4)
1962.225 (21)	6.2	14.20 (6)
2001.764 (36)	5.9	0.991 (34)
2047.822 (22)	4.5	21.16 (17)
2056.956 (31)	5.3	3.22 (6)
2129.959 (33)	5.5	1.667 (33)
2150.08 (19)	6.6	0.107 (19)
2237.69 (6)	5.6	0.667 (31)
2252.99 (12)	6.4	0.095 (6)
2353.72 (7)	5.6	0.307 (15)
2419.58 (7)	5.6	0.172 (15)
2574.1 (5)	5.5	0.046 (16)

* calculated using Q_β =2812 keV [1]