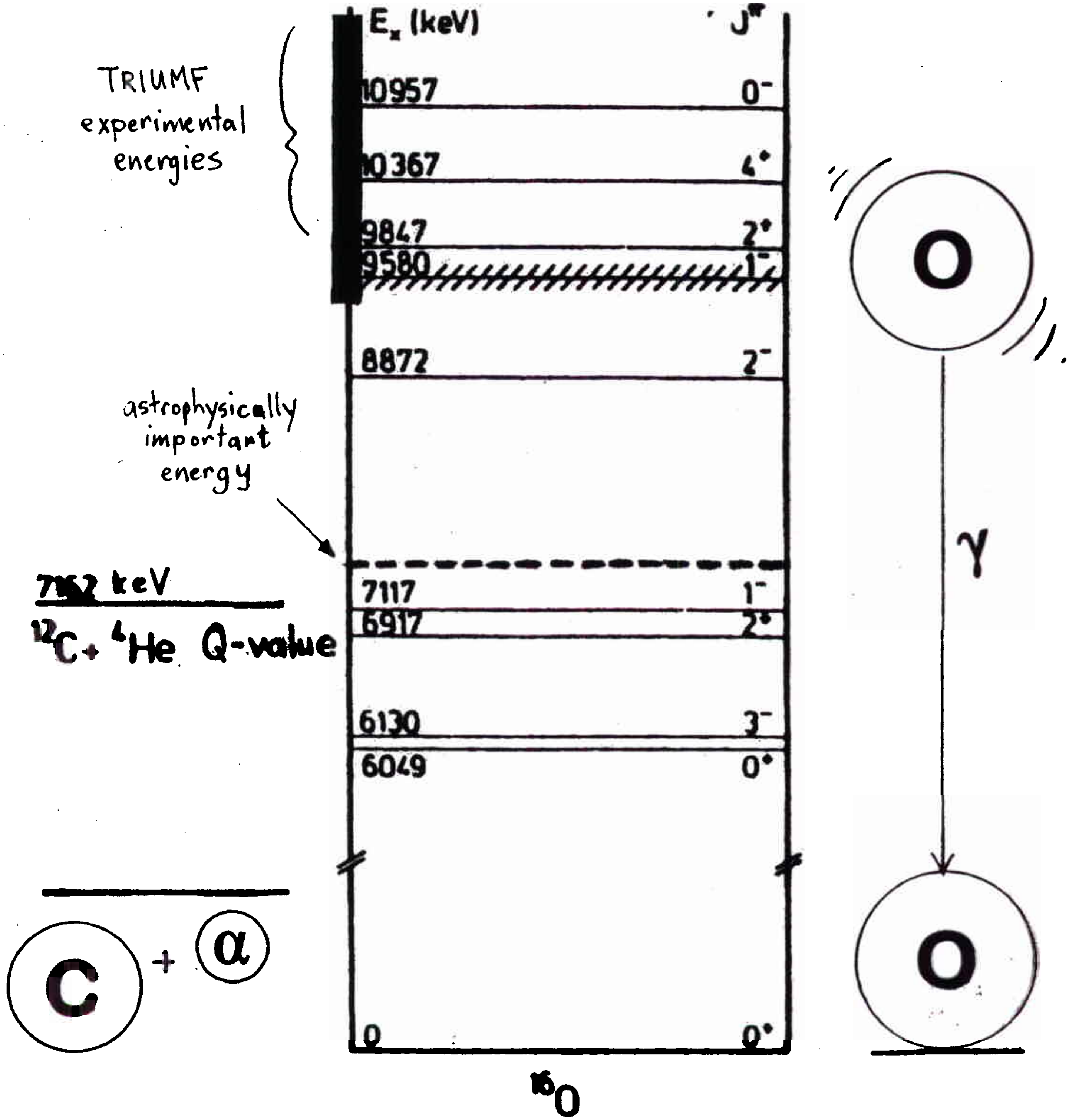


TRIUMF experimental energies
Ex (keV)
Jπ
10957 0−
10367 4+
9847 2+
9580 1−
8872 2−
astrophysically important energy
7162 keV
12C + 4He Q-value
7117 1−
6917 2+
6130 3−
6049 0+
0 0+
16O
C
+
α
O
γ
O

predict important decay paths

↓

create response function **R** for each path

↓

find a linear combination of the **R that** fits the experimental gamma spectrum

.

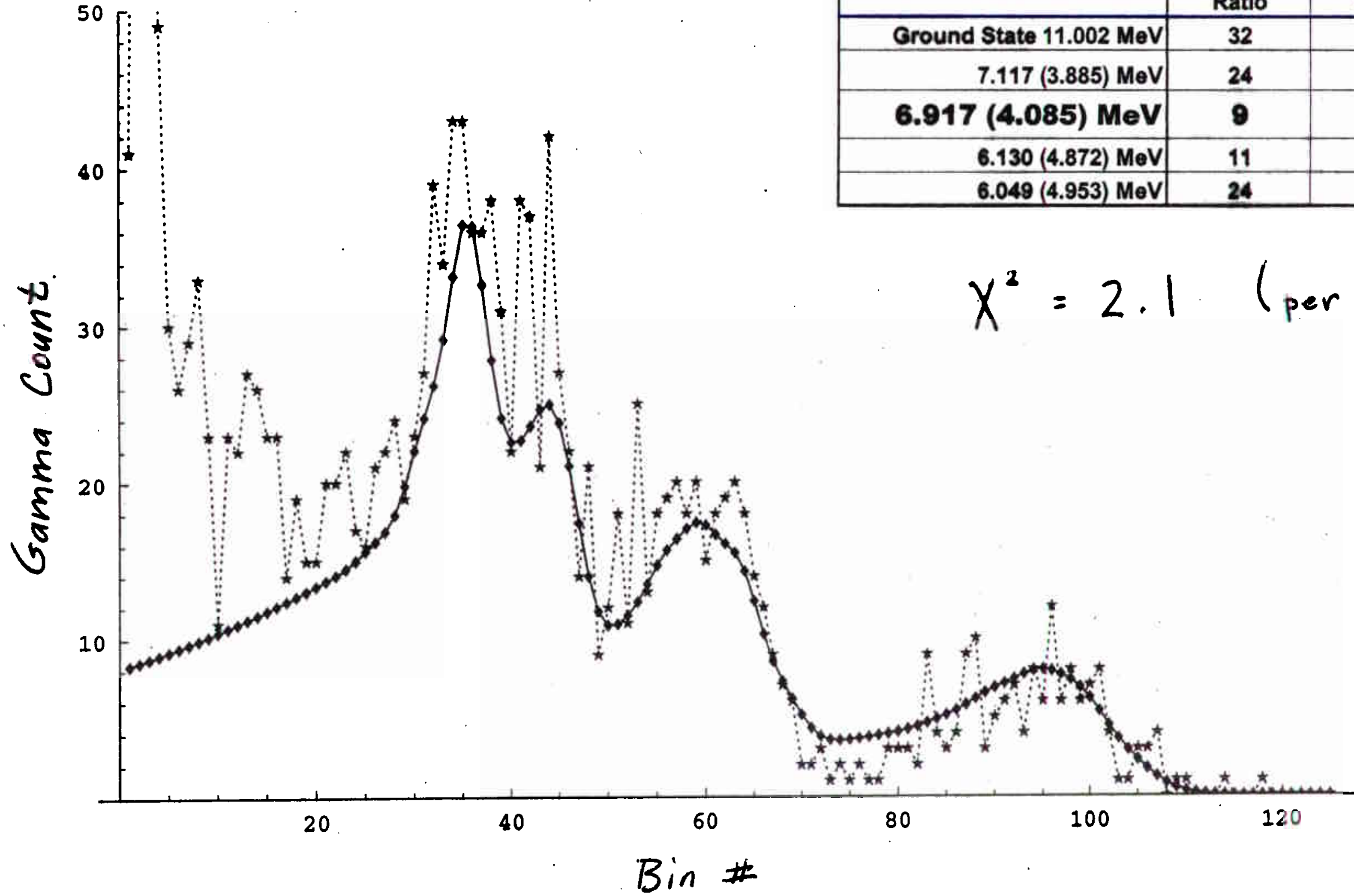
.

by using Minuit to minimize the X^2

$$X^2 = \sum \frac{(\text{experimental} - \text{theoretical})^2}{\text{error}^2}$$

↓

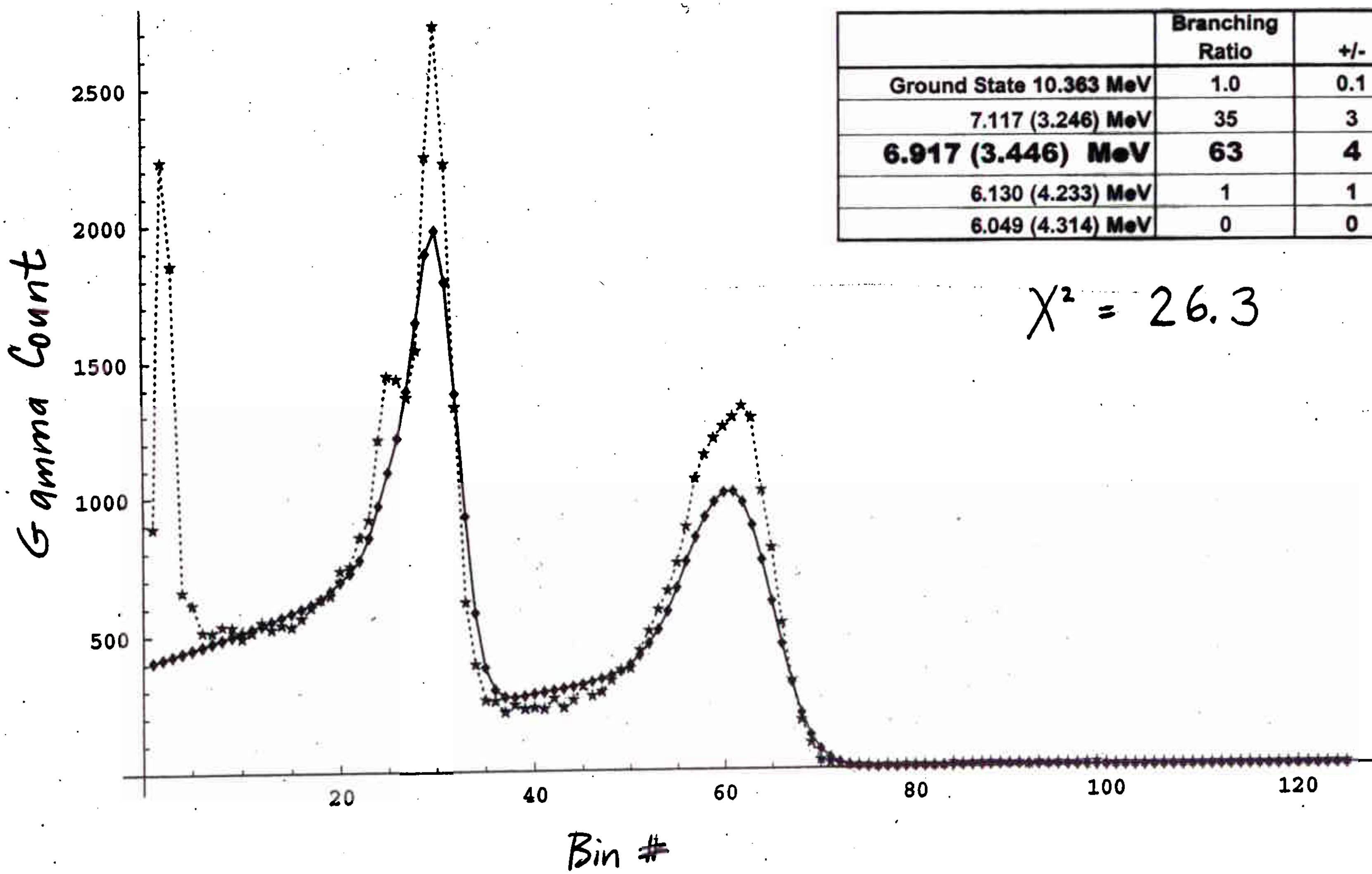
use the fit coefficients to find branching ratios



Beam Energy - 1.280 MeV/u

	Branching Ratio	+/-
Ground State 11.002 MeV	32	5
7.117 (3.885) MeV	24	7
6.917 (4.085) MeV	**9**	**7**
6.130 (4.872) MeV	11	4
6.049 (4.953) MeV	24	6

$\chi^2 = 2.1$ (per data point)



Beam Energy - 1.067 MeV/u

	Branching Ratio	+/-	Expected Ratio
Ground State 10.363 MeV	1.0	0.1	0
7.117 (3.246) MeV	35	3	0
6.917 (3.446) MeV	**63**	**4**	**100**
6.130 (4.233) MeV	1	1	0
6.049 (4.314) MeV	0	0	0

$\chi^2 = 26.3$

$$E_{detected} = (\text{gain})\, E_0$$

$$\text{gain} = \left(\begin{matrix}\text{intrinsic} \\ \text{detector gain}\end{matrix}\right)\left(\begin{matrix}\text{doppler} \\ \text{gain}\end{matrix}\right)$$

$$\text{doppler gain} = \left(1 + \frac{v}{c}\cos\theta\right) = \text{a function of energy}$$

... use run with good statistics to find "intrinsic detector gain", and assume consistent for all runs