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August 30, 1952

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MINUTES OF THE THIRTY-SIXTH MEETING OF THE THEORETICAL MEGATON GROUP

27 August 1952

1. The thirty-sixth meeting of the TMG convened at 9:00 AM on Wednesday, 27 August 1952, in the W-Division Conference Room. Those present were:

H. A. Bethe	C. L. Longmire
G. Breit	J. C. Mark, Chairman
W. C. Bright	H. L. Mayer
A. A. Broyles	L. W. Nordheim
K. M. Case	W. E. Ogle
G. A. Cowan	J. C. Potts
F. de Hoffmann	F. Reines
C. Evans	R. D. Richtmyer
F. Evans	A. Rosenbluth
E. Fermi	M. Rosenbluth
B. E. Freeman	P. R. Stein
G. Goertzel	B. R. Suydam
M. G. Holloway	T. B. Taylor
F. C. Hoyt	B. E. Watt
R. M. Landshoff	E. J. Zadina

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
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Topics

2. Corrections to previous minutes.
3. A. C. calculations.
4. Status of λ calculations.
5. Fission cross-section of 29.
6. Upshot experiments.

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2. Corrections

Fig. 1 of the last minutes contains a few errors and some of the numbers were changed as follows.

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3. A. C. Calculations

3.1 Implosion Calculations.

[redacted]

3.2 Yield Calculations.

[redacted]

4. Status of λ Calculations (de Hoffmann)

[redacted]

DOE b(3)

5. Fission Cross-section of 29

Bethe reported on a measurement by Ghiorso in which foils of 28 containing less than one per mil 25 were irradiated in the Arco high flux pile, and their fission activity determined as a function of time after the end of the irradiation. The activity is mainly due to 49 but just after the irradiation there is some contribution due to 29 which permits determination of its fission cross-section. Bethe's evaluation is as follows:

Let

a = rate of 29 production

t_r = time of irradiation (60 min)

τ_2 = lifetime of 29 (34 min)

τ_3 = lifetime of 39 (4800 min)

σ_2 = fission cross-section of 29

σ_4 = fission cross-section of 49

$s = t_r/\tau_2$.

The fission activity at a time $t \ll \tau_3$ after the end of the irradiation is then

$$F = \frac{at_r}{\tau_3}\left[\sigma_4\left(t + \frac{1}{2}t_r - \tau_2\right) + \frac{1-e^{-s}}{s}(\sigma_4\tau_2 + \sigma_2\tau_3)e^{-t/\tau_2}\right].$$

The initial value of the decaying part of F should be

$$A = \frac{at_r}{\tau_3}\frac{1-e^{-s}}{s}(\sigma_2\tau_3 + \sigma_4\tau_2).$$

The measured value was $A = 0.022 \pm 0.005$. When $t \gg \tau_3$ the amount of 49 will be at_r and the fission rate is then $p = \sigma_4 at_r$. This was measured to be 2.83. From these data the part of A due to σ_4 has the value 0.009, leaving 0.013 ± 0.005 to be attributed to σ_2. This leads to $\sigma_2 = 7 \pm 3$ b.

[redacted]

DOE b(3)

6. Upshot Experiments

6.1 Li^6 Mixing Experiment. (TMG-M34, 8.1)

There is little cross-talk for internal detectors and 50% cross-talk for external ones making the latter uninteresting. So far no other feasible experiments have been devised.

[redacted]

DOE b(2)

6.2 [redacted]

DOE b(3)

6.3 [redacted]

DOE b(3)

[redacted] Ogle opposed this because of the hope to think up other experiments.

Roy Landshoff

Rolf Landshoff

Distribution:

1A - H. Barschall
2A - G. Bell
3A - H. A. Bethe
4A - W. Bouricius
5A - N. E. Bradbury
6A - S. W. Burriss
7A - J. Calkin
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Fig. 2

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Fig. 3

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