

Session 2: Student Assignments

January 7, 2010

1. For the U and Th decay series, provide the half-lives of all the decay products, identifying the type of decay and the energies of predominant alpha and beta rays.
Provide your understanding of the decay series.
2. Reading/writing assignment:
Read the following articles about the Reines and Cowan experiment
and summarize your understanding in your own words.
The write up should be at least 1.5 to 2 full pages.
 - i) **Reines, F., and C. L. Cowan, Jr.,
Detection of the Free Neutrino.
Physical Review Letters, 1953, 92: 330.**
 - ii) **Reines, F., C. L. Cowan, Jr., F. B. Harrison,
A. D. McGuire, and H. W. Kruse.,
Detection of the Free Antineutrino.
Physical Review, 1960, 117 (1) : 159-174.**

REFERENCES

- × Aharmim, B., et al., SNO Collaboration,
Electron antineutrino search at the Sudbury Neutrino
Observatory,
Physical Review D, 2004, vol. 70,
pp. 093014-1 to 093014-8.
- × Araki, T., et al., KamLAND collaboration
Experimental investigation of geologically produced
antineutrinos with KamLAND,
Nature, 28 July 2005, vol. 436, 03980,
doi:10.1038/nature03980

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- × Eder, G., Terrestrial antineutrinos,
Nuclear Physics, 1966, vol. 78, pp. 657-662.
- × Evans, R. D.,
The atomic Nucleus,
R. Krieger Publishing Company, Florida,
ISBN 0-89874-414-8.
- × Frauenfelder, H., and Henley, E. M.,
Subatomic Physics,
Prentice-Hall Inc., New Jersey,
ISBN 0-13-859082-6.

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- ✖ Knoll, G. F.,
Radiation Detection and measurement
Wiley & Sons, New York,
ISBN 0-471-49545-X.
- ✖ Kozlov, A., KamLAND Collaboration,
New Developments at KamLAND,
International Workshop on Neutrino Masses and
Mixings, Shizuoka, Japan, December 17-19, 2006.
www.hepd5s.phys.utk.edu/kamland/Shizuoka_Kozlov.pdf

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- × **Reines, F., and C. L. Cowan, Jr.,
Detection of the Free Neutrino.
Physical Review Letters, 1953, 92: 330.**
- × **Reines, F., C. L. Cowan, Jr., F. B. Harrison,
A. D. McGuire, and H. W. Kruse.,
Detection of the Free Antineutrino.
Physical Review, 1960, 117 (1): 159-174.**
- × **The Reines and Cowan Experiments
library.lanl.gov/cgi-bin/getfile?00326606.pdf**

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12.091 Basics of Analysis with Antineutrinos from Heat Producing Elements – K, U, Th in the Earth
January (IAP) 2010

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