 MLF Experimental Report	提出日 Date of Report 2015/05/13
課題番号 Project No. 2014B0328 実験課題名 Title of experiment Measurements of Total Cross Sections of Au-197 実験責任者名 Name of principal investigator Kazushi Terada 所属 Affiliation JAEA	装置責任者 Name of responsible person Yosuke Toh 装置名 Name of Instrument/(BL No.) BL04 ANNRI 実施日 Date of Experiment 2015/03/09-2015/03/15

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。(適宜、図表添付のこと)
 Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

<p>1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.</p> <p>The resonance parameters of Au-197 below a few keV are well known, and so Au-197 sample can be used to verify the reliability of the measurements and data analysis. However, there are discrepancies in the measured total cross section data in the neutron energy region from 5 to 200 keV. Verification of the total cross sections is an important issue.</p> <p>A gold disk sample was used for the measurements of total cross sections of Au-197. The chemical form of the sample was pure metal. The diameter and thickness of the sample were 9.0 cm and 1.0 mm, respectively.</p>

<p>2. 実験方法及び結果 (実験がうまくいかなかった場合、その理由を記述してください。)</p> <p>Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.</p> <p>Two types of Li-glass detectors were used for the neutron total cross section measurements: GS20 detectors and GS30 detectors. These detectors are classified by the content Li. The GS20 Li-glass contains enriched Li-6 (95%), and the GS30 Li-glass contains enriched Li-7 (99.99%). The GS20 Li-glass is used for neutron detection via ${}^6\text{Li}(n,\alpha){}^3\text{H}$ reaction. On the other hand, the GS30 Li-glass detector is utilized for background estimation on neutron total cross section measurement with the GS20 Li-glass. Neutron sensitivity of the GS30 is reduced corresponding to the content of Li-6 while keeping the sensitivity of gamma ray. We used two GS20 Li-glass detectors (10cm x 10cm x 0.1cm, 10cm x 10cm x 1 cm) and two GS30 Li-glass detectors (10cm x 10cm x 0.1cm, 10cm x 10cm x 1 cm).</p> <p>To begin with, characteristic test of these GS20 detectors were carried out. The Li-glass detector was placed at the position of the downstream experimental area of ANNRI. The flight path length from the neutron source was about 28.5m. Figure 1 shows the experimental setup and the block diagram of the measurement system.</p>

2. 実験方法及び結果(つづき) Experimental method and results (continued)

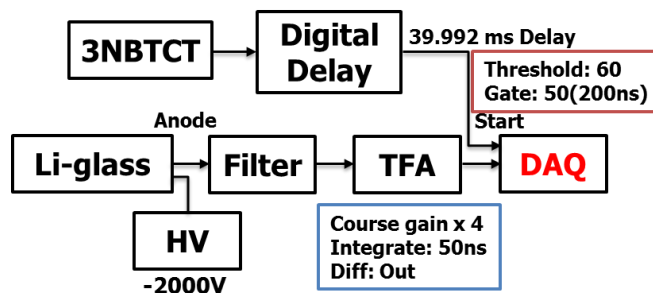
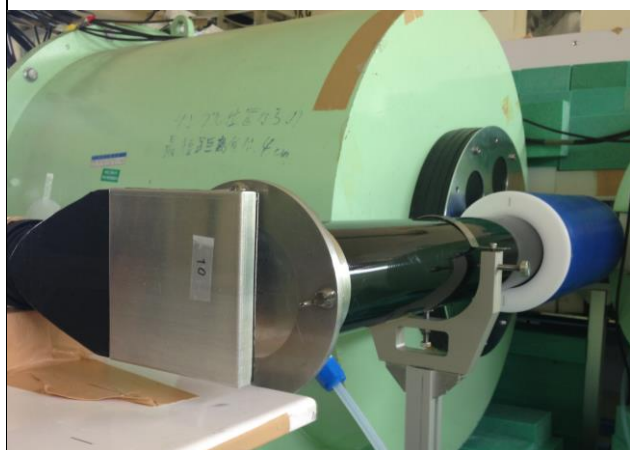


Figure 1. Experimental setup

Anode signals were amplified with ORTEC 474 Timing Filter Amplifier (TFA) and recorded as the time-of-flight and the pulse height data event by event. The sample was placed above the middle collimator. Neutrons penetrating the sample were measured with the detector. No sample measurements (Blank) were also carried out in order to obtain neutron transmission coefficients. Neutron notch filters (Mn, Co, In, Ag) were utilized to estimate background on the TOF spectra by black resonance method. Figure 3 shows the TOF spectra of Au-197 and Blank. Dips caused by Au-197 were observed. Figure 4 shows the TOF spectra of blank obtained from GS20 and GS30 Li-glass detectors. Data analysis, Dead time correction and background estimation, is in progress to derive neutron total cross sections of Au-197 and verify the reliability of the measurement system.

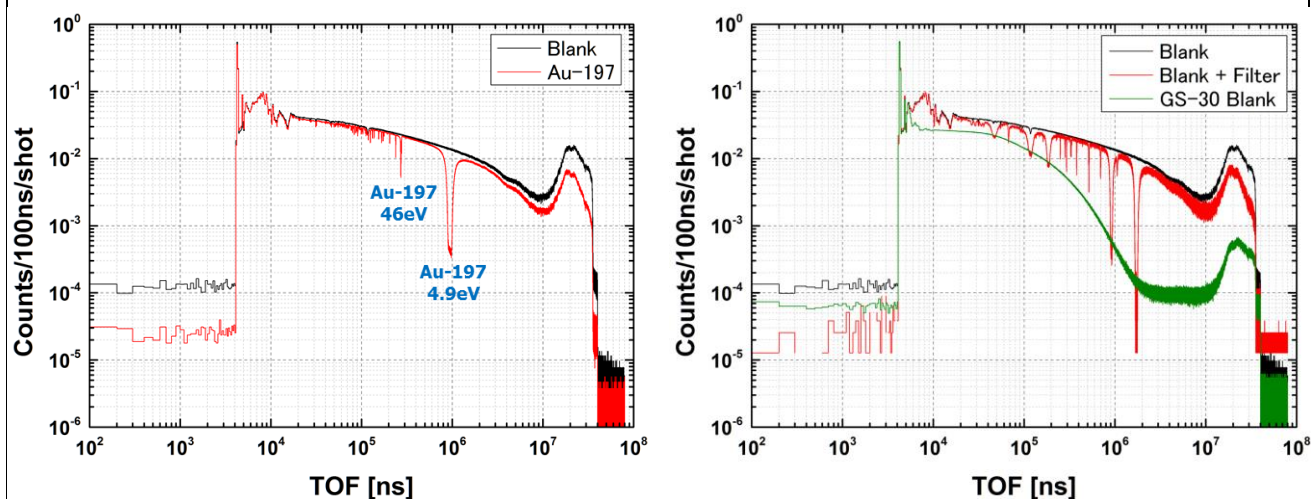


Figure 3. Left graph shows the TOF spectra of Au-197 and Blank obtained with GS20 Li-glass detector. Right graph shows the TOF spectra of blank with GS20 and GS30 Li-glass detector. Blank and red lines indicate the TOF spectra by GS20 Li-glass detector. Green line shows the TOF spectra by GS30 Li-glass detector.