粒ゼミ6 **進捗報告**

2017/01/11 H. Ito

Meeting Contents (1)H. Ito (2)K. Harada (3)T. Mizuno (4)Y. Emoto (5)K. Fujihara, (6)S. Kimura (7)A. kobayashi My Contents - Study of RTSC - This month works

2017/01/11

STUDY OF RTSC

RTSC: Real time Strontium 90 Counter

Type A ver. 1.1

2017/01/11



背景·目的

- 福島県沖漁業復興
- 即時90Sr放射能濃度測定
- 水道・テロ対策

仕様

- 有効面積: 300 mm x 100 mm
- WLSF light guide: BBYY
- Aerogel n=1.041
- Scintillating fiber sheet 1 layer

3

- 回路: HV, Disc., BRoaD

Study

- 線源の絶対感度
- 応答線形性
- 検出限界
- 感度一様性





ר ר

J

⁹⁰Sr

⁹⁰Sr

¹³⁷Cs, ⁴⁰K

Cosmic Rays

Logic (5). 1 Tigg	
$N_{\rm BG}$	392.06 ± 25.28 cph
$\eta_{ m Sr}$	$[4.58 \pm 0.09(\text{stat}) \pm 0.94(\text{sys})] \times 10^{-3} \text{ Bq}^{-1} \text{s}^{-1}$
$\eta_{\rm Cs}$	$[1.61 \pm 0.06(\text{stat}) \pm 0.32(\text{sys})] \times 10^{-5} \text{ Bq}^{-1} \text{s}^{-1}$
$\eta_{ m K}$	$[4.07 \pm 1.38(\text{stat}) \pm 0.02(\text{sys})] \times 10^{-5} \text{ Bq}^{-1} \text{s}^{-1}$
$\eta_{ m Sr}/\eta_{ m Cs}$	285
$\eta_{ m Sr}/\eta_{ m K}$	113
The inclination	$(4.55 \pm 0.06) \times 10^{-3} \text{ Bg}^{-1} \text{s}^{-1}$
χ^2 /NDF	2.3/9
A_{α}^{\min} (seawater)	$1.23 \pm 0.04 \text{ (stat)} \pm 0.25 \text{ (sys)} \text{ Bg kg}^{-1}$
$A_{\alpha}^{\rm Sr}$ (seafood)	36.1 ± 1.2 (stat) ± 7.4 (sys) Bg kg ⁻¹
L (A) T	
Logic (4): Trigg	$\frac{er \cap VETO \cap AC(M \ge 2)}{125.06 \pm 12.31 \text{ cph}}$
11BG	120.00 ± 12.01 cpn $[1.70 \pm 0.04(\text{stat}) \pm 0.26(\text{sys})] \times 10^{-3} \text{ D} \text{ s}^{-1}\text{ s}^{-1}$
$\eta_{ m Sr}$	$[1.09 \pm 0.04(\text{stat}) \pm 0.30(\text{sys})] \times 10^{-6} \text{ Bg}^{-1} \text{ s}^{-1}$
$\eta_{\rm Cs}$	$[1.32 \pm 0.19(\text{stat}) \pm 0.20(\text{sys})] \times 10^{-6} \text{ Bg}^{-1} \text{ s}^{-1}$
$\eta_{\rm K}$	$[5.77 \pm 7.83(\text{stat}) \pm 0.02(\text{sys})] \times 10^{-6} \text{ Bq}^{-1}\text{s}^{-1}$
$\eta_{\rm Sr}/\eta_{\rm Cs}$	1352
$\eta_{\rm Sr}/\eta_{\rm K}$	310
The inclination	$(1.74 \pm 0.06) \times 10^{-3} \text{ Bq}^{-1} \text{s}^{-1}$
χ^2 /NDF	2.6/9
$A_{\rm Sr}^{\rm min}$ (seawater)	$1.75 \pm 0.09 \text{ (stat)} \pm 0.36 \text{ (sys)} \text{ Bq kg}^{-1}$
$A_{\rm Sr}^{\rm min}$ (seafood)	$52.2 \pm 2.6 \text{ (stat)} \pm 10.7 \text{ (sys)} \text{ Bq kg}^{-1}$
Logic (5): $Trigger \cap \overline{VETO}$	
Logic (5), Trigg	
$N_{\rm BG}$	$28795.6 \pm 131.0 \text{ cph}$
$\frac{N_{\rm BG}}{\eta_{\rm Sr}}$	$\frac{28795.6 \pm 131.0 \text{ cph}}{[2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1} \text{s}^{-1}}$
$\frac{1}{N_{\rm BG}}$ $\eta_{\rm Sr}$ $\eta_{\rm Cs}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1} \text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1} \text{s}^{-1} \end{array}$
$\frac{N_{\rm BG}}{\eta_{\rm Sr}}$ $\frac{\eta_{\rm Cs}}{\eta_{\rm K}}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \end{array}$
$\frac{N_{\rm BG}}{\eta_{\rm Sr}}$ $\frac{\eta_{\rm Cs}}{\eta_{\rm K}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \end{array}$
$\frac{N_{\rm BG}}{\eta_{\rm Sr}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}/\eta_{\rm K}}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm Cs}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm K}/\eta_{\rm K}}$ The inclination $\chi^2/{\rm NDF}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\chi^2/{\rm NDF}$ $A_{\rm Sr}^{\min}({\rm seawater})$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{stat}) \pm 0.08 (\text{sys}) \text{ Bq kg}^{-1} \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2 (\text{NDF}}{\lambda_{\rm Sr}^{\rm min}(\text{seawater})}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{stat}) \pm 0.08 (\text{sys}) \text{ Bq kg}^{-1} \\ 6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1} \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2 (\text{NDF}}{M_{\rm Sr}^{\rm min}(\text{seawater})}$ $\frac{A_{\rm min}^{\rm min}(\text{seafood})}{\text{Logic (6): Trian}}$	$\frac{28795.6 \pm 131.0 \text{ cph}}{[2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1}} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1}} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1}} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{stat}) \pm 0.08 (\text{sys}) \text{ Bq kg}^{-1} \\ \underline{6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.76 + 0.01 (\text{stat}) \pm 0.01 (sta$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2 (\text{NDF}}{A_{\rm Sr}^{\min}(\text{seawater})}$ $\frac{A_{\rm Sr}^{\min}(\text{seafood})}{L_{\rm Ogic}(6): Trigg}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{stat}) \pm 0.08 (\text{sys}) \text{ Bq kg}^{-1} \\ \underline{6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{2297 \pm 50 \text{ cph}} \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/\rm NDF}{\Lambda_{\rm Sr}^{\rm min}(\rm seawater)}$ $\frac{\Lambda_{\rm Sr}^{\rm min}(\rm seafood)}{\rm Logic~(6):~Trigg}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{stat}) \pm 0.08 (\text{sys}) \text{ Bq} \text{ kg}^{-1} \\ 6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq} \text{ kg}^{-1} \\ \hline \frac{er \cap AC(M \geq 2)}{2297 \pm 50 \text{ cph}} \\ [1.80 \pm 0.05(\text{stat}) \pm 0.37(\text{sys})] \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \end{array}$
$\begin{array}{c} N_{\rm BG} \\ N_{\rm BG} \\ \eta_{\rm Sr} \\ \eta_{\rm Cs} \\ \eta_{\rm Sr} / \eta_{\rm Cs} \\ \eta_{\rm Sr} / \eta_{\rm K} \\ The inclination \\ \chi^2 / {\rm NDF} \\ A_{\rm Sr}^{\min}({\rm seawater}) \\ A_{\rm Sr}^{\min}({\rm seafood}) \\ \hline {\rm Logic} (6): Trigg \\ \eta_{\rm Sr} \\ \eta_{\rm Cs} \end{array}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{stat}) \pm 0.08 (\text{sys}) \text{ Bq kg}^{-1} \\ \underline{6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1}} \\ \underline{er \cap AC(M \geq 2)} \\ \hline 2297 \pm 50 \text{ cph} \\ [1.80 \pm 0.05(\text{stat}) \pm 0.37(\text{sys})] \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \\ [2.30 \pm 0.49(\text{stat}) \pm 0.46(\text{sys})] \times 10^{-6} \text{ Bq}^{-1}\text{s}^{-1} \end{array}$
$\begin{array}{c} N_{\rm BG} \\ N_{\rm BG} \\ \eta_{\rm Sr} \\ \eta_{\rm Cs} \\ \eta_{\rm Sr} / \eta_{\rm Cs} \\ \eta_{\rm Sr} / \eta_{\rm K} \\ The inclination \\ \chi^2 / {\rm NDF} \\ A_{\rm Sr}^{\min}({\rm seawater}) \\ A_{\rm Sr}^{\min}({\rm seafood}) \\ \hline {\rm Logic} (6): Trigg \\ \eta_{\rm Sr} \\ \eta_{\rm Cs} \\ \eta_{\rm K} \end{array}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{stat}) \pm 0.08 (\text{sys}) \text{ Bq kg}^{-1} \\ 6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1} \\ \hline 6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1} \\ \hline er \cap AC(M \geq 2) \\ \hline 2297 \pm 50 \text{ cph} \\ [1.80 \pm 0.05(\text{stat}) \pm 0.37(\text{sys})] \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \\ [2.30 \pm 0.49(\text{stat}) \pm 0.46(\text{sys})] \times 10^{-6} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.57 \pm 2.58(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-5} \text{ Bq}^{-1}\text{s}^{-1} \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}}$ $\frac{\eta_{\rm Cs}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{A_{\rm Sr}^{\rm sn}(\text{seawater})}$ $\frac{A_{\rm Sr}^{\rm sin}(\text{seafood})}{L_{\rm Ogic}(6): Trigg}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}}$ $\eta_{\rm Sr}$ $\eta_{\rm K}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}}/\eta_{\rm Cs}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{ stat}) \pm 0.08 (\text{ sys}) \text{ Bq kg}^{-1} \\ \hline 6.56 \pm 0.01 (\text{ stat}) \pm 1.35 (\text{ sys}) \text{ Bq kg}^{-1} \\ \hline 6.56 \pm 0.01 (\text{ stat}) \pm 1.35 (\text{ sys}) \text{ Bq kg}^{-1} \\ \hline 1.80 \pm 0.05(\text{ stat}) \pm 0.37(\text{ sys})] \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \\ [2.30 \pm 0.49(\text{ stat}) \pm 0.46(\text{ sys})] \times 10^{-6} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.57 \pm 2.58(\text{ stat}) \pm 0.01(\text{ sys})] \times 10^{-5} \text{ Bq}^{-1}\text{s}^{-1} \\ 800 \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2 (\text{NDF}}{A_{\rm Sr}^{\min}(\text{seawater})}$ $\frac{A_{\rm Sr}^{\min}(\text{seawater})}{M_{\rm Sr}^{\min}(\text{seafood})}$ $\frac{\text{Logic (6): Trigg}}{N_{\rm BG}}$ $\eta_{\rm Sr}$ $\eta_{\rm Cs}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$	$\begin{array}{l} \hline 28795.6 \pm 131.0 \ {\rm cph} \\ \hline [2.47 \pm 0.01({\rm stat}) \pm 0.51({\rm sys})] \times 10^{-1} \ {\rm Bq}^{-1}{\rm s}^{-1} \\ \hline [6.75 \pm 0.01({\rm stat}) \pm 0.14({\rm sys})] \times 10^{-2} \ {\rm Bq}^{-1}{\rm s}^{-1} \\ \hline [1.24 \pm 0.01({\rm stat}) \pm 0.01({\rm sys})] \times 10^{-1} \ {\rm Bq}^{-1}{\rm s}^{-1} \\ \hline [1.24 \pm 0.01({\rm stat}) \pm 0.01({\rm sys})] \times 10^{-1} \ {\rm Bq}^{-1}{\rm s}^{-1} \\ \hline [2.00] \\ \hline (2.49 \pm 0.01) \times 10^{-1} \ {\rm Bq}^{-1}{\rm s}^{-1} \\ \hline 2009 \\ \hline 0.39 \pm 0.01 \ ({\rm stat}) \pm 0.08 \ ({\rm sys}) \ {\rm Bq} \ {\rm kg}^{-1} \\ \hline 6.56 \pm 0.01 \ ({\rm stat}) \pm 1.35 \ ({\rm sys}) \ {\rm Bq} \ {\rm kg}^{-1} \\ \hline \hline 6.56 \pm 0.01 \ ({\rm stat}) \pm 1.35 \ ({\rm sys}) \ {\rm Bq} \ {\rm kg}^{-1} \\ \hline \hline 6.56 \pm 0.01 \ ({\rm stat}) \pm 1.35 \ ({\rm sys}) \ {\rm Bq} \ {\rm kg}^{-1} \\ \hline \hline 1.80 \pm 0.05 \ ({\rm stat}) \pm 0.37 \ ({\rm sys})] \times 10^{-3} \ {\rm Bq}^{-1}{\rm s}^{-1} \\ \hline [1.57 \pm 2.58 \ ({\rm stat}) \pm 0.01 \ ({\rm sys})] \times 10^{-5} \ {\rm Bq}^{-1}{\rm s}^{-1} \\ \hline 800 \\ 114 \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{\Lambda_{\rm Sr}^{\rm min}({\rm seawater})}$ $\frac{A_{\rm min}({\rm seafood})}{M_{\rm Sr}}$ $\frac{L_{\rm Ogic}(6): Trigg}{\eta_{\rm Sr}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{ stat}) \pm 0.08 (\text{ sys}) \text{ Bq kg}^{-1} \\ \underline{6.56 \pm 0.01 (\text{ stat}) \pm 1.35 (\text{ sys}) \text{ Bq kg}^{-1}} \\ \underline{6.56 \pm 0.01 (\text{ stat}) \pm 1.35 (\text{ sys}) \text{ Bq kg}^{-1}} \\ \underline{1.80 \pm 0.05(\text{ stat}) \pm 0.37(\text{ sys})] \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1}} \\ [1.80 \pm 0.05(\text{ stat}) \pm 0.46(\text{ sys})] \times 10^{-6} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.57 \pm 2.58(\text{ stat}) \pm 0.01(\text{ sys})] \times 10^{-5} \text{ Bq}^{-1}\text{s}^{-1} \\ 800 \\ 114 \\ (1.74 \pm 0.04) \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm Cs}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{\Lambda_{\rm Sr}^{\rm min}({\rm seawater})}$ $\frac{\Lambda_{\rm Sr}^{\rm min}({\rm seawater})}{\Lambda_{\rm Sr}^{\rm min}({\rm seawater})}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}/\eta_{\rm Cs}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{\chi^2/{\rm NDF}}$	$\begin{array}{l} \hline 28795.6 \pm 131.0 \ {\rm cph} \\ \hline [2.47 \pm 0.01({\rm stat}) \pm 0.51({\rm sys})] \times 10^{-1} \ {\rm Bq^{-1}s^{-1}} \\ \hline [6.75 \pm 0.01({\rm stat}) \pm 0.14({\rm sys})] \times 10^{-2} \ {\rm Bq^{-1}s^{-1}} \\ \hline [1.24 \pm 0.01({\rm stat}) \pm 0.01({\rm sys})] \times 10^{-1} \ {\rm Bq^{-1}s^{-1}} \\ \hline [1.24 \pm 0.01({\rm stat}) \pm 0.01({\rm sys})] \times 10^{-1} \ {\rm Bq^{-1}s^{-1}} \\ \hline [2.00] \\ \hline (2.49 \pm 0.01) \times 10^{-1} \ {\rm Bq^{-1}s^{-1}} \\ \hline 20/9 \\ \hline 0.39 \pm 0.01 \ ({\rm stat}) \pm 0.08 \ ({\rm sys}) \ {\rm Bq} \ {\rm kg^{-1}} \\ \hline \hline 6.56 \pm 0.01 \ ({\rm stat}) \pm 1.35 \ ({\rm sys}) \ {\rm Bq} \ {\rm kg^{-1}} \\ \hline \hline \hline 6.56 \pm 0.01 \ ({\rm stat}) \pm 1.35 \ ({\rm sys}) \ {\rm Bq} \ {\rm kg^{-1}} \\ \hline \hline \hline 1.80 \pm 0.05({\rm stat}) \pm 0.37({\rm sys})] \times 10^{-3} \ {\rm Bq^{-1}s^{-1}} \\ \hline [1.57 \pm 2.58({\rm stat}) \pm 0.04({\rm sys})] \times 10^{-5} \ {\rm Bq^{-1}s^{-1}} \\ \hline 800 \\ 114 \\ \hline (1.74 \pm 0.04) \times 10^{-3} \ {\rm Bq^{-1}s^{-1}} \\ 2.69 \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{\Lambda_{\rm Sr}^{\rm min}({\rm seatool})}$ $\frac{L_{\rm Ogic}(6):Trigg}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{\chi^2/{\rm NDF}}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{stat}) \pm 0.08 (\text{sys}) \text{ Bq kg}^{-1} \\ \hline 6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1} \\ \hline 6.56 \pm 0.01 (\text{stat}) \pm 1.35 (\text{sys}) \text{ Bq kg}^{-1} \\ \hline 1.80 \pm 0.05(\text{stat}) \pm 0.37(\text{sys})] \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.57 \pm 2.58(\text{stat}) \pm 0.46(\text{sys})] \times 10^{-5} \text{ Bq}^{-1}\text{s}^{-1} \\ \hline 800 \\ 114 \\ (1.74 \pm 0.04) \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \\ 2.6/9 \\ 7.42 \pm 0.08 (\text{stat}) \pm 1.52 (\text{sys}) \text{ Bq kg}^{-1} \end{array}$
$\frac{N_{\rm BG}}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{\Lambda_{\rm Sr}^{\rm min}({\rm seawater})}$ $\frac{\Lambda_{\rm Sr}^{\rm min}({\rm seawater})}{\Lambda_{\rm Sr}^{\rm min}({\rm seafood})}$ $\frac{{\rm Logic}~(6):~Trigg}{N_{\rm BG}}$ $\frac{\eta_{\rm Sr}}{\eta_{\rm Cs}}$ $\frac{\eta_{\rm K}}{\eta_{\rm Sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{\Lambda_{\rm Sr}^{\rm sr}/\eta_{\rm K}}$ The inclination $\frac{\chi^2/{\rm NDF}}{\Lambda_{\rm Sr}^{\rm sr}({\rm seawater})}$	$\begin{array}{l} 28795.6 \pm 131.0 \text{ cph} \\ [2.47 \pm 0.01(\text{stat}) \pm 0.51(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ [6.75 \pm 0.01(\text{stat}) \pm 0.14(\text{sys})] \times 10^{-2} \text{ Bq}^{-1}\text{s}^{-1} \\ [1.24 \pm 0.01(\text{stat}) \pm 0.01(\text{sys})] \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 3.67 \\ 2.00 \\ (2.49 \pm 0.01) \times 10^{-1} \text{ Bq}^{-1}\text{s}^{-1} \\ 20/9 \\ 0.39 \pm 0.01 (\text{ stat}) \pm 0.08 (\text{ sys}) \text{ Bq kg}^{-1} \\ \hline 6.56 \pm 0.01 (\text{ stat}) \pm 1.35 (\text{ sys}) \text{ Bq kg}^{-1} \\ \hline 6.56 \pm 0.01 (\text{ stat}) \pm 1.35 (\text{ sys}) \text{ Bq kg}^{-1} \\ \hline 1.80 \pm 0.05(\text{ stat}) \pm 0.37(\text{ sys})] \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \\ [2.30 \pm 0.49(\text{ stat}) \pm 0.46(\text{ sys})] \times 10^{-6} \text{ Bq}^{-1}\text{s}^{-1} \\ \hline 1.57 \pm 2.58(\text{ stat}) \pm 0.01(\text{ sys})] \times 10^{-5} \text{ Bq}^{-1}\text{s}^{-1} \\ \hline 800 \\ 114 \\ (1.74 \pm 0.04) \times 10^{-3} \text{ Bq}^{-1}\text{s}^{-1} \\ 2.69 \\ 7.42 \pm 0.08 (\text{ stat}) \pm 1.52 (\text{ sys}) \text{ Bq kg}^{-1} \\ 223 \pm 2 (\text{ stat}) \pm 46 (\text{ sys}) \text{ Bg kg}^{-1} \\ \end{array}$

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2017/01/11

 $Trigger \cap \overline{VETO}$

Trigger $\cap A C(M \ge 2)$









平均 $(1.11 \pm 0.53) \times 10^{-3} \text{ Bq}^{-1} \text{ s}^{-1}$

STUDY OF RTSC

応答線形性が良いので計数頻度から試 料の放射能濃度が見積もれる

Q. 検出限界を評価するうえで、有効面積をどう定義するか?

1) 端の感度は悪いが全面使用する。

 $A_{\rm Sr}^{\rm min}({\rm water}) = 2.74 \pm 1.27 \; {\rm Bq/kg}$ $A_{\rm Sr}^{\rm min}({\rm fish}) = 81.8 \pm 38.0 \; {\rm Bq/kg}$

2) 感度良い場所が有効面積である。

 $A_{\rm Sr}^{\rm min}({\rm water}) = 6.83 \pm 0.15 \text{ Bq/kg}$ $A_{\rm Sr}^{\rm min}({\rm fish}) = 204 \pm 4 \text{ Bq/kg}$

A. 検出限界を低くするためには1)が良 さそう。有効面積は100 mm x 300 mm

STUDY OF RTSC

RTSCの今後の研究方針

RTSC-A ver. 1.2 upgrade

- Shielding lead blocks <<<<<<< Getting Lead plates, 1/18 @ KEK
- Low background test
- performance Estimation on High-End
- if $N_{BG}=1$, $A_{sr}^{min}(fish)=5.4Bq/kg$ is expected.

Type B Development

- using PS-PMT
- Prototype Schedule (by April) Supported from REPIC (¥1.0M)

-> Detecting beta-ray from 214Bi in air -> study and search for cause of Lung Cancers

-> Measuring contamination concentration of 90Sr in seafood -> Go to Fukushima

Let's works together.

2017/01/11

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This month works

研究

RTSC-A

- 鉛遮蔽効果の検証実験
- 214Biβ線の感度と放射能測定
- 論文執筆

雑務

- 医物報文集1/12〆切
- 1/13 KEK出張
- 1/18 KEK出張、鉛運搬
- 1/23 E号棟真鍮運搬

Lung Cancer

- BGO test 継続的に測定
- G4 シミユ: 214Bi + 40K放射能推定

J-PARC E36実験

- CsI(TI) 波形解析コードデバッグ
- アルゴリズムupgrade
- Energy calibration
- 論文執筆開始