fragment PI

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概 要

I show the analysis of fragment PI briefly.
・fragment PI method
・fragment PI(^{24}O,^{23}O beam run)
・level scheme of ^{20}O,^{21}O,^{22}O
・Mass spectrum(^{24}O,^{23}O beam run)

1 fragment PI method

I used following gate.

・BEAM trigger
・beam@F2 : Z=8 beam
・target size @NDC : ϕ 40.0 mm
・VETO : no hit

$$\frac{\Delta \mathrm{Brho}}{\mathrm{Brho}} = \tan\theta_{\mathrm{f}} - (\mathrm{A}_1 + \mathrm{B}_1 * (\mathrm{x}_{\mathrm{f}} - \mathrm{x}_{\mathrm{tgt}})) \tag{1}$$

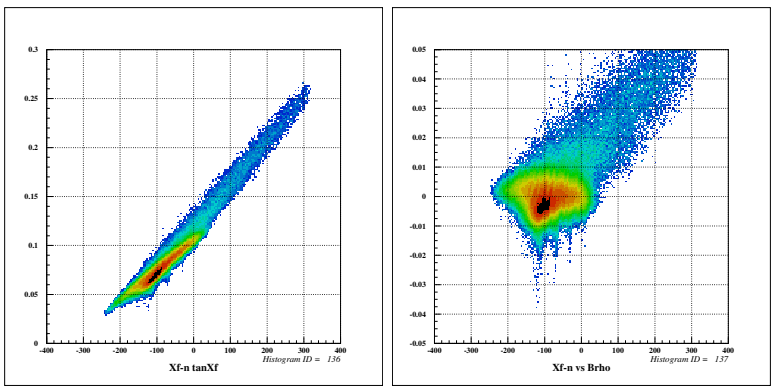


図 1: $x_f - x_{tgt}$ vs $\tan\theta_f$

Then, I used following gate.

・BEAM trigger

・beam@F2 : ^{24}O beam(^{24}O beam run), ^{23}O beam(^{23}O beam run)

・target size @NDC : ϕ 40.0 mm

・VETO : no hit

$$\text{mass(a.u.)} = \frac{\Delta\text{Brho}}{\text{Brho}} - (\text{A}_2 + \text{B}_2 * \text{TOF(tgt} - \text{HODO)}) \tag{2}$$

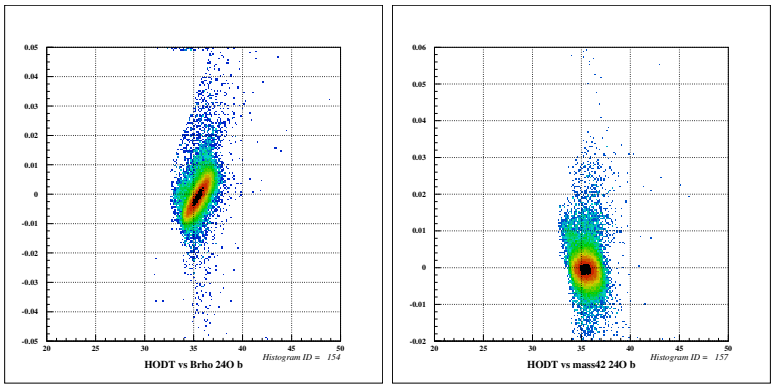


図 2: HODT vs Brho(a.u.)

2 fragment PI(^{24}O,^{23}O beam run)

I saw 'mass(a.u.)' with the following gate.

・BEAM × NEUT trigger

・beam@F2 : ^{24}O beam(^{24}O beam run), ^{23}O beam(^{23}O beam run)

・target size @NDC : ϕ 40.0 mm

・VETO : no hit ・NEUT : multiplicity = 1,2,3,$\cdots$

・NEUT : pulse height of QDC $\geq$ 6.0MeVee

・HODO : Z=8 (using only ID=2,3,4,5)

Then, I saw mass(a.u.) vs Energy of gamma-ray with the added gate.

・BEAM × GAMMA trigger

・GAMMA : multiplicity = 1

※ I didn't change parameters about DALI. So, I used same parameters about DALI with online analysis.

I think that the big peak of mass(a.u.) spectrum in ^{24}O beam run is not ^{23}O and it's ^{22}O, because we can see energy of gamma-ray corresponding 1383keV,3199keV gamma-ray from ^{22}O in this big peak. Also we can see similar Egamma spectrum in ^{22}O-fragment gate in ^{23}O beam run.

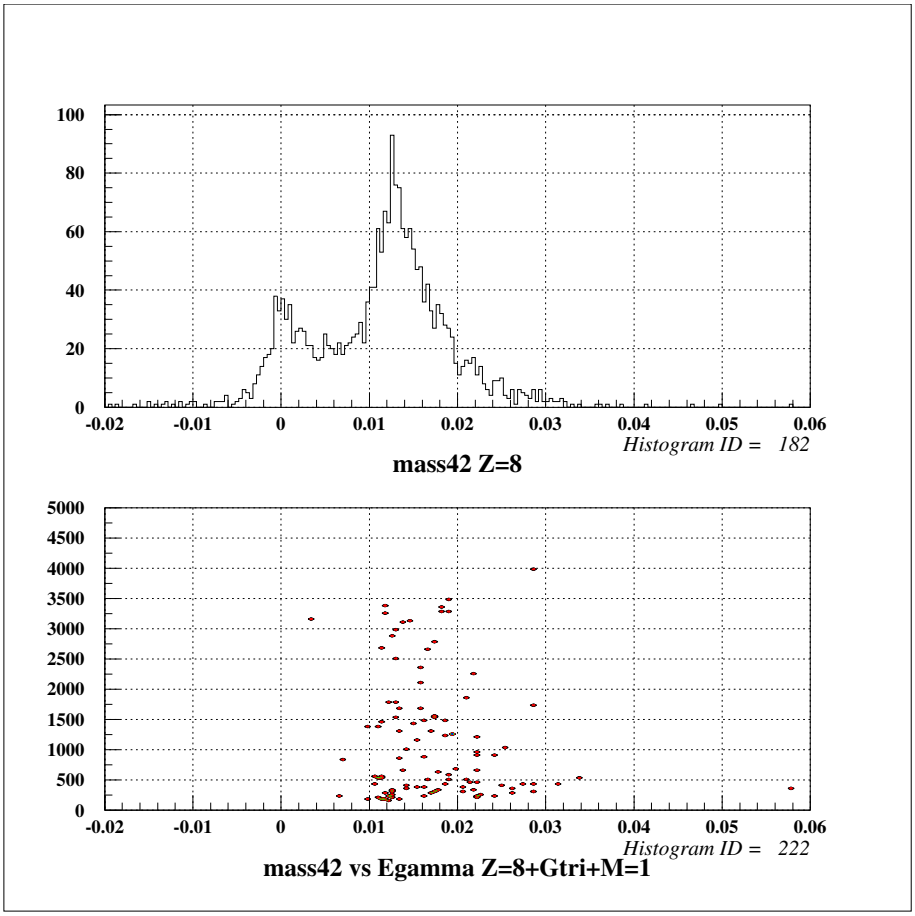


図 3: fragment PI in 24O beam run. We can see gamma ray corresponded 1383keV,3199keV gamma-ray from ^{22}O.

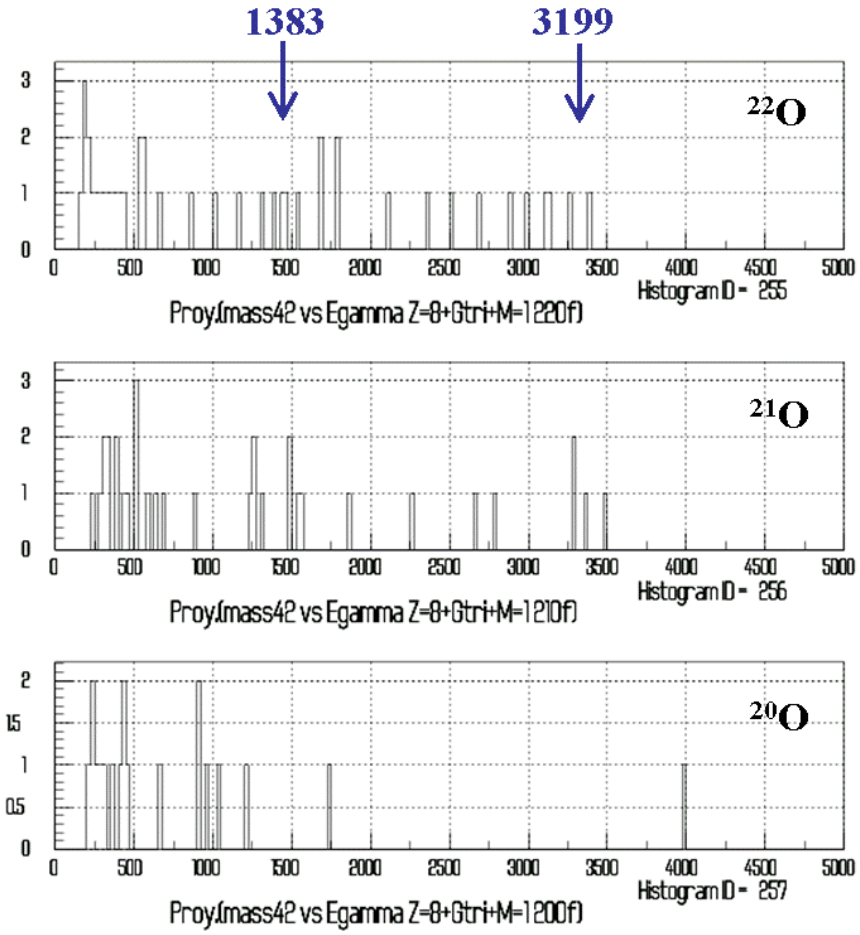


図 4: Egamma spectrum in 24O beam run with ^{22}O,^{21}O,^{20}O gate.

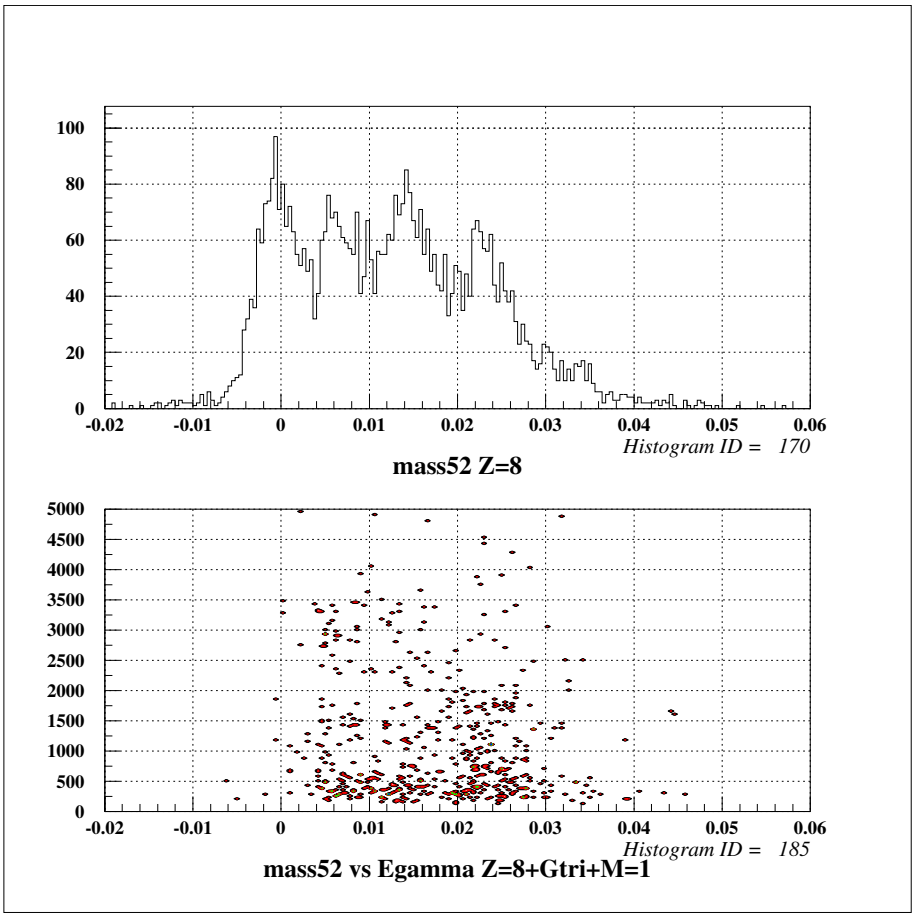


図 5: fragment PI in 23O beam run. We can see gamma ray corresponded 1383keV,3199keV gamma-ray from ^{22}O and 1675keV gamma-ray from ^{20}O.

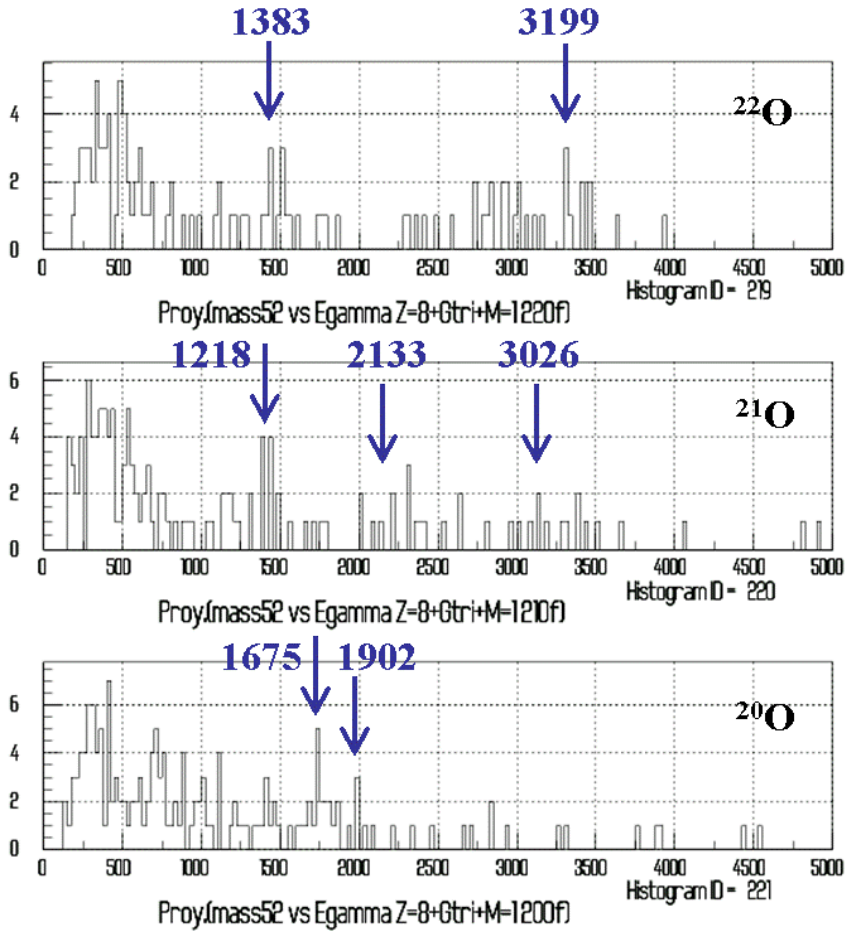


図 6: Egamma spectrum in 23O beam run with ^{22}O,^{21}O,^{20}O gate.

I saw 'mass(a.u.)' with the following gate without neutron-gate.

・BEAM trigger

・beam@F2 : ^{24}O beam(^{24}O beam run), ^{23}O beam(^{23}O beam run)

・target size @NDC : ϕ 40.0 mm

・VETO : no hit ・HODO : Z=8 (using only ID=2,3,4,5)

Then, I saw mass(a.u.) vs Energy of gamma-ray with the added gate.

・BEAM × GAMMA trigger

・GAMMA : multiplicity = 1

※ I didn't change parameters about DALI. So, I used same parameters about DALI with online analysis.

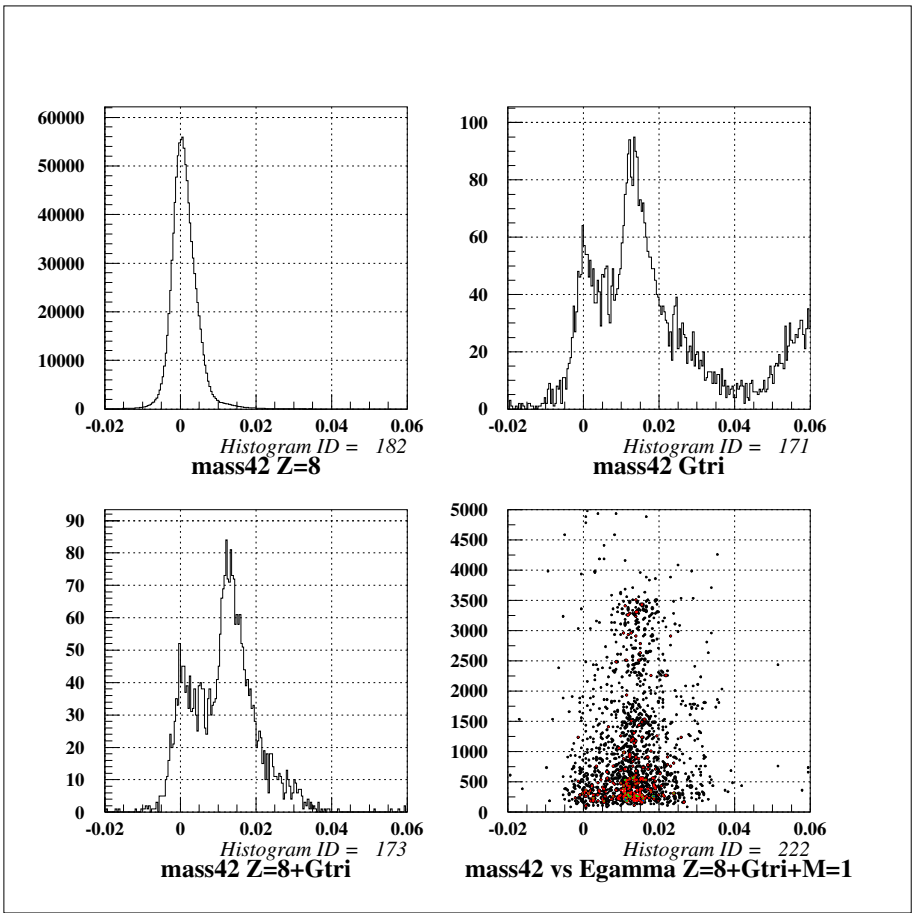


図 7: fragment PI in 24O beam run. We can see gamma ray corresponded 1383keV,3199keV gamma-ray from ^{22}O.

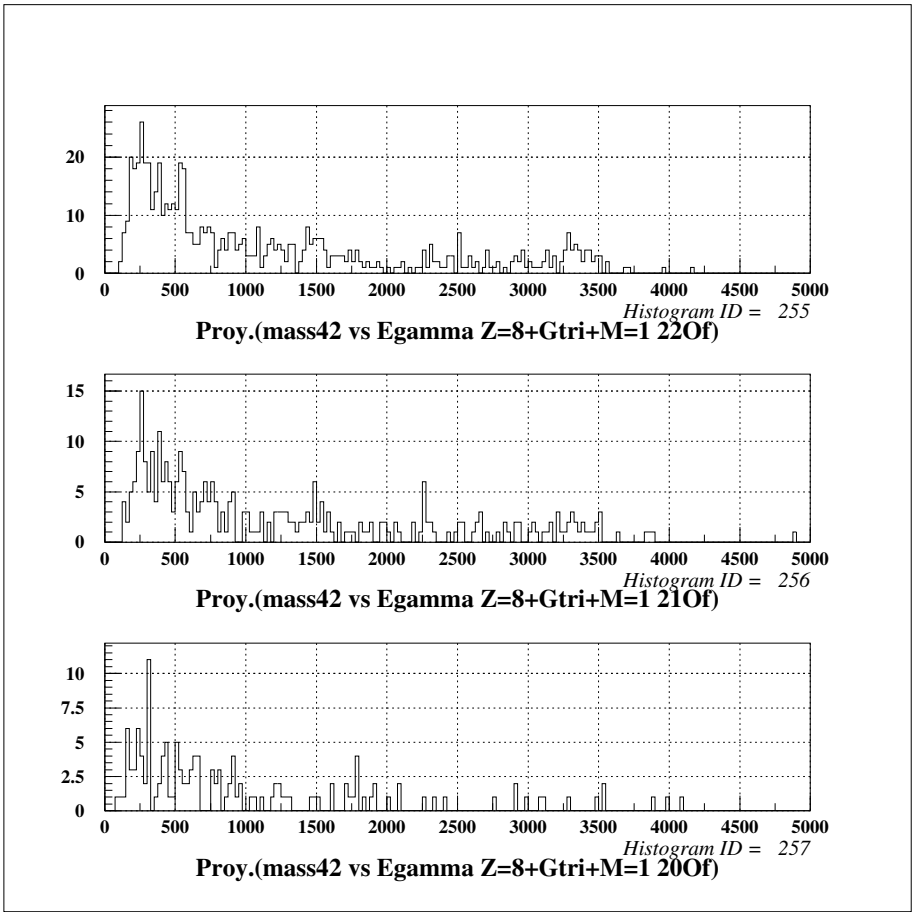


図 8: Egamma spectrum in 24O beam run with ^{22}O,^{21}O,^{20}O gate.

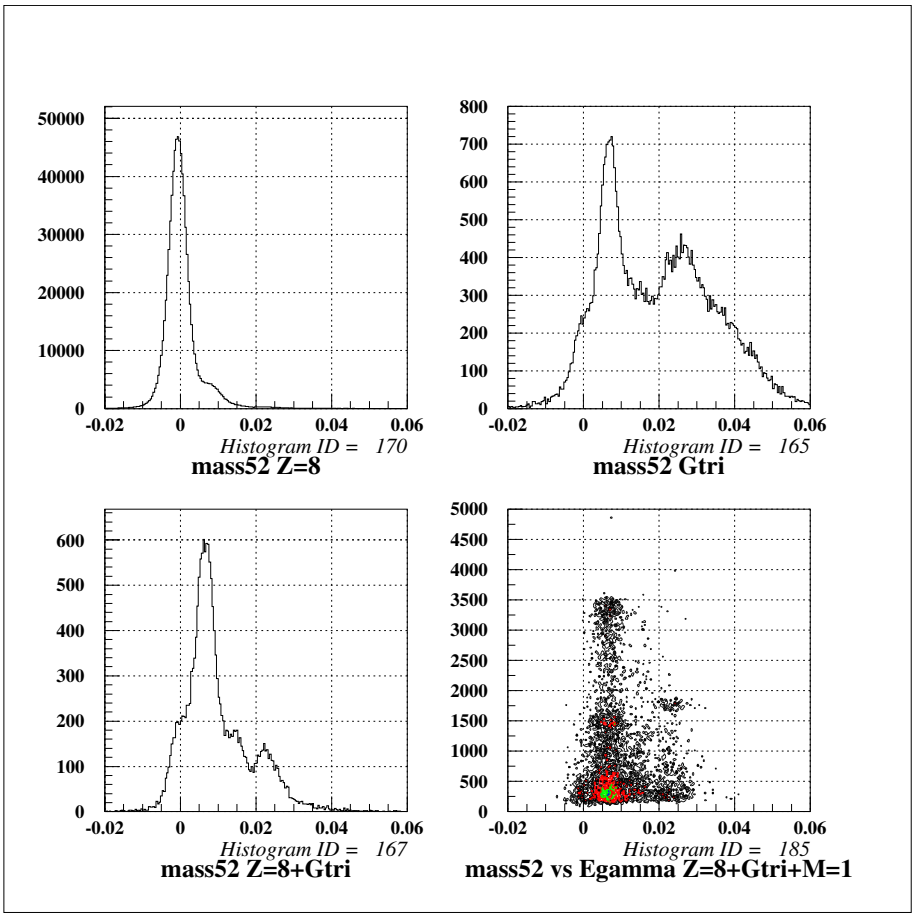


図 9: fragment PI in 23O beam run. We can see gamma ray corresponded 1383keV,3199keV gamma-ray from ^{22}O and 1675keV gamma-ray from ^{20}O.

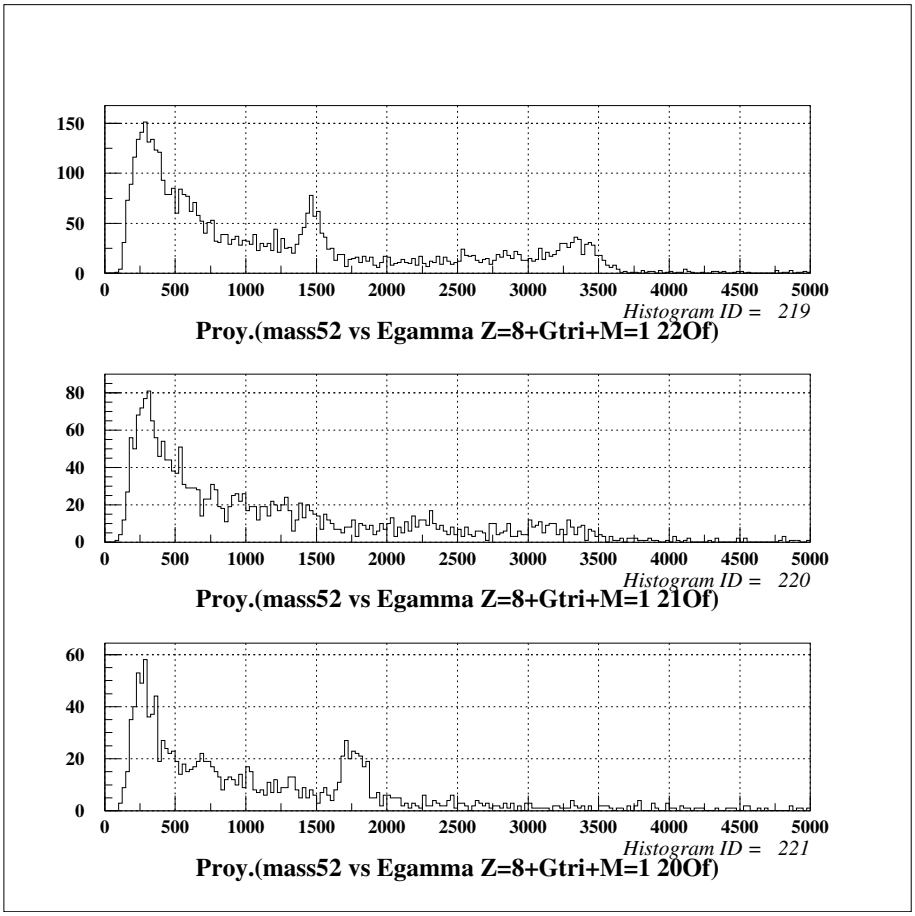
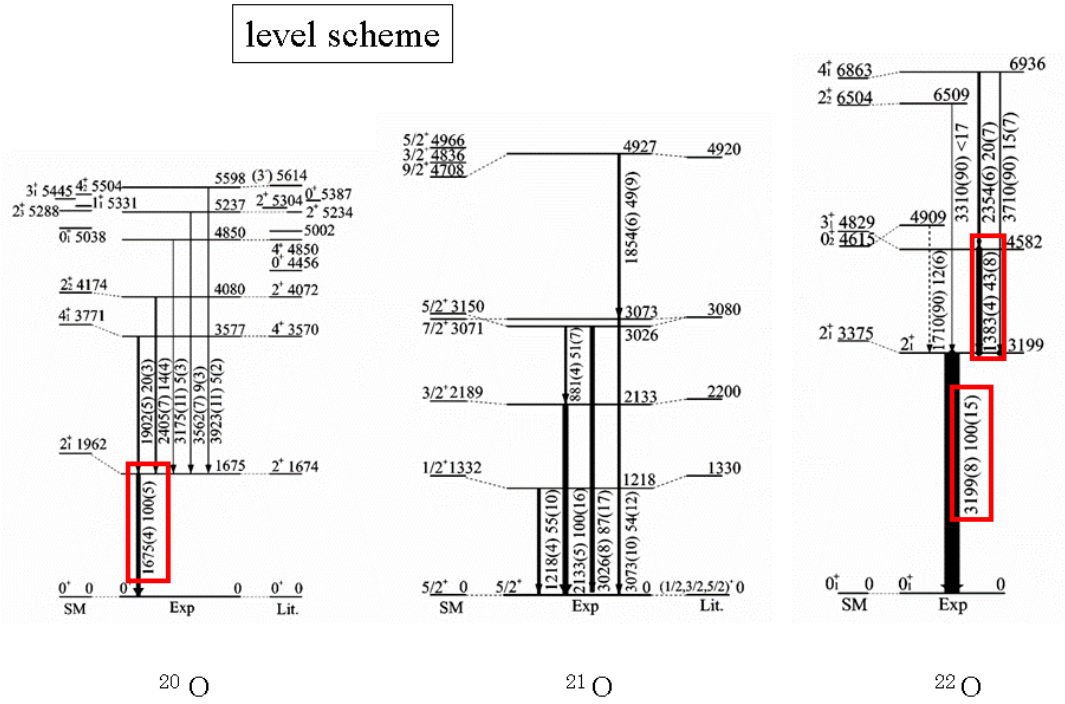


図 10: Egamma spectrum in 23O beam run with ^{22}O,^{21}O,^{20}O gate.

3 level scheme of ^{20}O,^{21}O,^{22}O



ref : M.Stanoiu *et al.* , Phys. Rev. C **69**, 034312 (2004)

図 11: level scheme of ^{20}O,^{21}O,^{22}O.

reference : M.Stanoiu *et al.*, Phys.Rev.C **69**. 034312(2004)

4 Mass spectrum(^{24}O,^{23}O beam run)

I calibrated A/Z.

$$\mathrm{A/Z} = \mathrm{P}_1 * \mathrm{mass(a.u.)} + \mathrm{P}_2 \tag{3}$$

And I got A.

$$\mathrm{A} = \mathrm{A/Z} * 8. \tag{4}$$

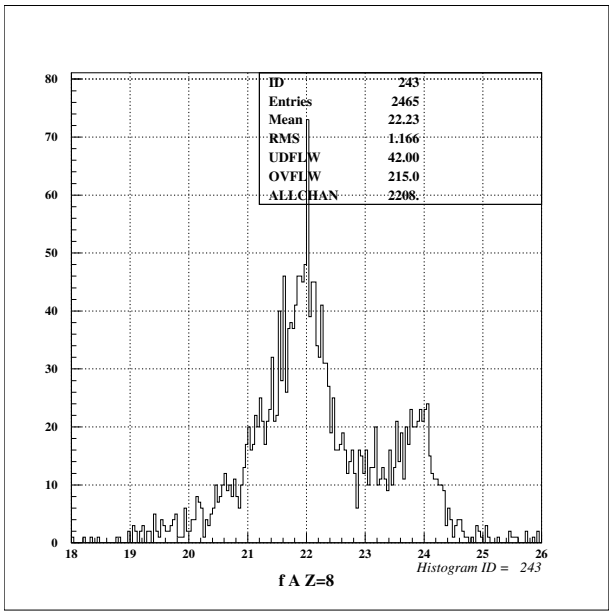


図 12: mass spectrum of fragment particles in ^{24}O beam run

fragment	A	ΔA(FWHM)	A/ΔA
^{24}O	23.86	0.7987	29.87
^{23}O			
^{22}O	21.94	1.000	21.94

表 1: mass resolution of fragment particles in ^{24}O beam run

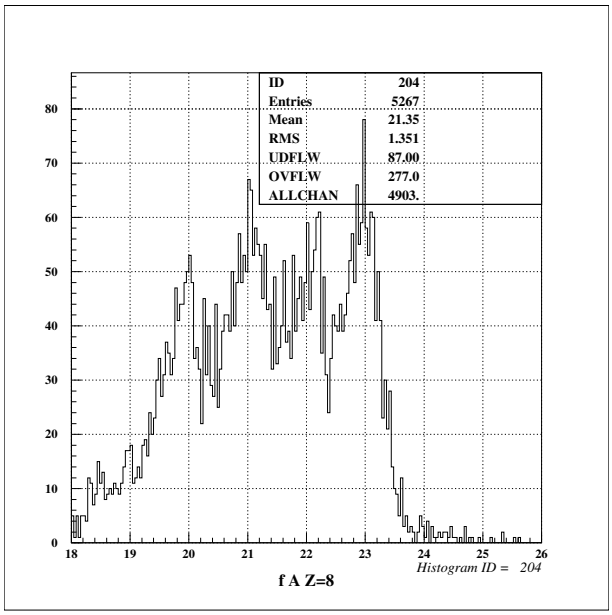


図 13: mass spectrum of fragment particles in ^{23}O beam run

fragment	A	ΔA(FWHM)	A/ΔA
^{23}O	22.93	0.7594	30.19
^{22}O	22.03	0.8558	25.74
^{21}O	21.04	1.125	18.70
^{20}O	19.88	0.8842	22.48

表 2: mass resolution of fragment particles in ^{23}O beam run